SLR-KN – 1

Seat No.	

M.E. (Civil-Structures Engineering) (Sem. – I) (New) Examination, 2015
(CBCS – CGPA)
Paper – I : THEORY OF ELASTICITY AND PLASTICITY

Day and Date : Monday, 21-12-2015 Total Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*

*2) **Use** of non-programmable calculators are **allowed**.*

SECTION – I

1. a) Write six compatibility equations in Cartesian coordinate for 3-D problem of elasticity. **5**

   b) Neglecting body forces find constraints A, B, C for following displacement field which satisfies the equilibrium. **12**

   $u = 0$, $v = Ayz$, $w = By^2 + Cz^2$.

2. a) Find stress distribution in a thick cylinder subjected to internal bursting pressure 10 MPa. Take inner and outer radii as 300 mm and 400 mm respectively. Hence find the maximum shear stress developed. **11**

   b) Prove that the stress function ϕ_1 represents the same stress distribution as given by ϕ in polar system when $\phi_1 = \phi + (A\cos\theta + B\sin\theta)r + C$ where A, B and C are arbitrary constants. **7**

3. a) Find the principal stresses developed for following state of stress at a point
   $\sigma_x = 120$ MPa, $\sigma_y = 90$ MPa, $\sigma_z = 110$ MPa
   $\tau_{xy} = 60$ MPa, $\tau_{yz} = 40$ MPa, $\tau_{zx} = 70$ MPa **11**

   b) Derive differential equation of equilibrium for a 2-D problem of elasticity in Polar Coordinate System. **6**

P.T.O.

SECTION – II

4. a) Write a short note on "Membrane Analogy". **6**

   b) Find shear stresses in a bar with elliptical cross section subjected to end torsion. **12**

5. a) Explain Partial, Complete and Over-Complete Collapse. **5**

   b) Sketch zones with alternatively positive and negative warp for following cross-section of a shaft subject to torque "T".

      i) Equilateral triangle

      ii) Rectangle with D/b = 1.4

      iii) Square

      iv) Rectangle with D/b = 2. **5**

   c) Find Collapse load for a simply supported circular plate subject to a concentrated load at centre. **8**

6. a) Write a note on – Idealized material behavior in plasticity. **6**

   b) State of stress at which a strained material yields is

      $\sigma_x = 130$ MPa, $\sigma_y = -10$ MPa, $\tau_{xy} = 60$ MPa

      Find the stress in unidirectional tension using Tresca as well as Mises criterion. **11**

SLR-KN – 2

Seat No.	

M.E. (Civil – Structure) (Semester – I) Examination, 2015
(New) (CBCS/CGPA)
Paper – II : MECHANICS OF STRUCTURES

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

N.B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) Assume suitable data if necessary and mention it ***clearly****.*

1. Draw ILD for R_A, R_B, M_A and M_B of fixed beam shown in figure 1. **12**

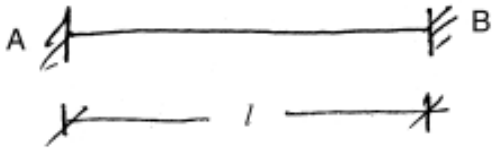


Figure 1

OR

1. Draw ILD for horizontal thrust in a two hinged parabolic arch of span 'L' and rise H. **12**

2. Draw SFD and BMD for the beam curved in plan as shown in figure 2. Assume ratio of flexural rigidity to torsional rigidity as 1.25. Also find max deflection in the beam i.e. at point C. **12**

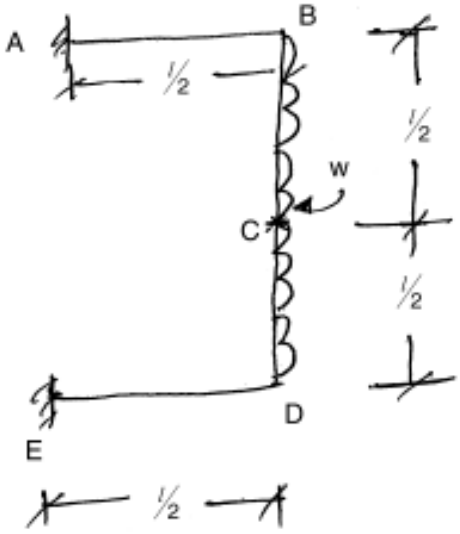


Figure 2

P.T.O.

3. Draw SFD, BMD deflection and foundation pressure diagram for a semi-infinite beam on elastic foundation fixed at one end and subjected to UDL of 'W' throughout the length. **11**

OR

3. Draw SFD, BMD deflection and foundation pressure diagram for a semi-infinite beam on elastic foundation hinged at one end and subjected to UDL of 'W' throughout length. **11**

SECTION – II

4. A beam column fixed at both the ends is subjected to an axial compressive force 'P' at both the ends. Its one end sinks down by 'δ' as compared to the other end. Derive expression for the fixed end moments at both the ends. **11**

5. Analyse the continuous beam as shown in figure 3 by stiffness method. Draw BMD. **12**

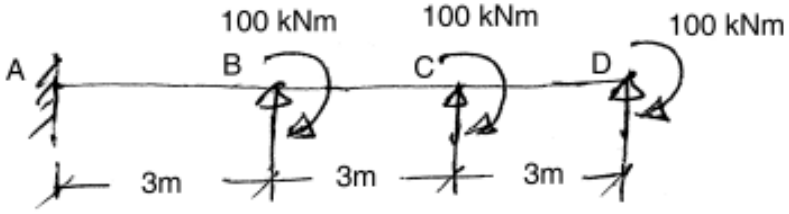


Figure 3

OR

5. Analyse the frame as shown in figure 4 by stiffness method. Draw BMD. **12**

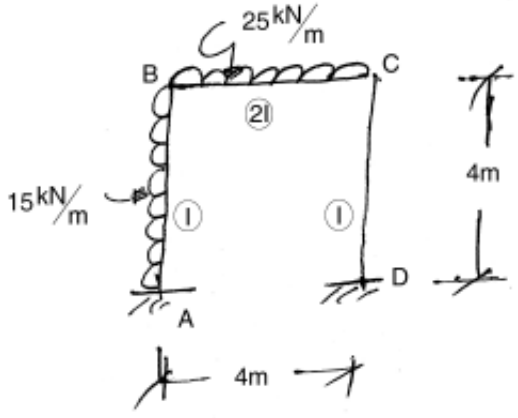


Figure 4

6. a) Write a note on properties of stiffness matrix. **4**

   b) Derive member oriented stiffness matrix for a member of pin jointed plane frame. Transform this matrix to structure oriented axis by using concept of rotation of axis. **8**

———————

SLR-KN – 3

Seat No.	

M.E. (Civil-Structures) (Semester – I) (New) Examination, 2015
(CBCS – CGPA)
Paper – III : ADVANCED DESIGN OF CONCRETE STRUCTURES

Day and Date : Saturday, 26-12-2015 Total Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

***Instructions** : 1) Answer **any two** questions from **each** Section.*

*2) **Assume** suitable data **if necessary**.*

*3) **Use** of calculator and IS 456, IS 3370 Part IV are **allowed**.*

*4) **Neat** sketch should be drawn **wherever** necessary.*

SECTION – I

1. Design a typical interior panel of a flat slab of size 4.6 m × 4.6 m without providing a drop and column head. Size of column in 450 mm × 450 mm and live load on panel in 4 kN/m^2. Take floor finish of 1 kN/m^2. Use M20 concrete and Fe 500 steel. Sketch the reinforcement details by sharing cross sections of column and middle strip. **17**

2. Two reinforced concrete columns 450 mm × 450 mm are to carry a load of 1200 kN each, inclusive of self weight. Design a combined rectangular footing having central beam joining the columns. The centre to centre spacing of column is 3.8 m. The safe bearing capacity of soil is 160 kN/m^2. Use M20 concrete and Fe 500 steel. **17**

3. Design a circular tank of capacity 11 lakh litres. The depth of water tank including free board is restricted to 3.6 m. The joint between floor and wall of the tank is rigid. I.S. code method of design. Use M25 concrete and Fe500 steel. **18**

P.T.O.

SECTION – II

4. a) Explain the advantages and disadvantages of prestressed concrete over reinforced concrete. **6**

   b) A PSC beam provided with parabolic profile tendon has a simply supported span of 6 m. The beam has a rectangular cross section of 250 mm × 550 mm. The total external load on the beam is 40 kN/m on whole span and the tendon carries a prestressing force of 1400 kN. The parabolic tendon has 120 mm eccentricity at mid span. Calculate the extreme fiber stresses for mid span section using stress concept, strength concept and load balancing concept. **11**

5. a) A prestressed concrete pile 350 mm × 350 mm is prestressed by 40 wires of 2 mm diameter. The wires are uniformly distributed over the section. The wires are initially subjected to a pull of 250 kN. Find the final prestress in the concrete after all losses. Take $Es = 2 \times 10^5$ mm^2, $Ec = 3 \times 10^{-4}$ mm^2, relaxation loss = 5%, shrinkage strain = 1.9×10^{-4}, creep strain = 28×10^{-6} per mm^2 of stress. **9**

   b) The end block of a port tensioned member is 300 mm wide and 600 mm deep is subjected to an axial prestress force 1250 kN. Design the end block by Guyon's method. **8**

6. A prestressed tank of diameter 15 m has to resist an internal head of 4.2 m of water. Find the reinforcement required per meter height and the thickness of concrete required. Take ultimate strength of concrete as 35 MPa, safe stress in concrete at transfer as 0.5 times ultimate stress, safe stress in concrete at service condition shall remain compressive, stress in steel is 1000 N/mm^2, loss of prestress is 18%, modular ratio is 8. **18**

———————

SLR-KN – 4

Seat No.	

M.E. Civil-Structure (Semester – I) (New) (CBCS/CGPA) Examination, 2015
Paper – IV : DYNAMICS OF STRUCTURES

Day and Date : Monday, 28-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

***Instructions**: 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

1. From the first principle derive the governing differential equation for damped forced vibrations. Obtain the complete solution of differential equation if the system is under critically damped. **18**

2. Derive an expression for force transmitted to foundation by a reciprocating type of machine exerting an external force $F(t) = F\sin(\omega_f t)$. Plot the graph of transmissibility vs frequency ratio for the damping ratio R = 2% & 20%. **17**

3. Derive the expression for Duhamel's integral for damped system. From this expression derive the expression for Duhamel's integral for the undamped system. **17**

SECTION – II

4. For a rigid frame shown in fig. 1, write the equations and calculate the first frequency of vibration and corresponding model shape. Take K = 1000 KN/m. **18**

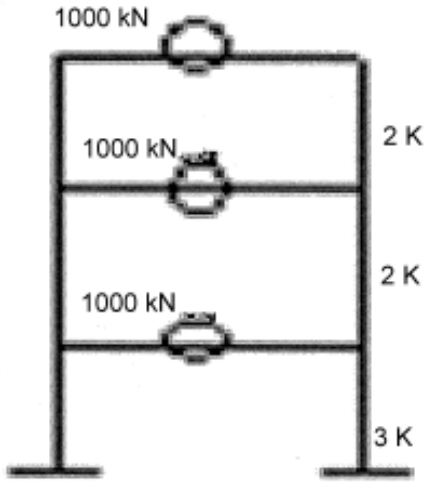


Figure 1

P.T.O.

5. What is MDOF system ? Derive generalized equation of motion for MDOF system for damped forced vibration. **17**

6. a) Develop a basic differential equation of motion for a simply supported beam of span 'L' and mass 'm' per unit length. **9**

   b) Derive from basic principle the equations to calculate displacement in a multi degree freedom system. **8**

SLR-KN – 5

Seat No.	

M.E. (Civil Structures) (Semester – I) (New) (CBCS – CGPA) Examination, 2015
Paper – V (Elective – I) : DESIGN OF FOUNDATIONS

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Make suitable assumption, ***if necessary*** *and mention it* ***clearly****.*

3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. A) A square footing 2.5 m × 2.5 m is built in a homogeneous bed of sand of unit weight 20 kN/m^3 and having an angle of shearing resistance of 36°. The depth of the foundation is 1.5 m below the ground surface. Calculate the safe load that can carried by a footing with factor of safety of 3 against complete shear failure. Use Terzaghi's analysis. **8**

   B) Explain various types of shear failure of soil. **4**

2. A) Explain under which circumstances combined footing is used. **4**

   B) Design a rectangular combined footing to support two adjacent columns (size 50 cm × 50 cm) at a distance of 3.5 m and carrying a load of 750 kN and 1000 kN. The cantilever portion available from centre line of lighter column is 1.2 m up to property line. Assume allowable soil pressure as 225 kN/m^2. Use M-20 Grade of concrete and Fe-415 steel. **8**

3. A) Describe in detail rigid and flexible approach for the design of raft foundation. **8**

   B) Explain under which circumstances raft foundation is used ? **3**

P.T.O.

SECTION – II

4. A) Explain types of piles with neat sketch. **4**

   B) A column carrying an axial load of 950 kN is supported by two piles of 400 mm in diameter. Spacing of the pile is 1.3 m centre to centre. Design the pile cap for M20 grade of concrete and Fe415 grade steel. Show reinforcement in pile cap with neat sketch. **8**

5. A) Explain various forces acting on well foundation. **6**

   B) Describe the advantages and disadvantages of drilled piers. **6**

6. A) Discuss the criteria for design of machine foundation. **3**

   B) Describe various types of machine foundation. **4**

   C) What do you understand by vibration isolators ? Explain in detail. **4**

———————

SLR-KN – 6

Seat No.	

M.E. (Civil Structures)(New) Semester – I Examination, 2015
Elective- I – ADVANCES IN CONCRETE COMPOSITES
(CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

Note : *Answer* ***any two full*** *questions from* ***each*** *Section.*

SECTION – I

1. a) Enlist different methods of construction of Ferro cement concrete. Explain any one in detail. **9**

   b) Explain behaviour of Fibre Reinforced Concrete under compression. **9**

2. a) What is the different workability tests used for Fibre Reinforced Concrete ? Explain any one in detail. **9**

   b) What are the mechanical properties of materials used in Ferro cement concrete ? **9**

3. a) What are the applications of Ferro cement concrete ? **(6×3=18)**

   b) What are the differences between Fibre Reinforced Concrete and Ferro cement concrete ?

   c) Explain applications of Fibre reinforced concrete.

SECTION – II

4. a) Explain different physical and chemical properties of Silica Fumes. **9**

   b) Write on Mechanical properties and durability of Silica Fume concrete. **8**

5. a) Explain properties of constituent materials of Polymer Concrete. **9**

   b) Write on Polymer impregnated concrete. **8**

6. a) Explain properties of silica fume concret in fresh state. **6**

   b) Classification of polymer concrete. **5**

   c) Write on application of Polymer concrete. **6**

SLR-KN – 8

Seat No.	

M.E. (Civil) Structures (Semester – II) CGPA Examination, 2015
Paper – VI : THEORY OF PLATES AND SHELLS

Day and Date : Tuesday, 15-12-2015 Total Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

Instructions : *1) Solve **any two** questions from **each** section.*
*2) Figures to the **right** indicate **full** marks.*
3) Assume suitable data, if required and mention it clearly.
4) Use of non programmable calculators is allowed.

SECTION – I

1. a) Differentiate between thin plates and thick plates. **6**

   b) Obtain relation between bending moment and curvature in pure bending of plates. **12**

2. a) Explain Levy's solution as applied to analysis of plates. **5**

   b) Using Navier's solution obtain expression for maximum deflection of a simply supported square plates subjected to patch load. **12**

3. Using finite difference method find max. deflection and max. bending moment in a uniformly loaded simply supported square plate of side a. Apply 4×4 square mesh. **17**

SECTION – II

4. a) Describe load carrying mechanism of Shells. **8**

   b) Classify shell according to their geometry. Give the applications of shells in engineering with neat sketches. **10**

5. a) Obtain equations of equilibrium using membrane theory of cylindrical shells. **10**

   b) Give stress displacement relationship for thin shells. **7**

6. Write notes on **any two**. **17**

   1) D.K.J. theory – Donnell's equation

   2) Schorer's theory – derivation of differential equation.

   3) Beam theory.

SLR-KN – 9

Seat No.	

M.E. (Civil-Structures) (Semester – II) (CGPA) Examination, 2015
Paper – VII : FINITE ELEMENT METHOD

Day and Date : Wednesday, 16-12-2015 Total Marks : 70

Time : 11.00 a.m. to 3.00 p.m.

Instructions : *1) Solve **any two** questions from Section – **I**.*

*2) In Section – **II** Q. No. **4** is **compulsory** and solve **any one** from remaining **two** questions.*

*3) **Use** of non-programmable calculator is **allowed**.*

*4) **Assume** suitable data if required and mention **clearly**.*

SECTION – I

1. For a spring assemble shown in figure 1. K_1 = 1000 N/mm, K_2 = 2000 N/mm and K_3 = 3000 N/mm, A point load of 1000 N (rightward) is acting at node 3, obtain : **18**

   i) Assemble the stiffness matrix

   ii) Displacement of node 2 and 3

   iii) The reaction forces at node 1 and 4

   iv) The forces in each spring.

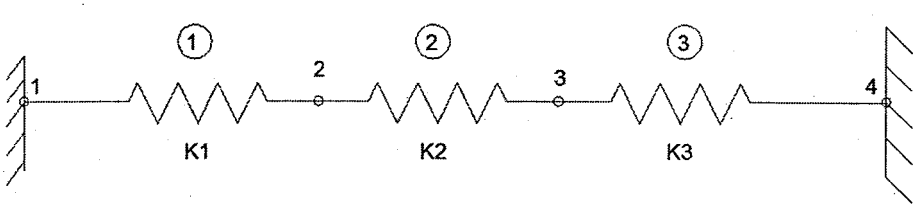


Figure 1

2. a) Write a note on weighted residuals method. **8**

   b) Develop a shape function for serendipity 8-noded element in natural co-ordinate system. **9**

P.T.O.

3. a) A beam is subjected to a uniformly distributed load of intensity w per unit length (in –y direction). Derive equivalent nodal force vector. **6**

   b) Explain Pascal's triangle for polynomial function. **6**

   c) State and explain generalized Hooke's law. **5**

SECTION – II

4. For the element having nodes 1(0, 0), 2(1, 0), 3(1, 1) and 4(0, 1), evaluate K_{11} and K_{33}, assume plain strain condition. Take E = 200 GPa, v = 0.25. (consider the global co-ordinate in meter). **18**

5. a) Explain triangular element for axi-symmetric analysis. **6**

   b) Write a note on iso-parametric, sub-parametric and super-parametric element. **6**

   c) Explain about patch test. **5**

6. a) Enlist any five shell element. **5**

   b) Write a short note on triangular plate bending element. Suggest displacement function for it. **6**

   c) Differentiate lumped mass Vs consistent mass formulation of internal properties. **6**

———————

SLR-KN – 10

Seat No.	

M.E. (Civil Structure) (Semester – II) (CGPA) Examination, 2015
Paper – VIII : EARTHQUAKE ENGINEERING

Day and Date : Thursday, 17-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 3.00 p.m.

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) **Use** of IS 1893 and IS 456 is **permitted**.*
*3) Figures to **right** indicate **full** marks.*
*4) Assume suitable data if **necessary** and state it **clearly**.*

SECTION – I

1. a) Explain in detail the general effects produced by an earthquake. **7**

   b) What do you understand by tectonic causes of an earthquake ? Explain various theories related to tectonic causes. **10**

   c) Write note on seismograph. **8**

2. A water tower of weight 1800 kN and having stiffness 1000 kN/m is subjected to ground acceleration $a_g = t^2$ for a period of 1 second. Determine the maximum relative displacement of the tower with respect to its base by using Newmark's β method. Assume 5 % damping. **25**

3. Derive expression for maximum displacement, velocity and acceleration response of SDOF system subjected to earthquake ground motion. From these expressions explain the concept of pseudo velocity and pseudo acceleration spectra. **25**

SECTION – II

4. a) What are the general principles to be followed to make a RCC building earthquake resistant ? **8**

   b) What are different types of irregularities which may present in buildings ? Suggest methods to minimize effect of these irregularities. **7**

   c) Design the special confining reinforcement for a circular column of diameter 600 mm. Assume M20 concrete and Fe 415 Steel. **10**

P.T.O.

5. A five storey building 4 m × 4 m in plan is supported by four columns at the corners each storey is 3.35 m height. Slab of each floor is 120 mm thick and the beams are 230 mm × 530 mm in size. All the columns are 300 mm × 300 mm and walls are of 230 mm thick brick masonry. The building is to construct in Solapur city. Assuming live load category 2 kN/m^2 over the slab, evaluate the lateral forces and storey shear. Distribute forces in horizontal direction. **25**

6. a) Explain the concept of structural health monitoring. What are the systems available for structural health monitoring. **13**

   b) What is response reduction factor ? Why it is incorporated in the expression for evaluating the design acceleration coefficient ? How it is useful for structures ? **12**

———————

SLR-KN – 11

Seat No.	

M.E. (Civil-Structures) (Semester – II) (CGPA) Examination, 2015
Paper – IX : ADVANCED DESIGN OF STEEL STRUCTURES

Day and Date : Friday, 18-12-2015 Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

Instructions : *i) Answer **any two** questions from **each** Section.*
*ii) **Use** of IS 800, steel table, calculator, IS 811 **allowed**.*
*iii) **Assume** suitable data **if necessary**.*
*iv) Draw **neat** sketches **wherever** necessary.*

SECTION – I

1. Determine the shears and moments in columns and beams of a building frame with moment resisting joints in figure 1, by cantilever method. Assume the area of bottom storey column as 2 A and the area of top storey column as A. **17**

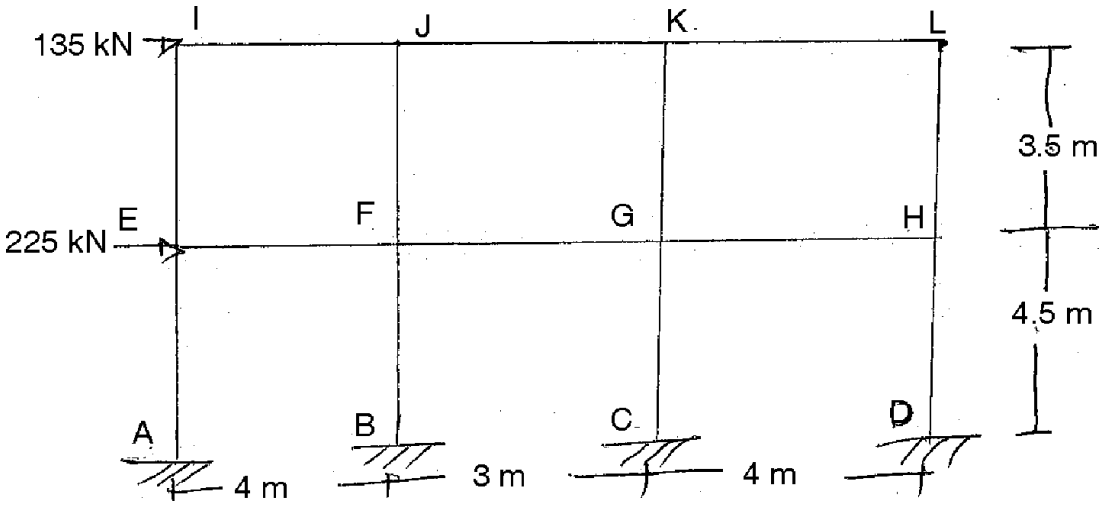


Figure 1

2. The effective span of a through type girder railway bridge is 50 m for a single lane B.G. track. The cross girders a speed at 4.8 m apart. The stringers are spaced at 2.5 m between centre line. The weight of stock and check rails are 0.5 kN/m and 0.4 kN/m. Sleepers are placed 0.45 m c/c. Weight of P.S.C. sleepers is 25 kN/m^3. The main girders are provided at 6.5 m apart, determine the design forces in top, bottom, vertical and diagonal members of central panel. Design the bottom member and vertical member. The bridges is to carry a equivalent U.D.L. line load of 4250 kN for B.M. and 4550 for shear force. **18**

P.T.O.

3. a) Write on special design considerations for light gauge steel compression element. **5**

   b) Write on design procedure for light gauge beams. **5**

   c) A hot section 100 mm × 50 mm × 4 mm with lip 20 mm is to be used as a concentrically loaded column of 3 m effective length. Determine the allowable load. **7**

SECTION – II

4. a) Write the design procedure of composite beams. **5**

   b) Determine the values of fully plastic moment of the frame, when loaded up to portal collapse. The portal frame has vertical layer AB = 2.5 m, CD = 5 m and horizontal portion BC = 6 m. The end A is fixed and is also fixed. A horizontal load of 30 kN towards B is acting at B and a vertical load of 40 kN acting downwards is a 2 m from B on BC portion. The plastic moment of the frame is uniform through out. Draw BMD also. **12**

5. a) Explain different collapse mechanisms. **5**

   b) A fixed beam of span 5 m carries a uniform distributed load 5.5 kN/m on the right hand 4 m portion of the beam. The load factor is 1.75 and the shape factor is 1.15. The yield stress is 250 MPa. Calculate the section modulus of the beam and locate the position of plastic hinges. **12**

6. a) Design a cased column to carry a load of 1200 kN. The effective length of column is 4.2 m. **9**

   b) Design a composite foot bridge having clear width of 3 m and effective span of 12 m. The bridge is to be designed foe live load of 4 kN/m^2. Assume kerb 45 cm × 35 cm and two steel girders at 1.8 m c/c are provided. **9**

SLR- KN – 12

Seat No.	

M.E. (Civil Structures) (Semester – II) (CGPA) Examination, 2015
Paper – X : DESIGN OF RCC BRIDGES (Elective – II)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

N. B. *: 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** additional data **if required** and mention **it clearly**.*

SECTION – I

1. a) With the help of neat sketch show various components of bridges with their functions. **6**

   b) What is impact force ? How it is calculated ? Explain in detail. **6**

2. Design a solid deck slab for two lane national highway culvert with following data :

   1) Clear span between abutment = 8 m

   2) Wearing coat = 80 mm

   3) Curb = 600 mm wide 250 mm thick

   4) Loading - IRC class A (two lane)

   5) Material - M-25 concrete, Fe-415 steel. **11**

3. A) Explain various components of bridges with their functions.

   B) Obtain Courbon's reaction factor and the maximum bending moment in case of a T beam bridge having following details.

   Road - Two lane, loading - IRC class A

   No. of main girders = 3, C/C spacing of main girder = 2.6 m.

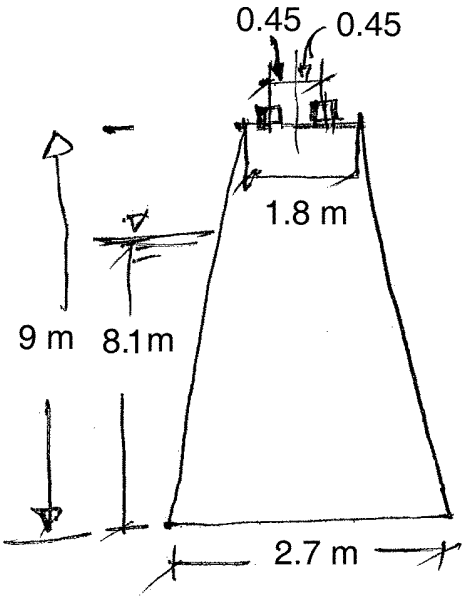
   Span of bridge = 16 m, Kerb width = 600 mm. **12**

P.T.O.

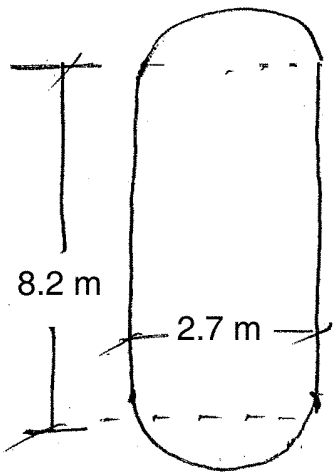
4. Write a note on :
   a) Effective width method
   b) Piegand's theory
   c) IRC class B loading
   d) Economical span of bridges. **12**

SECTION – II

5. Verify the adequacy of pier for following data :
   a) Span = 20 m
   b) D.L. from each span = 2250 kN
   c) Reaction due to LL on one span = 900 kN
   d) Maximum mean velocity of water current = 3.6 m/s
   e) M-20 cone
   f) IRC class AA tracked load. **12**



Section



Plan at bottom

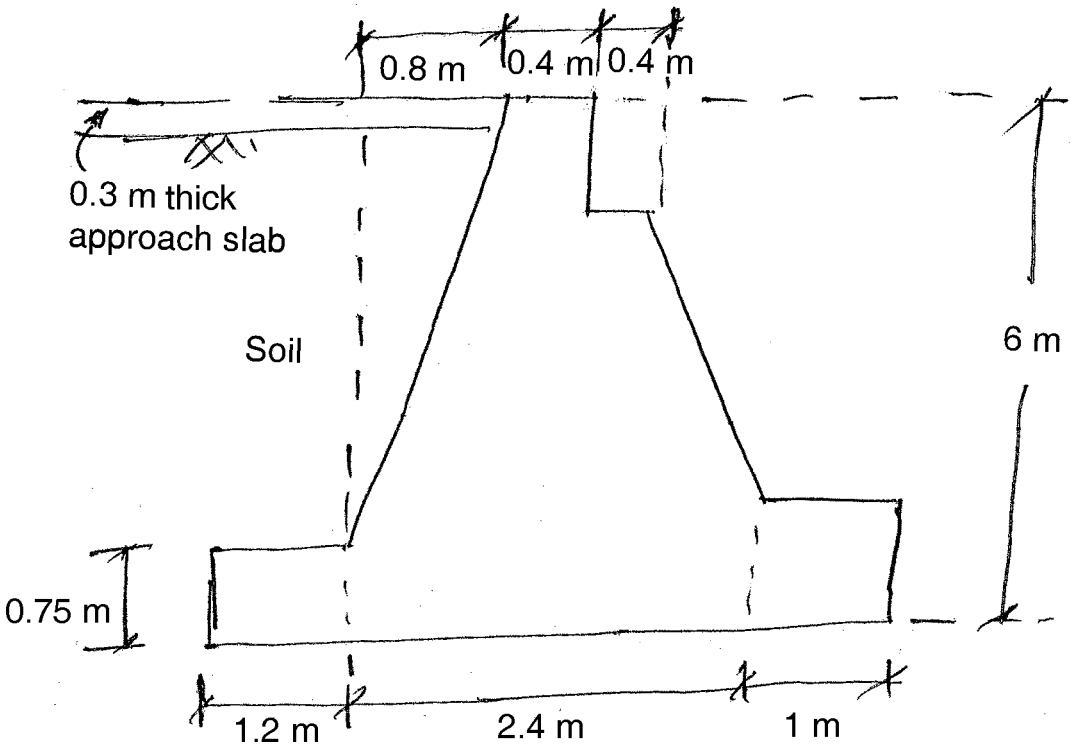
6. A) What is function of bearing ? Explain various types of bearing in detail. **6**

   B) Give IRC specifications for elastomeric bearings. **5**

7. Verify stability of abutment as shown below :

   Take - Density of soil = 18.5 kN/m^3, ϕ = 32°, μ = 0.5

   IRC class AA tracked loading. **11**



8. Write a note on :

   a) Cantilever method of construction

   b) Expansion joints

   c) Importance of bridge inspection

   d) Types of pier. **12**

SLR-KN – 16

Seat No.	

M.E. (Mech. Design Engg.) (Semester – I) Examination, 2015
(New) (CBCS/CGPA)
Paper – I : COMPUTATIONAL TECHNIQUES IN DESIGN ENGG.

Day and Date : Monday, 21-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of calculator is* ***allowed****.*
4) Assume suitable data if ***necessary****.*

SECTION – I

1. a) Fit a curve of the form $y = ab^x$ to the data. **6**

x :	1	2	3	4	5	6
y :	151	100	61	50	20	8

b) Evaluate $\int_0^{0.6} e^{-x^2} dx$, using Simpson's $\frac{1}{3}^{rd}$ rule, taking 7-ordinates. **6**

c) Solve the following system of equations by Gauss-Seidal method (perform six iterations). **6**

$8x - 3y + 2z = 20,\ 4x + 11y - z = 33,\ 6x + 3y + 12z = 35.$

2. a) Solve the following equations by LU decomposition method. **9**

$5x - 2y + z = 4,\ 7x + y - 5z = 8,\ 3x + 7y + 4z = 10$

b) From the following table, find f(34) using Everett's formula. **8**

x :	20	25	30	35	40
y = f(x) :	11.4699	12.7834	13.7684	14.4982	15.0463

3. a) Fit a straight line and a parabola to the following data. **9**

x :	0	1	2	3	4
y :	1	1.8	1.3	2.5	6.3

b) A curve passes through the points (1, 2), (1.5, 2.4), (2, 2.7), (2.5, 2.8), (3, 3) (3.5, 2.6) and (4, 2.1). **8**
Find the area bounded by the curve, the x-axis and x = 1 and x = 4. Also find the volume of solid of revolution got by revolving this area about the x-axis.

P.T.O.

SECTION – II

4. a) Using Picard's method find y for x = 0.2, 0.4, 0.6 given that $\frac{dy}{dx} = x - y^2$, y(0) = 0, continue the solution at x = 0.8, x = 1 using Milnes method. **10**

   b) Explain with neat sketch, mathematical modes of spring mass damper system. **7**

5. a) Using the finite difference method find y(0. 25), y(0.5) and y(0.75) satisfying the different equation $\frac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) = 2. **8**

   b) Find the largest eigen value and the corresponding eigen vector of the matrix

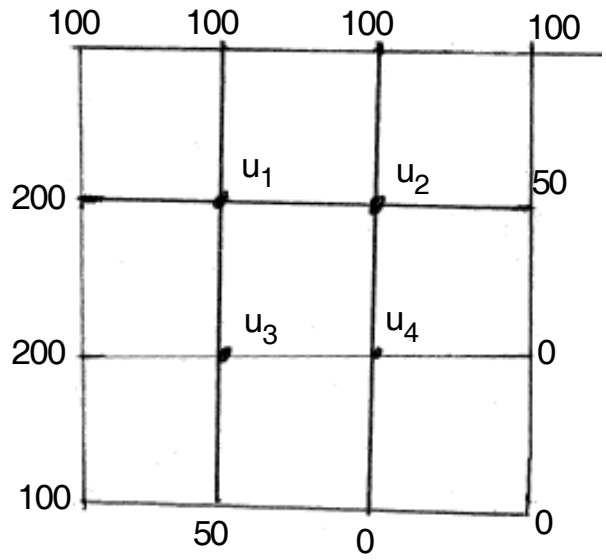
   $$\begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$$ by power method. **5**

   c) Using Crank-Nicholson method solve $u_{xx} = 16\ ut$, 0<x<1, t>0. **5**

   given u(x, 0) = 0, u(0, t) = 0, u(1, t) = 100 t compute u for one step in t direction taking h = $\frac{1}{4}$.

6. a) Obtain the value of y at x = 0.1, 0.2. Using Runge Kutta method of 4th order for the different equation $\frac{dy}{dx} + y + xy^2 = 0$, y(0) = 1. **7**

   b) For the following fig. evaluate u(x, y) satisfying Laplace equation $\frac{\partial^2 u}{\partial x^2} + \frac{\partial^2 u}{\partial y^2} = 0$ at piotal points of the fig. (perform four iterations). **10**



SLR-KN – 17

Seat No.	

M.E. (Mechanical-Design) (Semester – I) (New) Examination, 2015
CBCS/CGPA
Paper – II : MACHINE DYNAMICS

Day and Date : Wednesday, 23-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Answer **any three** questions from **each** Sections.*

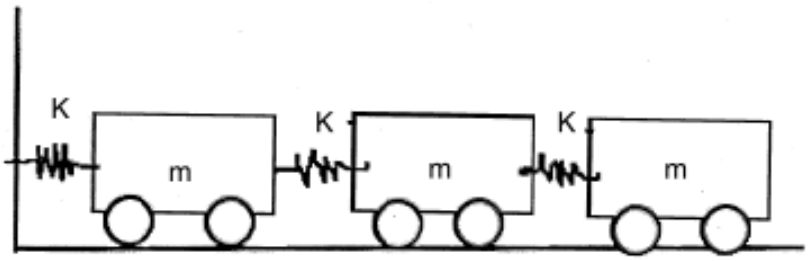
*2) Figures to the **right** indicate **full** marks.*

*3) Assume suitable data **if necessary** and state **it clearly**.*

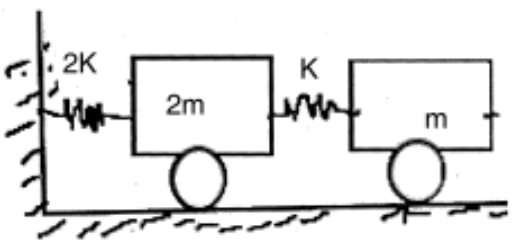
SECTION – I

1. Write detailed note on :
   a) Eigen Value problem
   b) Modal analysis of Multi Degree of Freedom System. **12**

2. Find fundamental Natural frequency of a system shown in figure below using Matrix Iteration Method. **12**



3. Find Natural frequency and made shapes of the system shown in figure below. **11**



P.T.O.

4. From the equation of Undamped forced system response, show that at resonance response goes to infinity. Derive expression for whirling of shaft. **11**

SECTION – II

5. Explain difference between discrete and Continues system. Derive an expression for vibration of beam under lateral loading. **11**

6. Write detailed note on Perturbation Method and explain its use for solving Duffing's equation. Briefly explain jump Phenomenon. **12**

7. Explain Wide band and Narrow band Processes. Obtain Response for linear system to Stationary excitations. **12**

8. Explain the following terms in details. Time domain and Frequency domain, analysis of signals, Experimental modal analysis and fault diagnosis. **11**

SLR-KN – 18

Seat No.	

M.E. (Mechanical Design Engineering) (Semester – I) (New)
(CBCS – CGPA) Examination, 2015
Paper – III : SOLID MECHANICS

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Make necessary assumptions **if required**.*

SECTION – I

1. a) Explain the importance of Airy Stress function in stress analysis. **4**

   b) Derive the differential equation of equilibrium for plane stress problem in polar coordinates. **8**

2. Investigate what problem of plane stress can be solved by using the following Airy stress function $\phi = \frac{3F}{4c}\left[xy - \frac{xy^3}{3c^2}\right] + \frac{P}{2}y^2$ for the region included by $y = \pm c$ and $0 \le x \le 1$. **11**

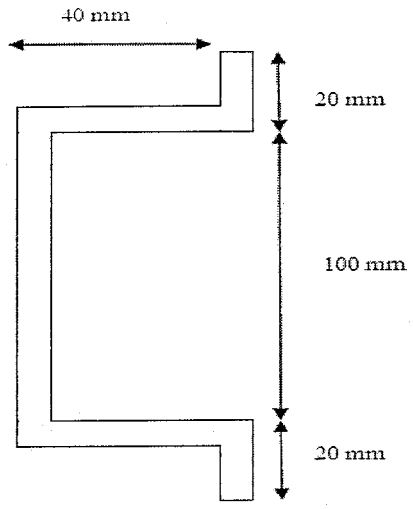
3. Derive the expression for stresses induced in thick cylinder subjected to both the internal pressure and external pressure. **11**

4. Write a note on **any two** of the following : **12**
   i) Membrane analogy
   ii) Differential equation of equilibrium for plane stress problem in Cartesian coordinates.
   iii) Stresses in rotating solid disc.

P.T.O.

SECTION – II

5. Locate the shear centre for the following section having uniform thickness of 4 mm. **11**



6. a) What are the assumptions made in theory of contract stresses ? **3**

   b) Derive the expression for area of contact and pressure distribution in case of contact stresses between two cylinders subjected to compressive load. **8**

7. a) Derive the expression for torsion and angle of twist for non circular cross section prismatic bar. **7**

   b) An elliptical shaft of semi major and semi minor axes as 0.08 and 0.04 meter respectively, is subjected to a twisting moment of 3000 Nm. Determine the maximum shearing stress and the angle of twist per unit length. Assume G = 100 Gpa. **5**

8. Write a note on **any two** of the following : **12**

   i) Shell of uniform strength

   ii) Soap film analogy

   iii) Contact stresses in involute teeth gears.

SLR-KN – 19

Seat No.	

M.E. (Mechanical) Design Engineering (Sem. – I) Examination, 2015
New (CBCS/CGPA)
Paper-IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Monday, 28-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve **any five** questions.*
*2) Figures to the **right** indicate **full** marks.*

1. a) What are the steps involved in the formulation of research task ? **7**
   b) What is hypothesis and its testing ? **7**
2. a) Explain various techniques for increasing creativity. **7**
   b) Explain robust design and its significance in process optimization. **7**
3. a) Explain discrete simulation and continuous simulation with suitable example. **7**
   b) Explain various steps in simulation experiments and their validation. **7**
4. a) Explain principles of DOE. **7**
   b) What is importance of literature review in research project ? Discuss the methods and sources for the same. **7**
5. a) Explain steps in DOE. **7**
   b) Explain principles of Modelling. **7**
6. a) What precautions are to be observed while writing a report ? **7**
   b) Explain any two techniques of creativity. **7**
7. Write short notes on **any two** : **14**
   a) Check list for good report
   b) Creative problem solving process
   c) Importance and parameters of review paper
   d) Types of data.

SLR-KN – 20

Seat No.	

M.E. (Mechanical-Design Engineering) (Semester – I) (New) (CBCS –CGPA) Examination, 2015
Paper – V : SYNTHESIS AND ANALYSIS OF MECHANISM AND MACHINES (Elective – I)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Que. No.* ***4*** *and* ***8*** *are* ***compulsory*** *and solve* ***any two*** *remaining questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary*** *and mention* ***it clearly****.*
4) ***Use*** *of non-programmable calculators is* ***allowed****.*

SECTION – I

1. a) Discuss the effect of spacing of accuracy points on generated function and structural error. **4**

   b) A four bar mechanism is to be designed using three precision points to generate the function $y = x^{1.5}$ for the range $1 \leq x \leq 4$. Assuming 30° starting and 120° finishing position for the input link and 90° starting and 180° finishing position for output link. Find the value of x, y, $\varnothing$, φ corresponding to the three precision points. **8**

2. a) Explain synthesis of slider crank mechanism with three accuracy points. **6**

   b) Derive Freudensteins equation. **6**

3. a) Explain Robert-Chabyshev theorem. **6**

   b) Explain the procedure for construction of circle point. **6**

4. Write notes on the following : **11**

   a) Task of kinematic synthesis

   b) Ball point.

P.T.O.

SECTION – II

5. a) Explain crank and follower synthesis with help of five accuracy points. **6**

   b) To determine link of four bar mechanism that will one of its position satisfy the following specifications :

   $W_1 = 8$ rad/sec $\quad \alpha_1 = 0$

   $W_2 = 1$ rad/sec $\quad \alpha_2 = 20 \text{ rad} / \text{sec}^2$

   $W_3 = 3$ rad/sec $\quad \alpha_3 = 0$

   Comment on the resulting mechanism. **6**

6. a) Discuss the application of spatial mechanism. **6**

   b) Derive Euler-Savary equation for a Four-bar linkage. **6**

7. a) Explain industrial Robot manipulator. **6**

   b) Explain Pole triangle. **6**

8. Write notes on the following : **11**

   a) Return circle

   b) Denavit-Harternberg Parameter.

SLR-KN – 21

Seat No.	

M.E. Mech. (Design Engineering) (Semester – I) (New CBCS/CGPA) Examination, 2015
Elective – I : INDUSTRIAL INSTRUMENTATION (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Draw **neat** diagrams **wherever** necessary.*
*4) Assume additional suitable data if necessary and state it **clearly**.*

SECTION – I

1. a) Explain basic and auxiliary functional elements of measurement system. **8**
   b) Describe in brief types of standards of measurement. **4**

2. a) Explain the following performance parameters. **8**
      1) Accuracy
      2) Static sensitivity
      3) Range and span
      4) Dead band
   b) Describe types of dynamic inputs with examples. **4**

3. a) Explain mechanical and hydraulic amplifying element. **6**
   b) Explain electrodynamic transducer for linear and rotary motion measurement. **5**

4. a) Explain hydraulic and pneumatic load cell. **6**
   b) Explain dead weight pressure gauge tester. **5**

SECTION – II

5. a) Explain total radiation pyrometer with neat sketch. **6**
   b) Explain the terms ‘sound pressure level’ and ‘sound power level’. **6**

P.T.O.

6. a) Explain system analysis by Harmonic testing. **6**

   b) Explain McLeod gauge with neat sketch. **5**

7. a) Describe Data Acquisition system. **6**

   b) Explain wear behavior monitoring. **5**

8. Write a note on (**any four**) : **12**

   1) Ferrographic analyser
   2) Importance of computers in Instrumentation.
   3) Particle counters
   4) R.T.D.
   5) Electromagnetic frequency domain transducer
   6) Seismic Instrument.

———————

SLR-KN – 22

Seat No.	

M.E. (Mech.) Design (Semester – I) (New) (CBCS-CGPA) Examination, 2015
Elective – I : RELIABILITY ENGG. (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m

Instructions *: i)* ***All*** *questions are* ***compulsory****.*
ii) Assume suitable data if ***necessary****.*
iii) Figures to ***right*** *indicate marks.*

SECTION – I

1. a) Discuss Taguchi loss function concept. **5**

   b) A Jet Engine consist of fire modules each of which was found to have a weibull failure distribution with a shape parameter of 1.5. Their scale parameters (characterifies life) are (in operating cycle) 3600, 7200, 5850, 4780 and 9300.

   Find the MTTF and meantime to failure of the engine. **6**

2. a) A company supplies a box of 50 condenser of which fire detective units get mixed up due to an error if four items are drawn with replacement, what is the probability of

      i) Getting exactly 2 defective condensers.
      ii) Getting at least 2 defective condensers.
      iii) Getting at the most 2 defective condensers. **6**

   b) The PDF for the time to failure of the drive train on a regional transit authority bus is given by

      $f(t) = 0.2 - 0.02\ t \quad 0 \leq t \leq 10$ years

      Find

      1) Show that the hazard rate function is increasing, indicating continuous wear out overtime.
      2) Find the MTTF.
      3) Mean time to failure.
      4) Mode failure distribution.
      5) Standard deviation. **6**

P.T.O.

3. Write a short notes (**any three**) : **(4×3=12)**
   1) Cause and effect diagram.
   2) Reliability allocation and its benefits.
   3) Boolean algebra laws and probability properties.
   4) Gamma distribution.

SECTION – II

4. a) What are the main steps used of performing FMECA. **6**
   b) Describe the steps associated with the RCM process. **5**

5. a) Assume that a system is composed of five independent and identical subsystems in series. The constant failure rate of each subsystem is 0.0025 failures/hrs. Calculate
      i) Reliability for 50 hours mission
      ii) System (MTTF). **6**
   b) Explain reliability life testing. **6**

6. Write a short notes **(any three)** : **(4×3=12)**
   1) Interchange ability-as one maintainability design factor
   2) Reliability growth cycle
   3) Decomposition method
   4) Benefits of FMECA.

———————

SLR-KN – 23

Seat No.	

M.E. Mechanical (Design Engineering) Semester – I (New CBCS-CGPA) Examination, 2015

Paper – V : Elective – I : MECHANICAL SYSTEM DESIGN

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Qu.* ***1*** *and Qu.* ***5*** *are* ***compulsory****.*

2) Solve ***any two*** *questions from the* ***remaining*** *questions in Section –* ***I*** *and Section –* ***II****.*

3) Figures to the ***right*** *indicate* ***full*** *marks.*

4) ***Use*** *of non-programmable calculator is* ***allowed****.*

5) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Solve **any four** : **(5×4=20)**

   a) Give the basic aspects of concurrent engineering. How does it help in product design and development ? Illustrate with suitable example.

   b) Explain system design where environment and safety is of prime importance.

   c) Explain system analysis view point.

   d) Explain role of models in engineering design.

   e) Explain steps involved in simplex method for linear goal programming problem.

2. A leather belt is required to transmit 7.5 KW from a pulley 1.2 m diameter, running 250 rpm. The angle embraced is 165° and the coefficient of friction between the belt and the pulley is 0.3. If the safe working stress for the leather belt is 1.5 MPa, density of leather is 1 mg/m^3 and thickness of belt is 10 mm. Find the width of the belt taking centrifugal tension into account. **8**

P.T.O.

3. Explain linear graph modeling concept. **7**

4. For the network shown in fig. IV find the shortest path from node 1 to node 8. The figures adjacent to the arcs denote their lengths. **7**

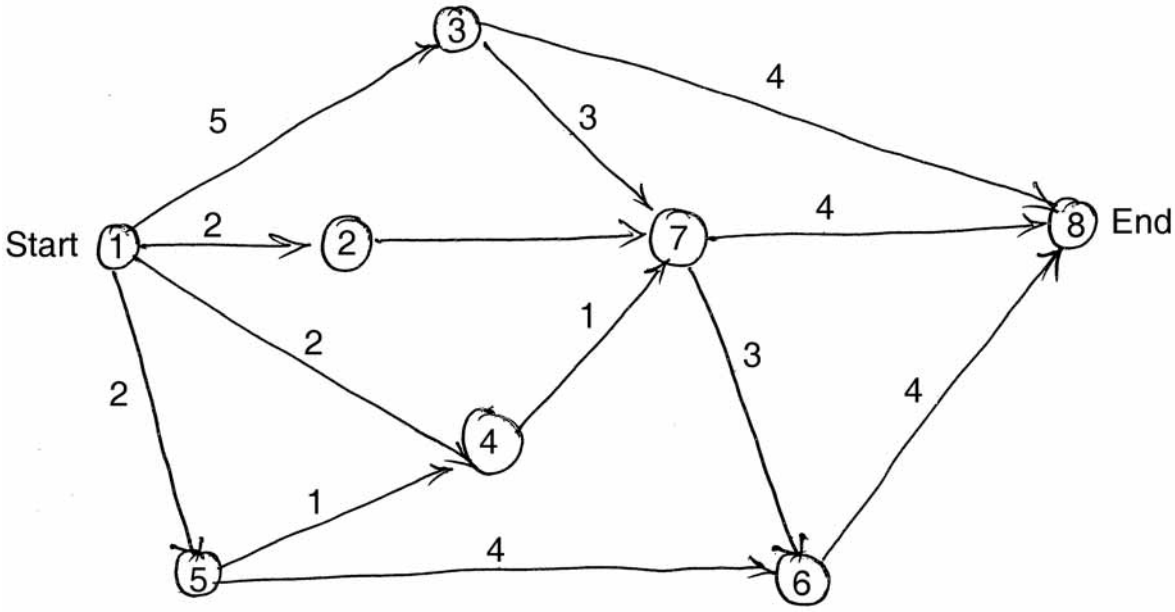


Fig. IV

SECTION – II

5. Solve **any four** : **(5×4=20)**

a) Explain analytical approach for optimization.

b) Explain the various factors which are considered, while making a feasibility analysis of a system.

c) Explain the model with two variables with inequality constraints.

d) Explain scientific approach to the decision making.

e) What are the desirable features of simulation software ?

6. The data regarding the initial cost, operating cost etc. of two equipments A and B is as given below. Find out the economical machine for selection using present worth method. **8**

	Equipment A	**Equipment B**
Initial cost Rs.	10,000	15,000
Operating cost per year Rs.	1,000	800
Life of Equipment in years	4	5
Interest rate 10%		

7. Consider a function in two variables X_1 and X_2 given as

   $F(X_1, X_2) = X_1^2 - 8X_2 + 2X_2^2 - 6X_1 + 30$

   Find the optimal values of X_1 and X_2 and verify the values obtained for maxima/ minima. **7**

8. What is the fundamental probability ? State and prove Baye's theorem. **7**

———————

SLR-KN – 24

Seat No.	

M.E. (Mech. – Design Engg.) (Semester – II) (CGPA) Examination, 2015
ADVANCED DESIGN ENGINEERING (Paper – VI)

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: i) Solve* ***any three*** *questions from* ***each*** *Section.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Assume necessary data, if ***required****.*

SECTION – I

1. a) State the laws of cam design. Discuss the importance of SVAJ diagram in design of high speed cam. **5**

   b) Plot SVAJ diagram for 4 – 5 – 6 – 7 polynomial cam and find the peak values for the data given below : **7**

   Dwell at zero displacement for 90°

   Rise of 25 mm in 90°

   Dwell at 25 mm for 90°

   Fall at 25 mm in 90°

   Cam velocity = 1 rev./sec.

2. a) Give the comparison between hydrodynamic and hydrostatic journal bearing. **5**

   b) A hydrodynamic 360°, short journal bearing of l/d ratio 0.4 is to be designed to support a radial load of 5 kN. The journal rotates at 5100 rpm. The eccentricity ratio is 0.6. If the central lubrication system supplies lubricating oil of viscosity 46.7 Cp at a flow rate of 0.5 lit/minute to the bearing. Calculate **6**

   i) the diameter of journal

   ii) the radial clearance

   iii) the dimension of bearing and

   iv) minimum oil film thickness.

P.T.O.

3. a) Explain Archard's theory of adhesive wear. **5**

   b) Derive an expression for oil flow rate of hydrostatic step bearing. State the assumptions made. **7**

4. Write short note on **any two** of the following : **12**

   i) Deformation theory of friction.

   ii) Effect of temperature and pressure on viscosity.

   iii) CEP and CPM in high speed cams.

   iv) Sommerfeld number.

SECTION – II

5. a) Explain the term MTTF and MTBF used in reliability analysis. Derive the relation for MTTF in terms of R(t) in integral form. **6**

   b) In a survival test conducted on 100 cartoons for their strength under impact loading, the following results were obtained **6**

No. of impacts	20	22	24	26	29	32	35	37
No. of failures	6	10	15	16	18	15	12	8

   Determine failure density, hazard rate and reliability.

6. a) Explain the significance of thermal stresses in design and derive the expression for thermal stresses in hollow cylinder due to thermal gradient. **6**

   b) What are major principles used in the design of forgings ? **5**

7. a) What is systems reliability ? Explain the methods of finding reliability in series and parallel configuration. **5**

   b) A system consists of ten components, all connected in series. The predicted reliabilities as obtained from their respective failure data analysis, are shown in the following table : **6**

Component Number	1	2	3	4	5	6	7	8	9	10
Predicted reliability	0.996	0.998	0.998	0.996	0.997	0.997	0.985	0.985	0.984	0.984

   It is desired that the system reliability be 0.952. Determine the reliability goal of each component.

8. Write short note on **any three** of the following : **12**

i) Methods of reducing thermal stresses.

ii) Design for manufacturing and assembly.

iii) Bath tub curve.

iv) Elastohydrodynamic bearings.

v) Form and contiguity constraints.

———————

SLR-KN – 25

Seat No.	

M.E. (Mech. Design Engg.) Semester – II (CGPA) Examination, 2015
Paper – VII : FINITE ELEMENT ANALYSIS

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) Make suitable assumptions if necessary and state them **clearly.***
*3) Figures to **right** indicate **full** marks.*
*4) **Use** of non programmable calculator is **allowed.***

SECTION – I

1. a) Explain Rayleigh Ritz method in FEM. **6**

   b) What is finite element method ? Describe advantages and limitations of this method. **5**

2. Using the finite element method calculate the nodal displacements, stresses in the bar and reaction forces for the bar as shown in Figure – I. **12**

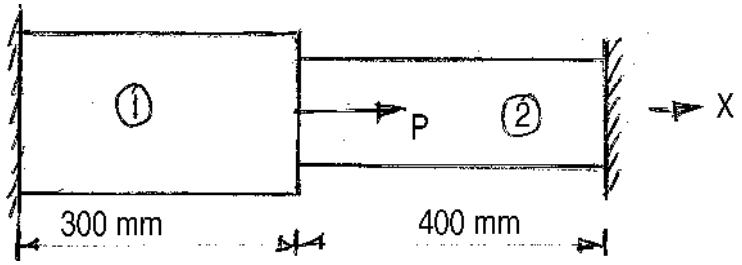


Figure – I

$P = 200$ kN, $A1 = 2400$ mm^2, $A2 = 600$ mm^2

$E1 = 70 \times 10^9$ N/m^2, $E2 = 200 \times 10^9$ N/m^2

3. a) Derive property matrix [D] for plane stress and plane strain condition. **6**

   b) Explain the factors affecting accuracy of Finite Element Analysis. **5**

P.T.O.

4. Write short note on (attempt **any two**) : **12**
   a) FEM and BEM
   b) Weighted Residual Method
   c) Choice of Elements in FEA.

SECTION – II

5. a) Explain model validity and model accuracy using approximation of geometry and material property. **6**

   b) Explain the general rules of mesh generation in finite element formulation. **5**

6. Using finite element method determine the temperature distribution in the wall as shown in figure – II and calculate the heat flow through wall thickness where A : Steel and B : Insulation. **12**

   $K_A = 55\times10^{-3}$ W/mm°c, $K_B = 0.1\times10^{-3}$ W/mm°c, A = 1 mm^2

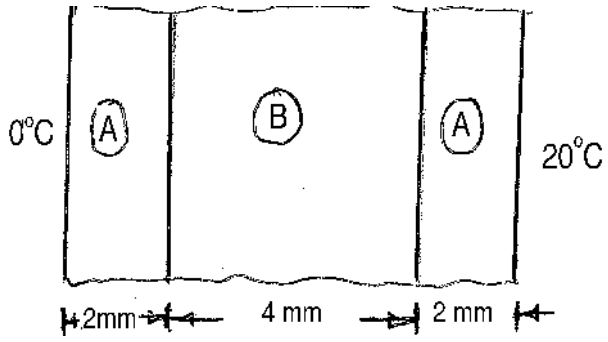


Figure – II

7. Explain modeling procedure of linear static analysis using software based FEM along with its application. **11**

8. Write short note on (attempt **any two**) : **12**
   a) Simplex, complex and multiplex elements.
   b) Modal analysis.
   c) Spectrum analysis.

———————

SLR-KN – 26

Seat No.	

M.E. (Mechanical-Design Engineering) (Semester-II) (CGPA) Examination, 2015

Paper – VIII : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Thursday, 17-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Answer **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) Assume suitable data if **necessary** and mention it **clearly**.*

*4) Use of non programmable calculators is **allowed**.*

SECTION – I

1. a) Derive the expression for the light intensity seen through analyzer when the stressed Photo elastic model is kept in the light field circular polariscope. **7**

   b) Explain the method of identifying 'zero order' fringe. **5**

2. a) A circular disc made of photo elastic material is used for calibration. The disc diameter is 80 mm and its thickness is 6 mm. It is subjected to equal and opposite compressive loads of 250 N along the vertical diameter. The observed fringe order at the disc centre and two other points 08 mm and 15 mm along the horizontal diameter is 0.42, 0.35 and 0.30 respectively. Calculate the average value of the maternal fringe constant. **6**

   b) Discuss Stress freezing techniques in three dimensional Photo elasticity. **5**

3. a) Explain the electrical analogy method. **5**

   b) Explain in brief **6**

      i) Isoclinics

      ii) Birefringence

      iii) Isochromatics

      iv) Polarization of light.

P.T.O.

4. Write short note on : **11**

   a) Dynamic Photo elasticity.

   b) Use of holography in stress analysis

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows $\in_a$ = 500 micro-strain, $\in_b$ = 380 micro-strain, $\in_c$ = 200 micro-strain.

   Determine the principal strains, principal stresses, its directions and maximum shear stress.

   Take E = 210 GPa and μ = 0.286. **8**

   b) Explain in brief grid, backing and adhesive material used in strain gauges. **4**

6. a) Explain balanced and unbalanced Wheatstone bridge. Derive the expression for the output voltage of unbalanced Wheatstone bridge. **6**

   b) Explain model Analysis technique. **5**

7. a) Explain brittle coating method. **6**

   b) Discuss use of strain gauge for measurement of load and pressure. **5**

8. Write short notes : **11**

   a) Cross sensitivity of strain gauge

   b) Commercial strain gauge Indicators.

SLR-KN – 27

Seat No.	

M.E. (Mechanical Design Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – IX : INDUSTRIAL PRODUCT DESIGN

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: i) Attempt* ***any five*** *questions from the following.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Support the answers by ***neat*** *sketches* ***if necessary****.*

1. a) Explain prototype designs and rapid prototyping. **7**
   b) How the creative ideas are generated with the help of brain storming session ? How it is effectively conducted ? **7**
2. a) Discuss the importance of creativity in industrial product design and development. Discuss the role of creativity in the design of Laptops. **7**
   b) Discuss quality and maintainability considerations in product design with suitable examples. **7**
3. a) Explain the role of anthropometric data in design. State the main limitations of anthropometric data and suggest ways in which these may be overcome. **7**
   b) Discuss the aspects of ergonomic design of testing equipments. **7**
4. a) Compare requirements of industrial products with consumer products. In what way they differ from each other ? **7**
   b) "Ergonomics and aesthetics are two sides of a coin, in industrial product design". Explain this statement with suitable examples. **7**
5. a) Discuss the visual effect of line and form for cars and sport vehicles. **7**
   b) Explain the concept of symmetry, balance and stability. **7**
6. a) What are the different techniques of the value analysis and cost reduction in industrial product design ? **7**
   b) Explain the influence of the concept of order with variety on the aesthetic design of a product. **7**
7. a) Explain mechanics of seeing with suitable examples. **7**
   b) Explain role of setting specification and market requirements in product design. **7**

SLR-KN – 28

Seat No.	

M.E. Mechanical (Design Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – X (Elective – II) : Industrial Tribology

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Question **1** and Question **5** are **compulsory**. Solve **any two** questions **each** from Section **I** and Section **II** out of **remaining**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume necessary data, if **required**.*

SECTION – I

1. a) Derive the equation of Law of adhesive wear as proposed by Archard and comment on it. **8**

   b) Using Stribeck's curve explain range and types of lubrication modes. **5**

2. a) Derive Petroff's equation. What are its limitations ? **7**

   b) What is Sommerfeld number ? State its significance in bearing design. **4**

3. a) Derive an expression for flow rate through rectangular slot. What are assumptions made while deriving the equation ? **7**

   b) Explain with neat sketch the arrangement of different accessories in hydrostatic lubrication system. **4**

4. a) Explain the following :

   1) Thermal balance in hydrodynamic journal bearings. **4**

   2) Tribological properties of lubricants. **4**

   3) Piston Pin lubrication. **3**

P.T.O.

SECTION – II

5. a) Derive an expression for pressure distribution of squeeze film lubrication between parallel rectangular plates. Also evaluate instantaneous load carrying capacity for given parallel rectangular plates. **8**

   b) Differentiate between squeeze film lubrication and hydrodynamic lubrication. **5**

6. a) Derive Reynolds equation for aerodynamic bearings under steady state. **8**

   b) What are merits of air lubricated bearings. **3**

7. a) Using Ertel Grubin theory derive relation

$$\frac{h_0}{R} = 1.19 \left[\frac{\mu_0 U \alpha}{R}\right]^{\frac{8}{11}} \left[\frac{ELR}{W}\right]^{\frac{1}{11}}.$$ **11**

8. Briefly discuss

   1) Mechanics of tyre road interactions. **4**

   2) Lubrication of gears. **4**

   3) Hertz theory of elasto hydrodynamic lubrication. **3**

SLR-KN – 29

Seat No.	

M.E. (Mechanical Design Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – X : ENGG. FRACTURE MECHANICS (Elective – II)

Day and Date : Saturday, 19-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Use*** *of scientific calculator is* ***allowed****.*
4) ***Assume*** *suitable data* ***if necessary*** *and mention* ***it clearly****.*

SECTION – I

1. a) Explain with suitable figures opening mode, shearing mode and tearing mode. **7**

   b) A plate 1.5 m width and 3 m length is required for construction operations. The expected load in the longitudinal direction is 4 MN. Experimental methods to detect through thickness edge cracks are valid only for cracks longer than 2.7 mm. Two steel plates M and N are considered for this purpose. Steel M has yield strength of 850 MPa and steel N has yield strength of 1500 MPa. The corresponding critical stress intensity factors for two materials are for M, K_{IC} = 100 MPa$\sqrt{m}$ and for N, 60 MPa $\sqrt{m}$. A factor of safety of 1.5 is to be used. Minimum weight is important. Which of two materials should be selected ? Take $\alpha = 1.1$. **10**

2. a) Explain stress intensity factor with respect to fracture mechanics. **7**

   b) A 75 cm wide steel plate has central crack of length 2a = 10 cm. The plate is 5 mm thick. The plate is pulled to fracture and the fracture load is 800 KN. Determine the stress intensity factor assuming a/W as small. Also determine the value of fracture resistance. Take Young's Modulus for material as 207 GPa. **10**

3. Write short note on following (**any three**) : **18**
   i) Griffith energy criteria
   ii) Compliance method
   iii) Interferometry and holography technique for determination of fracture toughness
   iv) Clip gauge.

P.T.O.

SECTION – II

4. a) Explain different stages of fatigue crack initiation and propagation. **7**

   b) An edge crack detected on a large plate is of 3.1 mm under a constant amplitude cyclic load having $\sigma_{max} = 310$ MPa and $\sigma_{min} = 1720$ MPa. If the plate is made of a ferrite-pearlite steel and $K_{IC} = 165$ MPa $\sqrt{m}$. Determine :

      i) propagation life up to failure and

      ii) propagation life if the crack length is a not allowed to exceed 25 mm. **10**

5. a) Define J-integral. Discuss the significance and limitations of J-integral as a fracture parameter. **7**

   b) An end notched specimen is made of height 2h = 2.8 mm initial crack length a = 26 mm, total length between the support 2L = 100 mm and thickness B = 25 mm. The load displacement relation under P-u record i.e. compliance $C = 1.67 \times 10^{-3}$ mm/N and critical load $P_c = 1361$ N. Determine the critical energy release rate G_{IIC}. **10**

6. a) Explain the plastic zone shape according to Tresca and VonMises criteria ? **10**

   b) Compare creep and stress rupture test. **8**

———————

SLR-KN – 30

Seat No.	

M.E. (Mechanical Design Engineering) Semester – II (CGPA) Examination, 2015

THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Elective – II) (Paper X)

Day and Date : Saturday, 19-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Attempt **any two** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

3) Use of Scientific calculator is allowed.

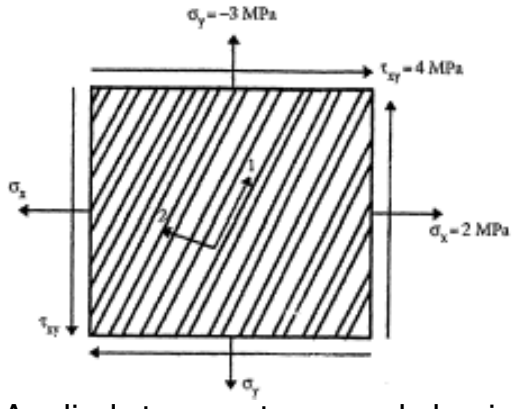
4) Assume suitable data if necessary and mention it clearly.

SECTION – I

1. A) How are composites classified ? **6**

   B) Find the following for a 60° angle lamina of graphite/epoxy. Use the properties of unidirectional graphite/epoxy lamina from table [1],

   1) Transformed compliance matrix
   2) Transformed reduced stiffness matrix. If the applied stress is $\sigma x = 2$ MPa, $\sigma y = -3$ MPa and $\tau xy = 4$ MPa, also find
   3) Global strains
   4) Local strains
   5) Local stresses
   6) Principal stresses
   7) Maximum shear stress
   8) Principal strains
   9) Maximum shear strain. **12**



Applied stresses to an angle lamina

P.T.O.

2. A) Give expressions for the stiffness matrices [A], [B] and [D] for an isotropic material in terms of its thickness, t, Young's modulus, E, and Poisson's ratio, μ . **11**

   B) What are different composite materials applications ? Explain in detail. **6**

3. A) Derive an expression for nine independent constants for orthotropic materials. **10**

   B) Explain Wu tensor theory. **7**

SECTION – II

4. A) Explain Antisymmetric laminates. **6**

   B) Explain basic principle of fracture mechanics related to composite materials. **6**

   C) Explain pultrusion and pulforming. **5**

5. A) What are basic restrictions, assumptions and consequences for governing equation for bending, buckling and vibration of laminated plates ? **10**

   B) How interlaminar stresses are confirmed by experimentally ? **7**

6. Write short note on following. **18**

   a) Design of composite structures

   b) Vibration equations for laminate plates

   c) Buckling equations for laminate plates.

TABLE NO. [1]

Typical Mechanical Properties of a Unidirectional Lamina (SI System of Units)

Property	Symbol	Units	Glass/ epoxy	Boron/ epoxy	Graphite/ epoxy
Fiber volume fraction	V_f		0.45	0.50	0.70
Longitudinal elastic modulus	E_1	GPa	38.6	204	181
Transverse elastic modulus	E_2	GPa	8.27	18.50	10.30
Major Poisson's ratio	ν_{12}		0.26	0.23	0.28
Shear modulus	G_{12}	GPa	4.14	5.59	7.17
Ultimate longitudinal tensile strength	$(\sigma_1^T)_{ult}$	MPa	1062	1260	1500
Ultimate longitudinal compressive strength	$(\sigma_1^C)_{ult}$	MPa	610	2500	1500
Ultimate transverse tensile strength	$(\sigma_2^T)_{ult}$	MPa	31	61	40
Ultimate transverse compressive strength	$(\sigma_2^C)_{ult}$	MPa	118	202	246
Ultimate in-plane shear strength	$(\tau_{12})_{ult}$	MPa	72	67	68
Longitudinal coefficient of thermal expansion	α_1	μm/m/°C	8.6	6.1	0.02
Transverse coefficient of thermal expansion	α_2	μm/m/°C	22.1	30.3	22.5
Longitudinal coefficient of moisture expansion	β_1	m/m/kg/kg	0.00	0.00	0.00
Transverse coefficient of moisture expansion	β_2	m/m/kg/kg	0.60	0.60	0.60

SLR- KN – 31

Seat No.	

M.E. Mechanical (Design Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – X : Elective – II : ENGINEERING DESIGN OPTIMIZATION

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt **any three** questions from Section – **I** and Section – **II**.*
*2) Figures to the **right** indicates **full** marks.*
*3) **Assume** suitable data **if necessary** and state it **clearly.***
*4) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) Explain need for optimization and historical development. **6**

   b) Define the following :
      i) Multi-objective programming problem
      ii) Separable programming problem
      iii) Stochastic programming problem. **6**

2. a) Find the dimensions of a box of largest volume that can be inscribed in a sphere of unit radius. **8**

   b) What is the significance of Lagrange multiplier method ? **3**

3. a) Explain how any linear programming problem can be expressed in the standard form. **5**

   b) Define the following : **6**
      i) Convex set
      ii) Feasible solution
      iii) Extreme point.

4. a) Explain exhaustive search method. **6**

   b) Explain Golden section method. **6**

P.T.O.

SECTION – II

5. a) Explain the difference between random jumping and random walk methods. **6**

   b) Explain the procedure of scaling of design variables. **5**

6. a) Explain the characteristics of constrained problem. **5**

   b) Explain the algorithm of Sequential Quadratic Programming method. **6**

7. a) Explain what is the purpose and applications of optimum design ? **6**

   b) Explain effect manufacturing errors on optimum design. **6**

8. a) What is the purpose of mutation ? How is it implemented in GAs ? **6**

   b) Explain the procedure of weighted minimum-maximum method. **6**

SLR-KN – 32

Seat No.	

M.E. (Electronics) (Semester – I) (New) (CBCS/CGPA) Examination, 2015
CMOS VLSI DESIGN (Paper – I)

Day and Date : Monday, 21-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

N.B. *: 1) Q.**1** and Q.**5** are **compulsory**.*
*2) Solve **any two** questions from Q.**2** to Q.**4** for Section **I**.*
*3) Solve **any two** questions from Q.**6** to Q.**8** for Section **II**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Explain MOS transistor design equations. **5**

   b) Draw Physical structure of PMOS transistor and explain accumulation, depletion and inversion modes. **6**

2. a) Explain the procedure to obtain VTC of CMOS inverter and draw VTC of CMOS inverter. **6**

   b) Explain static and dynamic power dissipation of CMOS inverter. **6**

3. a) What is Pass transistor logic ? **4**

   b) Comment on speed and power dissipation of dynamic CMOS logic. **8**

4. a) Explain cascading of dynamic gates. **6**

   b) Design basic gates using pass transistor logic. **6**

SECTION – II

5. a) Explain multiplexer based latches. **6**

   b) Explain bistability principle for latches. **5**

P.T.O.

6. a) Explain C^2 MOS master slave positive edge triggered register. **6**

   b) Explain timing classification of digital systems. **6**

7. a) Explain clock skew and jitter. **6**

   b) What are sources of clock skew and jitter ? **6**

8. a) Explain designing of fast adders. **6**

   b) Explain designing of SRAMS. **6**

———————

SLR-KN – 33

Seat No.	

M.E. (Electronics Engg.) (Semester – I) (New) (CBCS-CGPA) Examination, 2015

ADVANCED DIGITAL SIGNAL PROCESSING (Paper – II)

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if required****.*

SECTION – I

1. 1) Draw the block diagram of forward linear prediction and prediction error filter, derive the normal equation for the coefficient of the linear predictor. **6**
   2) Draw the block diagram of backward linear predictor, derive the equation for backward prediction error. **6**

2. 1) Derive the equation for energy density spectrum of the sampled signal. **6**
   2) What is periodogram ? Derive the equation for estimation of power density spectrum. **6**

3. 1) Explain the design of optimum equiripple linear phase FIR filter. **6**
   2) Explain in detail design of linear phase FIR filters by using frequency sampling method. **5**

SECTION – II

4. 1) The pass band and stop band cut off frequencies are 350 Hz and 1000 Hz respectively. The attenuation at pass band and stop band are –3dB and –10 dB respectively. The sampling frequency is 5000 Hz. Design a digital low pass butter worth filter using bilinear transformation. **6**
   2) Explain IIR filter design by using pade-approximation method. **6**

5. 1) Explain with timing diagram a technique for sampling rate conversion and its equation in terms of Km. **6**
   2) Explain the process of decimation by factor D with block diagram. Derive the equation for output and draw the spectrum at each stage. **6**

6. 1) Define wavelets. Explain any one wavelet expansion system in detail. **6**
   2) Define DWT. Explain in detail atleast two properties of DWT. **5**

SLR-KN – 34

Seat No.	

M.E. (Electronics Engineering) Part – I (Semester – I) (New) (C.B.C.S./C.G.P.A.) Examination, 2015
Paper – III : ADVANCED NETWORK ENGINEERING

Day and Date : Saturday, 26-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Figures to the **right** indicate **full** marks.*

*2) Assume suitable data if **necessary**.*

SECTION – I

1. Answer following questions : **(3×4=12)**

   1) Compare the performance of TCP and UDP. What is UDP pseudo header ?

   2) Discuss TCP congestion control algorithm is detail.

   3) Draw IPv6 datagram and explain it neatly.

2. Answer **any two** from following questions : **(2×6=12)**

   1) Draw and explain ARP frame.

   2) What are the different query messages used in ICMP ? Explain echo request and replay and time stamp request and replay in ICMP.

   3) What are the block ciphers ? Explain data encryption standard in detail.

3. Answer following questions :

   1) What are privacy and authentication services ? Draw authentication header format and explain. **6**

   2) Explain various attacks on security. Discuss concept of digital signature in detail. **5**

   OR

   2) What are packet level filter specifications ? Discuss packet level filters. **5**

P.T.O.

SECTION – II

4. Answer following questions : **(3×4=12)**

   1) Discuss MPEG-21 frame work in detail.

   2) What are different multimedia applications ?

   3) Discuss image compression using JPEG standard.

5. Answer **any two** from following questions : **(2×6=12)**

   1) What are the requirements of streaming ? What is jitter and playback buffers ? Explain relevance of jitter and play back buffer.

   2) What are RTCP messages ? How synchronization of streams is done using RTCP ? Discuss various stages in RTSP session.

   3) What are video object plane, video objects and object layer ? Discuss shape coding and motion estimation related to MPEG-4.

6. Answer following questions :

   1) Explain basic operation of DVMRP. Discuss physical and tunnel interface in DVMRP. **6**

   2) What are translator and mixer related to multimedia communication ? Explain RTP header is detail. **5**

   OR

   2) List different DVB standards. Draw and explain functional diagram of DVB-S system. **5**

———————

SLR-KN – 35

Seat No.	

M.E. (Electronics Engineering) (Semester – I) (CBCS – CGPA) Examination, 2015
Paper – IV : RANDOM SIGNALS AND PROCESSES (New)

Day and Date : Monday, 28-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*

*2) Assume suitable data **if necessary**.*

SECTION – I

1. Attempt following :

   a) What are the Bernoulli trials ? Derive the expression for Binomial distribution. **5**

   b) The three urns A, B and C contains balls as below :

      A) 1 White, 2 Black and 3 Red balls

      B) 2 White, 1 Black and 1 Red balls

      C) 4 White, 5 Black and 3 Red balls

      One urn is chosen at random and two balls are drawn. They happen to be Red and White. Determine the probability that they come from :

      I) Urn A

      II) Urn B

      III) Urn C. **6**

2. Attempt **any two** of the following : **(2×6=12)**

   a) What are the moment generating functions and characteristic functions ? Explain. Obtain the characteristic function for Gaussian random variable with zero mean and unit variance.

   b) A fair coin is tossed three times and the random variable X equals the total number of heads. Find the sketch the Fx(x) and fx(x). Also obtain the mean and variance of random variable X.

P.T.O.

c) Suppose a random variable X is equally likely to fall anywhere in the interval [a. b]. Then the PDF is of the form

$$f(x) = \begin{cases} \frac{1}{b-a} & a \le x \le b \\ 0 & \text{Elsewhere} \end{cases}$$

Find and sketch the corresponding CDF. Find the mean value and variance of the random variable X.

3. Attempt **any two** of the following : **(2×6=12)**

a) Explain estimation of population mean along with the expected value and variance of estimate.

b) If random variable X is uniformly distributed in the interval (–1, 1), find the probability density function of $Y = 4 - X^2$.

c) Two random variables X and Y have, $\mu X = 2$, $\mu Y = -1$, $\sigma X = 1$, $\sigma Y = 4$ and correlation coefficient between X and Y is 0.25. Let $U = X + 2Y$ and $V = 2X - Y$. Find the following quantities :

i) E[U] and E[V]

ii) ($E[U^2]$, $E[V^2]$, Var(U) and Var(V)

iii) Cov (U, V).

SECTION – II

4. Attempt **any two** of the following : **(2×6=12)**

a) What is a random a random process ? What is a cross correlation function of random processes ? Explain in detail along with its properties.

b) If $X(t) = B \cos(\omega_0 t + \phi)$ where B and ω_0 are constants and ϕ is uniformly distributed random variable in $(0, 2\pi)$ calculate the autocorrelation function of the process.

Also test whether the process in WSS process.

c) An ergodic random process has an auto correlation function of the form

$Rx(\tau) = 5e^{-|\tau|} - Ae^{-2|\tau|}$ where A is a constant.

i) Find the mean value of the process

ii) Find the variance of the process

iii) Find the largest value of A for which the expression is a valid auto correlation function.

5. Attempt **any two** of the following : **(2×6=12)**

   a) Define spectral density. Explain its properties. State Einstein Wiener Khinchine theorem.

   b) Find the power spectral density of a stationary random process for which the ACF is given by

   $Rxx(\tau) = 9e^{-2|\tau|}$.

   c) An Ergodic random process has a spectral density of the form

   $Sx(\omega) = 98\pi\delta(\omega) + 37$

   It is applied to a system whose transfer function is

   $$H(s) = \frac{4}{s+28}$$

   Find the magnitude of the mean value of the system output.

6. Attempt following :

   a) Explain in brief the concept of matched filter. **3**

   b) Define a Gaussian random process. When is a random process said to be Normal ? State the properties of a Gaussian Process. **4**

   c) White noise is applied to the input of the linear system whose impulse response is h(t) = u(t) – u(t – 1). Determine and sketch the autocorrelation function of the output. **4**

———————

SLR-KN – 36

Seat No.	

M.E. (Electronics Engineering) (Semester – I) (New) Examination, 2015
Paper – V : Elective-I – DESIGN OF WIRELESS SYSTEM (CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data if necessary.*

SECTION – I

1. a) Design a QPSK modulator and demodulator using RFMD RF 2713. **7**

   b) Design a BJT LC Oscillator for 25 to 500 MHz. **6**

2. a) What is PLL phase noise ? How to overcome it ? **6**

   b) Discuss design of shortened stub bandpass filter. **6**

   OR

   c) Design a low cost variable bias VGA amplifier with reverse gain control. Assume suitable parameters. **6**

3. a) Discuss behavior of resistor, inductor and capacitor at radio frequency. **5**

   b) Discuss digital modulation issues. **5**

   OR

   c) Discuss direct digital synthesis. **5**

SECTION – II

4. a) Draw and explain dual gate single ended narrowband MOSFET mixer for upto 250 MHz. Discuss design steps. **7**

   b) Draw and explain $50\,\Omega$ LC power splitter/combiner with 0° . Also design it for f_r = 915 MHz with $Z_{IN} = Z_{OUT} = 50\,\Omega$. **6**

P.T.O.

5. a) Explain how QOS in IEEE 802.11 WLAN system can be analyzed by suitable simulation. **6**

   b) Discuss Linear Congruential and Extended Fibonacci methods for random number generation. **6**

   OR

   c) Discuss basics of discrete event simulation. **6**

6. a) Discuss distortions in passive filter. **5**

   b) Draw and explain a superheterodyne dual conversion receiver. **5**

   OR

   c) Explain RF link budget. **5**

———————

SLR-KN – 37

Seat No.	

M.E. (Electronics Engineering) (Semester – I) (New) Examination, 2015
(Paper – V) Elective – I : WIRELESS SENSOR NETWORKS (CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if*** *necessary.*

SECTION – I

1. a) What are different energy based metrics used to evaluate routing protocols ? **7**
   b) Explain D MAC. **6**

2. Solve **any two** :
   a) What are the different hardware platforms available for sensor nodes ? **6**
   b) What are the objectives of MAC design ? **6**
   c) Explain flooding and gossiping. **6**

3. Solve **any two** :
   a) Explain directed diffusion. **5**
   b) Explain contention free MAC. **5**
   c) Explain protocol stack for WSN. **5**

SECTION – II

4. a) Explain data transfer in Beacon enabled and non-Beacon enabled networks. **7**
   b) Explain GPS based localization. **6**

5. Solve **any two** :
   a) Explain classification of power conservation mechanisms for WSN. **6**
   b) What are the challenges for time synchronization ? **6**
   c) Explain range based localization. **6**

6. Solve **any two** :
   a) Explain ZigBee functional layer architecture and protocol stack. **5**
   b) Give overview of IEEE 802.15.4. **5**
   c) Explain how devices can be connected using SPI bus. **5**

SLR- KN – 39

Seat No.	

M.E. (Electronics) (Semester – I) (New) (CBCS/CGPA Pattern) Examination, 2015

Paper – V : IMAGE AND VIDEO PROCESSING (Elective – I)

Day and Date : Wednesday, 30-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Solve the following questions : **(2×5=10)**

   i) What is quantization ? Explain visual Quantization.

   ii) Explain details Hadamard Transform.

2. Solve **any two** : **(2×6=12)**

   i) Explain details Blind De-convolution.

   ii) Explain details algorithm of K-L transform.

   iii) Explain the types of gray level transformation used for image enhancement.

3. Solve **any two** : **(2×6=12)**

   i) What is the use of Wiener filter in image restoration ? Explain.

   ii) Write short note on Bayesian method.

   iii) Explain image degradation model/restoration process in detail.

P.T.O.

SECTION – II

4. Solve the following questions : **(2×6=12)**

   i) Solve Huffman coding for given below example and find out efficiency of Huffman coding.

3	3	2	3
2	2	4	4
3	3	5	2
2	3	4	4

   ii) Differentiate between lossless and lossy compression and explain transform coding system with a neat diagram.

5. Solve **any two** : **(2×6=12)**

   i) Discuss about region based image segmentation techniques. Compare threshold region based techniques.

   ii) Define chain codes. Explain different type of chain code.

   iii) What is coding redundancy ? Explain brief details.

6. Solve **any two** : **(2×6=12)**

   i) Write short note on :

      a) H.261

      b) H.263.

   ii) Explain details MPEG 4, MPEG 7.

   iii) Explain Color model in video processing.

SLR-KN – 41

Seat No.	

M.E. (Electronics Engineering) (Semester – II) (New CGPA) Examination, 2015
Paper – VI : RESEARCH METHODOLOGY

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
3) Assume suitable data if necessary.

SECTION – I

1. a) What is significance of literature review ? How to carry it ? **6**
   b) With suitable example explain research design. **6**

2. a) With suitable example explain process for selecting research problem. **5**
   b) With suitable engineering application explain continuous modeling. **5**

   OR

   c) With suitable engineering application explain discrete modeling. **5**

3. a) With suitable example, explain objective, sub objective and scope in a typical engineering research synopsis. **7**
   b) Discuss Monte Carlo simulation. **6**

   OR

   c) What are motivational factors for carrying research ? **6**

SECTION – II

4. a) Explain confidence interval in statistical output analysis. **6**
   b) Explain hypothesis testing in statistical output analysis. **6**

P.T.O.

5. a) Write a note on Ethical research in engineering. **5**

   b) Write a note on use of virtual lab for engineering research. **5**

   OR

   c) With suitable engineering example explain guidelines for design of experiment. **5**

6. a) With suitable engineering example explain process for identifying distribution based on historical data. **7**

   b) Explain a general structure of an engineering research project report. How it differs from similar report of other disciplines like social science. **6**

   OR

   c) Discuss the role of ICT at different stages of research. **6**

SLR-KN – 42

Seat No.	

M.E. (Electronics) (Semester – II) (New – CGPA) Examination, 2015
Paper – VII : EMBEDDED SYSTEM DESIGN

Day and Date : Wednesday, 16-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instruction : All** questions are **compulsory**.*

SECTION – I

1. Explain the following Instruction **(any five)** : **(5×3=15)**
   1) MRC p2, 5, R3, c5, c6
   2) SWPB R2, R3, [R4]
   3) SWPEQ R0, R0, [R1];
   4) LDRH R1, [R2, – R3]!;
   5) STRH R3, [R4, #14];
   6) LDR R1, [R2, R3, LSL#2].

2. Draw diagram for interfacing of Stepper Motor with motor rotating in clockwise direction for 30 seconds and half the speed in reverse direction for 15 seconds using ARM 9 and write the programme in C. **10**

3. Explain interrupts and timers in ARM 9 architecture. **10**

   OR

   Explain the characteristics of embedded computing applications.

SECTION – II

4. Explain threads, mutex management and semaphore management. **10**

5. Explain the concept of various queues, stack and optimization of memory needs used in embedded system. **10**

6. Explain system design example of data base application in wireless robotics. **15**

———————

SLR-KN – 43

Seat No.	

M.E. (Electronics Engineering) (Semester – II) (New C.G.P.A.) Examination, 2015

Paper – VIII : PERIPHERAL SYSTEM DESIGN AND INTERFACING

Day and Date : Thursday, 17-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Figures to the **right** indicate **full** marks.*

*2) Assume necessary data if **required**.*

SECTION – I

1. Answer the following questions. **(3×4 = 12)**
   1) Explain various handshake signals use in RS 232. How multiple RS 232 devices can be connected ?
   2) List popular expansion and external buses available in PC. Draw and explain briefly I/O write operation in ISA bus cycle.
   3) Which signals are involved in data transfer in PCI ? How data transfer in case of PCI takes place ?

2. Answer **any two** from following questions. **(2×6 = 12)**
   1) Discuss PCI bus system and PCI bus arbitration.
   2) Explain organization of standard Centronics port in PC. Draw and explain timings for data transfer in Centronics interface.
   3) Draw and discuss GPIB bus expanders. What are bus extenders in GPIB ?

3. Answer the following questions.
   1) What are different classes in USB ? Draw and discuss various packet formats in USB communication. **6**
   2) What are the benefits of EISA over ISA ? Draw structure of EISA and discuss. **5**

      OR

   3) What is 20 mA current loop for serial communications ? What are the advantages and disadvantages of 20 mA current interface ? **5**

P.T.O.

SECTION – II

4. Answer following questions. **(3×4 = 12)**

   1) What is the purpose of controller chips in PC ? Which different controllers are available in PC ? Explain at least four registers associated with communication controller PC 16550D UART.

   2) Draw the block diagram of industrial controllers and describe function of each block.

   3) What are the basic functions of computer aided control system ? Draw block diagram of typical computer aided process control system and explain.

5. Answer **any two** from following questions. **(2×6 = 12)**

   1) Draw a block diagram showing architecture of PLC and describe each block.

   2) Draw the message format in case of Control Net protocol and explain it in detail.

   3) Explain basic DMA operation. Which different DMA channels are available in PC ?

6. Answer the following questions.

   1) Compare between analog, hybrid and digital communication protocols. What are field buses ? Discuss field bus classes and field bus architecture. **6**

   2) Name different HART protocol layers. Draw structure of HART telegram and explain it in detail. **5**

   OR

   3) Which transmission modes are supported by MODBUS ? Draw typical RTU-MODBUS message format and discuss. **5**

———————

SLR-KN – 44

Seat No.	

M.E. (Electronics) (Semester – II) Examination, 2015
ADVANCED CONTROL SYSTEMS (New CGPA) (Paper – IX)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicates* ***full*** *marks.*
2) ***Assume*** *suitable data* ***whenever*** *necessary.*

SECTION – I

1. Attempt **any two** : **(6×2=12)**

   a) Discuss the design procedure for designing lead compensator by root locus method.

   b) Describe the system in state variable form and determine observability properties for following system which is described by the differential equation

   $\frac{d^3y(t)}{dt^3} = u(t)$. Where y(t) is observed output and u(t) is input.

   c) Find inverse Z-transform for $\frac{z}{3z^2 - 4z + 1}$ where ROC is

   $|z| > 1, |z| < \frac{1}{3}$ and $\frac{1}{3} < |z| > 1$.

2. Attempt **any two** : **(6×2=12)**

   a) Obtain Eigen vectors for following matrices :

   $A = \begin{bmatrix} 2 & -5 \\ -2 & 4 \end{bmatrix}$.

   b) Obtain the state space representation for the system with following transfer function $T(s) = \frac{2}{s^3 + 2s^2 + 4s + 8}$.

   c) Explain Liapunov's stability analysis for nonlinear systems.

P.T.O.

3. a) Explain sampling, quantization effect in detail. **5**

   b) Explain mapping between S-plane and Z-plane. **6**

SECTION – II

4. Attempt **any two** : **(6×2=12)**

   a) Consider the system with transfer function $\frac{Y(s)}{U(s)} = \frac{s^2 + 2s + 3}{s^4 + 2s^3 + 3s^2 + 5s + 7}$.

   Find matrices A, B, C in observable canonical form.

   b) With block diagram explain 1-DOF control.

   c) Explain state space model of MIMO.

5. Attempt **any two** : **(6×2=12)**

   a) The negative feedback control system has the forward path transfer function as $\frac{Y(s)}{U(s)} = \frac{10}{s(s+1)}$. While the feedback path transfers function H(s) is 5. Determine the sensitivity of the closed loop transfer function with respect to H at $\omega = 1 \text{rad/sec}$.

   b) Explain pole placement control problem using Ackerman's equation.

   c) Explain structured and unstructured uncertainties.

6. Write short notes on the following :

   a) Write a note on internal stability. **5**

   b) Write a note on basic MIMO control loop. **6**

SLR-KN – 45

Seat No.	

M.E. (Electronics Engineering) (Sem. – II) (New) (CGPA) Examination, 2015
Elective – II : MOBILE TECHNOLOGY (Paper – X)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N. B. *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. a) With suitable diagram explain MS registration and the mobile call termination procedure. **7**
   b) List out the GPRS network nodes. Briefly explain its functions. **7**

2. Answer **any two** : **12**
   a) Explain any one method of VLR overflow control. What is the significance of it ?
   b) Describe GPRS PDP (Packet Data Protocol) context procedures.
   c) Explain WAP protocols.

3. a) Briefly explain the evolution of GPRS from GSM system. **5**
   b) Explain telecommunication management network. **4**

   OR

   b) Write a note on usefulness of WAP developer tool kits. **4**

P.T.O.

SECTION – II

4. a) Explain Iu-PS and Iu-CS interface protocol architecture. **7**

   b) Describe transport and physical channels of WCDMA. **7**

5. Answer **any two** : **12**

   a) Explain the types of handover, UMTS supports.

   b) Briefly write about EVDO revision 'O' and 'A'.

   c) With neat diagram explain working of 'Public Key Cryptography' in GSM.

6. a) Describe different components of information security. **5**

   b) Explain the 3GPP release 4 distributed network architecture. **4**

   OR

   b) Briefly explain the architecture of UTRAN. **4**

SLR-KN – 46

Seat No.	

M.E. (Electronics Engg.) (Semester – II) (New) Examination, 2015
Paper – X : Elective – II : REAL TIME SYSTEMS (CGPA)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. 2.00 p.m.

Instructions** : 1) **All** questions are **compulsory.
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable **data** if required.*

SECTION – I

1. 1) Explain with properties of performance measures of Real Time System. **6**

   2) Explain with the block diagram timing estimation system. **5**

2. 1) Explain with examples data type used in various programming tools. **6**

   2) Describe control structures used in programming language. **6**

3. 1) Explain multitasking used in various programming language. **6**

   2) Explain task scheduling mechanism in programming of Real Time Systems. **6**

SECTION – II

4. 1) Discuss a two phase approach to improve predictability. **6**

   2) Explain in detail serialization consistency with alteration of serialization order. **6**

5. 1) Discuss different communication media and their protocol used in Real Time Systems. **6**

   2) Explain different network topologies used in Real Time Systems. **6**

6. 1) Explain the Aggregated state model in case of transient faults. **6**

   2) Explain composite series-parallel system. **5**

SLR-KN – 47

Seat No.	

M.E. (Electronics) (Semester – II) (New CGPA Pattern) Examination, 2015
(Elective – II) Paper – X : VLSI IN SIGNAL PROCESSING

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

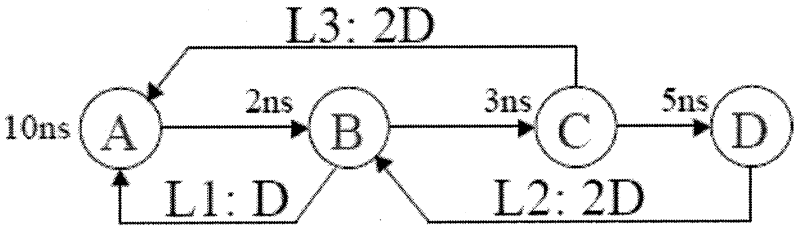
SECTION – I

1. Solve **any four** : **20**

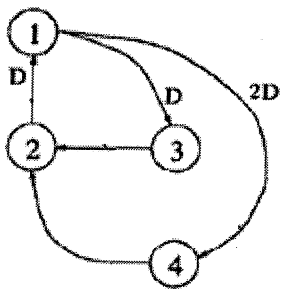
   a) Draw the block diagram, SFG and DFG for $y(n) = ax(n) + bx(n-1) + cx(n-2)$.

   b) Explain the advantages of pipelining and parallel processing on account of power consumption and justify the same.

   c) Compute the loop bounds for the following loops :



   d) Perform the retiming for the following DFG shown in fig.

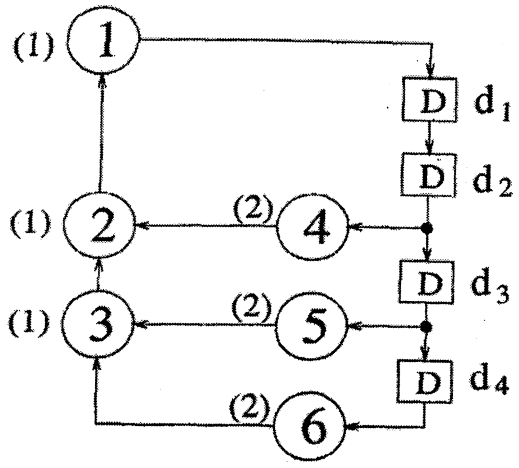


   e) What is retiming of DFG ? Explain properties of retiming.

P.T.O.

2. Solve the following : **8**

a) For DFG shown below find iteration bound using MCM algorithm.



b) In the SFG shown in fig. (a) the computation time for each node is assumed to be 1 u.t.

i) Calculate critical path computation time.

ii) The critical path has been reduced to 2 u.t. by inserting 3 extra delay element as shown in fig. (b).

iii) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t. **7**

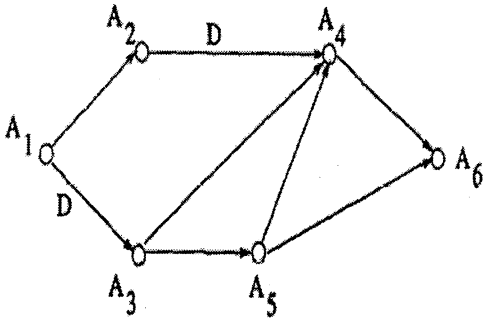


Fig. a

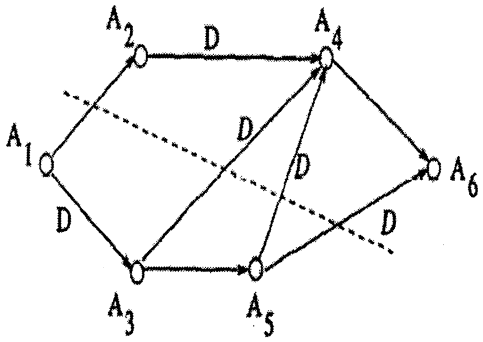
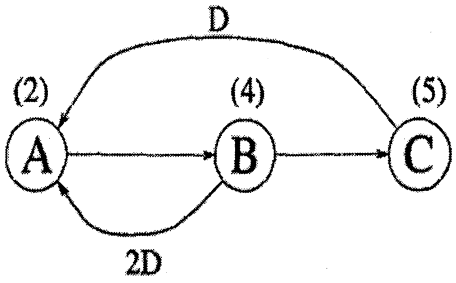


Fig. b

OR

b) Find the loop bound and iteration bound for the DFG shown below. Also examine the precedence constraints and justify the loop bound calculated above.



7

SECTION – II

3. Solve **any four** : **20**

a) Write a note on systolic design for matrix-matrix multiplication.

b) Mention the step to minimize register in folding architecture.

c) Prove the relationship with suitable example that unfolding preserves number of delay.

d) Explain applications of unfolding.

e) Explain parallel carry save array multipliers.

4. Solve the following : **8**

a) Design B1 filter for FIR systolic array.

b) Draw the constraint graph and use it to determine if the following system inequalities have a solution and find the solution if one exists using Floyd-Warshall algorithm.

$r_1 - r_2 \leq 0$

$r_3 - r_1 \leq 5$

$r_4 - r_1 \leq 4$

$r_4 - r_3 \leq -1$

$r_3 - r_2 \leq 2$ **7**

OR

b) Draw the circular life time chart for following with period N = 9 : **15**

Variable name	Tin
a	0
b	1
c	2
d	3
e	4
f	5
g	6
h	7
i	8

SLR-KN – 49

Seat No.	

M.E. (Electronics) Semester – II (Old) Examination, 2015
EMBEDDED SYSTEM DESIGN (Paper – VII)

Day and Date : Tuesday, 15-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

N.B. : *i)* ***All*** *questions are* ***compulsory****.*
ii) Figures to ***right*** *indicate* ***full*** *marks.*
iii) Assume suitable data if ***necessary****.*

SECTION – I

1. Attempt **any two** : **16**
   a) Explain features of PIC Microcontroller 16F 877.
   b) Interface 4 × 4 keyboard matrix to PIC microcontroller 16F 877.
   c) Compare I2C & UART serial interfaces.
2. a) Explain PWM mode of PIC microcontroller. **8**
   b) Explain compare mode using Timer – 1. **8**
3. a) Explain UART initialization in PIC microcontroller. **9**
   b) Write a program to display “SOLAPUR” on LCD display. **9**

SECTION – II

4. a) Explain Function-Queue-Scheduling architecture. **8**
   b) Explain any two interprocess communication techniques. **8**
5. a) How events are managed in RTOS ? **8**
   b) Power saving techniques in RTOS. **8**
6. Attempt **any three** : **18**
   a) Cross-Compilers
   b) Semaphore problems
   c) Hard Real-time scheduling
   d) Tasks and data.

SLR-KN – 50

Seat No.	

M.E. (Electronics) (Semester – II) (Old) Examination, 2015
Paper – VIII : ADVANCED PROCESS CONTROL

Day and Date : Wednesday, 16-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Figures to the **right** indicates **full** marks.*
*2) **Assume** suitable data **whenever** necessary.*

SECTION – I

1. Attempt **any two** : **(8×2=16)**
   a) Describe different steps in modeling of system. How can these steps be categorized as model development and solution ?
   b) Develop feed forward control design for any process control system. Draw neat diagram. What is feed forward control decision criteria ? – Explain.
   c) Explain an empirical model building procedure.

2. Attempt **any two** : **(8×2=16)**
   a) Explain noninteracting and interacting structures of series systems.
   b) Compare process reaction curve method and statistical identification method.
   c) Discuss the effect of proportional gain, integral constants and derivative constant on the closed loop response of the process control with PID controller.

3. Attempt **any three** : **(6×3=18)**
   a) Effect of control on product quality
   b) Linearization with respect to modeling.
   c) Processes control benefits.
   d) Parallel systems.

P.T.O.

SECTION – II

4. Attempt **any two** : **(8×2=16)**

   a) Analyze the control performance for internal model control, feedback control of the three tank mixing process using closed loop frequency response.

   b) Compare Automatic Control Processes (APC) and Statistically Processes Control (SPC)

   c) Explain in detail PLC ladder diagram.

5. Attempt **any two** : **(8×2=16)**

   a) What are various steps to be considered when we are executing a project based on PLC ?

   b) What are the effects of interaction on multi loop control ? Define relative gain-array 'λ ij' and explain relative gain-array 'λ ij' and explain.

   c) Explain Smith predictor with a neat block diagram.

6. Write short notes on **any three** of the following : **(6×3=18)**

   a) Multi Loop Control

   b) PLC Architecture

   c) Explain Shewhart Chart

   d) Relative Gain Array (RGA)

———————

SLR-KN – 52

Seat No.	

M.E. (Electronics Engineering), (Sem. – II) Examination, 2015
Paper – IX : MOBILE COMMUNICATION ENGINEERING
(Elective – II) (Old)

Day and Date : Thursday, 17-12-2015 Max. Marks : 100

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Assume suitable data if ***necessary****.*

SECTION – I

1. a) Discuss in detail the following parameters of mobile multipath channels. **9**
   i) Doppler spread
   ii) Time dispersion parameter
   iii) Coherence bandwidth

   b) Explain Fresnel zone geometry. Explain in detail knife edge diffraction model. **9**

2. a) Explain long distance path loss model in detail. **8**

   b) What are the advantages and disadvantages of the two ray ground reflections model in the analysis of path loss ? In the following case tell whether the two ray model could be applied and explain why or why not at ht = 35 m, hr = 3 m, d= 250 m. **8**

3. Answer **any two** : **16**

   a) Briefly write on radio communication on flat rayleigh fading channel.

   b) Explain radio modems for wireless networks.

   c) With block diagram explain 'spread spectrum sliding correlator channel sounding' measurement system used for small-scale fading effects.

P.T.O.

SECTION – II

4. a) Discuss classification of equalizers. Explain in detail working of linear equalizers. **9**

   b) Explain least mean square algorithm. What is its significance ? **9**

5. a) Explain DECT TDMA frame structure. **8**

   b) With block diagram explain $\pi/4$ DQPSK modulation scheme. **8**

6. Answer **any two** : **16**

   a) Explain signal processing in GSM.

   b) In IS - 95 CDMA system if total RF bandwidth, W = 1.25 MHz, information bitrate R = 9600 bps and the number of users N = 14.

      i) Calculate Eb/No

      ii) When no voice activity is there, calculate Eb/No for omnidirectional antennas

      iii) If voice activity = 3/8 and three sector antennas are used, calculate the total number of users cell.

   c) Briefly explain working of personal access communication system.

———————

SLR-KN – 53

Seat No.	

M.E. Electronics (Semester-II) (Old) Examination, 2015
Paper- IX – DISTRIBUTED DATABASE SYSTEM (Elective-II)

Day and Date : Thursday, 17-12-2015 Total Marks :100

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*

*2) Figures to the **right** indicate **full** marks.*

3) Assume suitable data if necessary.

SECTION – I

1. Solve following.

   A) Explain framework for transaction management. **10**

   B) Explain Top-Down and Bottom-Up Approach to the design of Data Distribution. **8**

   OR

   Explain design of horizontal fragmentation. **8**

2. Solve following.

   A) Explain methods for optimization of general queries. **10**

   B) Explain communication structure for commit protocols. **6**

3. Solve following.

   A) Explain recovery for distributed databases systems with different failure types. **10**

   B) Explain AHY algorithm for optimization. **6**

   OR

   Explain importance of query optimization in distributed databases. **6**

P.T.O.

SECTION – II

4. Solve following.

   A) Explain concurrency control based on timestamp. **10**

   B) Explain non blocking commitment protocol. **8**

   OR

   Explain object distribution design. **8**

5. Solve following.

   A) Explain content of catalog and different alternatives to distribute catalog. **10**

   B) Explain false deadlock. **6**

6. Solve following.

   A) Explain distributed object database management system. **10**

   B) Explain schema and queries at different levels of multibase architecture. **6**

   OR

   Explain role of catalog in distributed database system. **6**

SLR-KN – 54

Seat No.	

M.E. (Electronics Engineering) (Sem. – II) (Old) Examination, 2015
Paper – X : BROADBAND COMMUNICATION (Elective – III)

Day and Date : Friday, 18-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Figures to the* ***right*** *indicate* ***full*** *marks.*
2) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Solve **any two** : **(2×8=16)**
   1) List different switching techniques. Explain each in detail. What is the significance of packet size in packet communication ?
   2) Draw and explain block diagram showing functional grouping and reference points in case of ISDN.
   3) How many channels are available for communication in case of ISDN ? Discuss multi-framing in ISDN in detail.

2. Solve **any two** : **(2×8=16)**
   1) What is the meaning of bursty traffic ? Explain modeling of bursty traffic in detail.
   2) What are different video traffic characteristics ? Discuss fluid source model for video.
   3) What is call control in ISDN ? Explain Q.931 protocol and format in detail.

3. Solve **any two** : **(2×9=18)**
   1) What is the need of rate adaption and multiplexing in ISDN ? Discuss both rate adaption and multiplexing in ISDN in detail.
   2) Explain X.25 packet standard in detail. What are internal operations and external services in case of ISDN ?
   3) What is the difference between X.25 and frame relay standard ? Discuss LAPF core control protocol in case of frame communication.

P.T.O.

SECTION – II

4. Solve **any two** : **(2×8=16)**
   1) Compare ATM and IP communication. What are the advantages of equal length packet processing in packet networks ? How packet size changes communication time in packet network ?
   2) What are the different methods of transferring ATM cells in networks ? Explain each in detail.
   3) What is the meaning of synchronous mode of communication ? Draw and explain ATM cell structure.

5. Solve **any two** : **(2×8=16)**
   1) Draw logical and physical hierarchy of SONET system and explain.
   2) Draw a flow chart showing ATM call establishment and explain each stage in detail.
   3) How ATM cell is processed in network ? What are the aspects of buffer in the ATM switches ?

6. Solve **any two** : **(2×9=18)**
   1) Draw the block diagram of generic ATM switch element and explain it in detail. What are matrix type ATM switches ?
   2) Explain rate based traffic control in ATM Networks.
   3) Describe different broadband services in detail.

SLR-KN – 55

Seat No.	

M.E. Electronics (Semester – II) (Old) Examination, 2015
Paper X : SOFTWARE ENGINEERING (Elective – III)

Day and Date : Friday, 18-12-2015 Max. Marks : 100

Time : 11.00 a.m. to 2.00 p.m.

1. Solve **any four** : **(5×4=20)**
   a) Explain module level concepts.
   b) Define software. Justify your answer on software is developed/engineered, it is not manufactured in classical sense.
   c) List prescriptive process models. Explain any one with strengths and weakness.
   d) What is Estimation in s/w project management ?
   e) Write a note on s/w project plan.

2. Solve the following : **(3×10=30)**
   a) What are software myths ? Explain in detail.
   b) Define requirement. List types of documents in s/w project. Write an IEEE standard format for software requirement.
   c) Explain Rational Unified process's phases and workflow.

      OR

   c) Explain object oriented concepts in detail.

3. Solve **any four** : **(5×4=20)**
   a) What is data design ? Explain it's need.
   b) Discuss objectives of software quality assurance.
   c) Draw DFD for "Safe Home" security function.
   d) Explain cyclomatic complexity.
   e) Write a note on CASE.

4. Solve the following : **(3×10=30)**
   a) Explaincase tools for Analysis and design.
   b) Draw DFD with level 1, 2 and 3 for "Monitor sensors with flow boundaries".
   c) Define software testing. Explain levels of testing in detail.

      OR

   c) Discuss manual testing and automatic testing.

———————

SLR-KN – 56

Seat No.	

M.E. (Electronics Engineering) (Semester – II) (Old) Examination, 2015
Paper – VI : ADVANCED COMPUTER ARCHITECTURE

Day and Date : Saturday, 19-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks*
*3) Assume suitable data if **necessary**.*

SECTION – I

1. a) Explain relaxed models for memory consistency. **8**
   b) Explain instruction formats and load store instructions for DLX. **10**

   OR

   c) Explain basic pipeline for DLX. **10**

2. a) Explain data hazard classification. **8**
   b) Explain dynamic scheduling. **8**

3. a) Discuss classification of instruction set. **10**
   b) Discuss first three cycles of DLX instructions. **6**

   OR

   c) Explain encoding of an instruction set. **6**

SECTION – II

4. a) Discuss how to enchance vector performance. **10**
   b) Explain effectiveness of compiler vectorization. **8**

   OR

   c) Explain vector length control. **8**

5. a) Explain multiprocessor cache coherence. **8**

   b) Explain directory protocol. **8**

6. a) Explain instruction level parallelism. **8**

   b) Explain reducing control stalls using target buffer. **8**

   OR

   c) Discuss Tomasulo approach. **8**

SLR-KN – 57-1

Seat No.	

M.E. (Electronics Engineering) (Semester – III) Examination, 2015

Self Learning Module

NETWORK AND INTERNET SECURITY (Paper – I)

Day and Date : Thursday, 31-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. a) Discuss wireless network threats and security measures. **7**

   b) What is Kerberos ? What is motivation behind it ? What are requirements ? **6**

2. Solve **any two** : **(2×6=12)**

   a) Explain remote user authentication using asymmetric encryption.

   b) Explain IEEE 802.11i phases of operations in brief.

   c) Explain WAP end to end security.

3. Solve **any two** : **(2×5=10)**

   a) Explain cryptographic algorithm for WAP.

   b) Draw and explain TCP/IP model.

   c) Explain IEEE 802.11i pseudorandom function.

P.T.O.

SECTION – II

4. a) With suitable diagram explain internet mail architecture. **7**

   b) Explain DKIM functional flow. **6**

5. Solve **any two** : **(2×6=12)**

   a) Explain IPSec scenario and its benefits.

   b) What are Web Security Threats ?

   c) Explain SSL architecture.

6. Solve **any two** : **(2×5=10)**

   a) What are the intrusion techniques ?

   b) What are password selection strategies ?

   c) Explain firewall protection.

SLR-KN – 57-2

Seat No.	

M.E. (Electronics) (Semester – III) Examination, 2015
Self-Learning Subject
Paper – I : ADVANCED SIGNAL AND IMAGE PROCESSING

Day and Date : Thursday, 31-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Solve **any four** of the following : **20**
   a) Explain Biometric system with the help of neat diagram.
   b) What are the various security and privacy related issues in Biometric system ?
   c) Explain the application of fuzzy logic in Image processing.
   d) Explain the filters used to reduce the noise in medical images.
   e) Explain feature extraction process in medical image processing.

2. Solve the following :
   a) Explain the design cycle of Biometric system. Also mention the various types of system errors. **8**
   b) Explain biomedical image processing with the help of neat diagram. **7**

   OR

   b) Explain how fuzzy logic is useful in data mining. **7**

SECTION – II

3. Solve **any four** of the following : **20**
   a) Explain with the help of equations effect of scaling on power consumption.
   b) What are the various power reduction techniques ? Explain in brief.

P.T.O.

c) Explain how the power is estimated in sequential circuits.

d) Explain multiplexer based Manchester adder.

e) Explain in detail force directed scheduling algorithm.

4. Solve the following :

a) Explain Wallace tree multiplier with the help of neat diagram. **8**

b) Explain simulation and non-simulation based approaches in low power VLSI design. **7**

OR

b) Explain the application of DSP processor in Multimedia signal processing. **7**

———————

SLR-KN – 58

Seat No.	

M.E. (CSE) (Semester – I) (New) (Examination, 2015
Paper – I : THEORY OF COMPUTATION (CBCS/CGPA)

Day and Date : Monday, 21-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Answer **any four** : **24**

   a) What is proof by Contradiction ? Prove that $\sqrt{2}$ is rational.

   b) Illustrate E_{DFA} and EQ_{DFA} in decidability and prove that they are decidable languages.

   c) Prove that for any two sets A and B prove that $\overline{A \cap B} = \overline{A} \cup \overline{B}$ with possible method of proof.

   d) Define and illustrate the terminologies sequence, tuples and functions with example.

   e) Define non-deterministic TM. Prove that every non-deterministic TM has an equivalent deterministic TM.

2. Answer the following : **6**

   Define a Turing Machine and Design a TM for a language $L1 = \left\{1^{2^n} \mid n >= 0\right\}$ the language consisting of 1s whose length is a power of 2.

3. Answer the following : **5**

   What is diagonalization ? Prove that R is uncountable where R is a set of real numbers.

P.T.O.

SECTION – II

4. Answer **any four** : **24**

   a) Prove that E_{TM} is undecidable and elaborate reduciability.

   b) Define computation history and linear bounded automation. Prove that A_{LBA} is decidable.

   c) State base functions and strategy sets of primitive recursive functions.

   d) Explain tractable and intractable problems.

   e) What is time complexity ? Brief out the time complexity of a TM.

5. Answer the following : **6**

   Define mapping reducibility and prove that if $A \leq_m B$ & A is undecidable then B is undecidable.

6. Answer the following : **5**

   What is the terminology of a recursion theorem ? Elaborate with its applications.

SLR-KN – 59

Seat No.	

M.E. (Computer Science and Engg.)(Semester – I)(New) Examination, 2015
(CBCS-CGPA)
ADVANCED OPERATING SYSTEMS (Paper – II)

Day and Date : Wednesday, 23-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

I. Answer **any two** of the following. **10**

1) Define distributed systems. List out the differences between network operating system and distributed operating system.

2) Explain correctness feature in message passing system. What are the issues related to correctness ?

3) With example illustrate the CBCAST protocol for implementing causal ordering semantics.

II. Answer **any two** of the following. **10**

1) Explain RPC mechanism with diagram.

2) With example illustrate stateful and stateless server.

3) What is thrashing ? What are the methods used for solving the problem of thrashing ?

III. Answer the following.

1) Explain design and implementation issues of DSM. **8**

2) How memory coherence protocols work in Replicated Migrating Blocks (RMB). **7**

P.T.O.

SECTION – II

IV. Answer **any two** of the following. **10**

1) Draw the taxonomy of Load-Balancing algorithms and explain Static Load balancing algorithms.

2) Explain Location policies

   i) Bidding

   ii) Pairing

3) List and explain thread scheduling methods.

V. Answer **any two** of the following. **10**

1) Explain mechanisms for handling co-processes.

2) How message-forwarding takes place in process migration ?

3) List five important features of a good process migration.

VI. Answer the following. **8**

1) Explain the following consistency models.

   i) Sequential consistency model

   ii) Causal consistency model.

2) Explain memory management in Linux. **7**

———————

SLR-KN – 60

Seat No.	

M.E. (CSE) (Semester – I) (New) (CBCS – CGPA) Examination, 2015
Paper – III : ANALYSIS OF ALGORITHMS

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Figures to the **right** indicate **full** marks.*
*2) Solve **any three** questions from **each** Section.*

SECTION – I

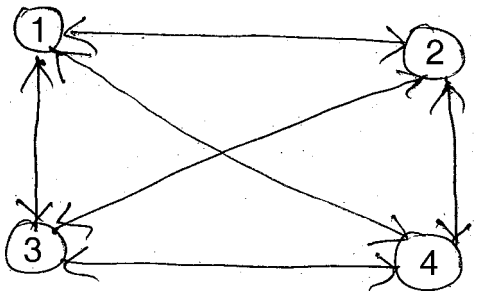
1. A) What are the asymptotic notations ? Determine the time complexity of following algorithm :

```
Algorithm mult (a, b, c, m, n, p)
{
      for i = 1 to m do
         for j = 1 to p do
         {
              c[i, j] = 0;
           for k = 1 to n do
           c[i, j] = c[i, j] + a[i, k] * b[k, j];
   }  }
```

6

B) Explain the amortized complexity (analysis) in detail. **6**

2. A) Consider the following directed graph and cost matrix. Find a tour of minimum cost. **6**



(a)

$$\begin{bmatrix} 0 & 10 & 15 & 20 \\ 5 & 0 & 9 & 10 \\ 6 & 13 & 0 & 12 \\ 8 & 8 & 9 & 0 \end{bmatrix}$$

(b)

Fig. 1 : Directed Graph

B) What is principle of optimality ? Explain any two problems for which principle of optimality holds. **5**

P.T.O.

3. A) Obtain a minimum cost spanning tree using Prim's algorithm from the following weighted graph. Analyze the time complexity of Prim's algorithm. **6**

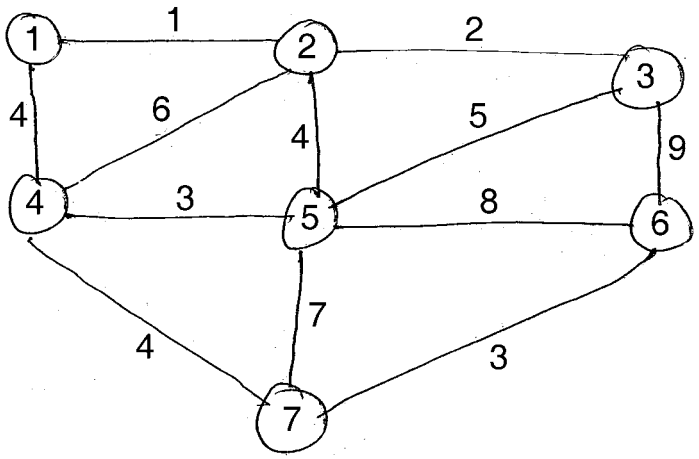


Fig. 2 : Weighted Graph

B) Using substitution method solve the following recurrence equation :

$$T(n) = \begin{cases} 2 & , \quad \text{if } n = 1 \\ 2T(n/2) + n, & \text{if } n > 1 \end{cases}$$ **6**

4. A) What is 8-Queen problem ? Write the algorithm to solve the n-queen problem using backtracking. **6**

B) Explain how to solve o/1 knap-sack problem using branch and bound method. **6**

SECTION – II

5. A) Explain NP-Hard scheduling problems. **6**

B) State and explain Cook's theorem. **6**

6. A) Explain the fundamental techniques and algorithm in PRAM. **7**

B) Explain Voronoi diagrams. **5**

7. A) Explain how to compute convex Hulls in geometric algorithm. **6**

B) Explain a work-optimal algorithm. **6**

8. Write short note on : **11**

A) Odd-even merge algorithm

B) NP-Hard Graph Problems.

SLR-KN – 61

Seat No.	

M.E. (Computer Science and Engineering) (Part – I) (Semester – I) (New) Examination, 2015

Paper – IV : RESEARCH METHODOLOGY (CBCS – CGPA)

Day and Date : Monday, 28-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q. No.* ***(4)*** *and Q. No.* ***(8)*** *are* ***compulsory****.*

2) Attempt ***any two*** *from remaining questions in* ***each*** *Section.*

3) Assume suitable data if needed.

4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) List types of research and explain quantitative vs. Qualitative research with suitable example. **6**

   b) Explain the difference between Research Methods and Research Methodology. **6**

2. a) Explain the meaning of the following in context of Research design. **6**

   – Experimental and Control groups.

   – Treatments.

   b) Describe some of the important research designs used in experimental hypothesis-testing research study. **6**

3. a) Explain the telephone interviews with merits and demerits. **6**

   b) Explain and illustrate the following research designs **6**

   – Latin square design

   – Factorial design.

4. Draw Research Process Flow Chart and Explain Preparation of report process in detail with suitable example. **11**

P.T.O.

SECTION – II

5. a) Find the mean, geometric mean, harmonic mean and median of the following data : 6, 7, 10. **6**

   b) Write a short note on problems in processing. **6**

6. a) What things are to be considered while reading a scientific paper ? **6**

   b) Write a short note on Patents and Copyrights. **6**

7. a) What are the precautions that need to be taken while writing a research report ? **6**

   b) Explain the layout of Research Report. **6**

8. a) What are the important statistical measures used to summarize the survey/ research data ? **6**

   b) Explain the procedure for Hypothesis Testing along with Flow Diagram. **5**

———————

SLR-KN – 62

Seat No.	

M.E. (Computer Sci. and Engineering) (Semester – I)
(New) Examination, 2015
Paper – V : Elective – I : DATA MINING (CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any five** questions from **each** Section.*
*2) Assume suitable data **if needed**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Define KDD and explain KDD process in detail. **7**
2. Explain star and snowflake schema of data warehouse with example. **7**
3. List out the categories of OLAP tools and explain them. **7**
4. Explain nearest neighbor algorithm and PAM algorithm. **7**
5. What are similarity measures ? **7**
6. Write short note on Bayes theorem. **7**

SECTION – II

7. Explain Web usage mining. **7**
8. Explain Harvest System and Personalization of Web Content Mining. **7**
9. Explain SPADE in detail. **7**
10. Write short note on trend dependencies. **7**
11. Explain SD (CLARANS) algorithm. **7**
12. List out different applications of Data Mining. **7**

SLR-KN – 63

Seat No.	

M.E. (Computer Science and Engg.) (New) (Semester – I) Examination, 2015
(CBCS/CGPA)
Paper – V : Elective – I : MOBILE COMPUTING

Day and Date : Wednesday, 30-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

1. Solve **any two** : **12**

   a) Define modulation. List different modulation techniques and explain advanced phase shift keying.

   b) Discuss main problem of signal propagation.

   c) Explain Code Division Multiple Access (CDMA).

2. Solve **any two** : **12**

   a) How is localization, location update, roaming etc. done in GSM and reflected in databases ? What are typical roaming scenarios ?

   b) Explain MTC and MOC in GSM.

   c) Draw and explain GPRS architecture reference model.

3. Explain MACA with polling and ISMA. **6**

   OR

   Draw and explain FHSS transmitter and receiver.

4. Explain security in GSM. **5**

P.T.O.

SECTION – II

5. Solve **any two** : **12**

   a) Explain synchronization and power management in IEEE802.11.

   b) Write a note on WML script.

   c) Explain DFWMAC-PCF with RTS/CTS extension.

6. Solve **any two** : **12**

   a) Explain fast transmit/recovery and selective retransmission in mobile TCP.

   b) Explain agent discovery phase in detail.

   c) Explain infrastructure-based and ad-hoc wireless network.

7. Explain Palm OS architecture with kernel features and system managers. **6**

   OR

   Draw and explain Symbian OS architecture.

8. Explain wireless datagram protocol in WAP. **5**

SLR-KN – 66

Seat No.	

M.E. (CSE) (Semester – II) (CGPA) Examination, 2015
INTERNET ROUTING ALGORITHM (New) (Paper – VI)

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***Wherever*** *required draw* ***neat*** *diagrams.*
2) If not given assume appropriate essential basic data.

SECTION – I

I. Write answer to **any two** questions : **(2×5=10)**

a) Write a short note on IP Protocol Stack Architecture.

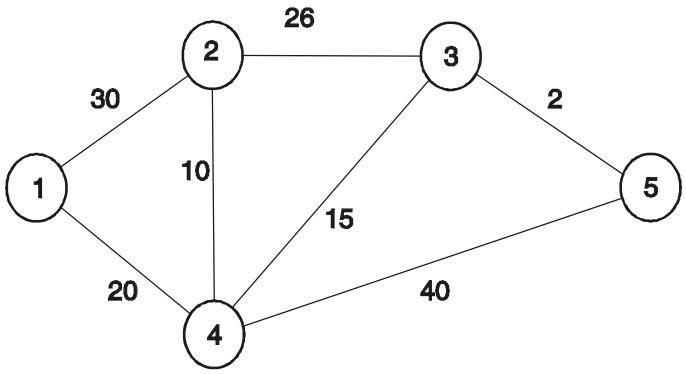
b) Which IPv4 address blocks are reserved for current usage ? Why is it necessary to reserve some addresses from an address space rather than making all of them available ?

c) What is a link state advertisement ? Why are different types of LSAs defined in OSPF ?

II. Write answer to **any two** questions : **(2×5=10)**

a) Using mathematical notations and equations write the Bellman-Ford algorithm that iterates in terms of number of hops.

b) Consider the following network topology. The number listed next to the links is assumed to be bandwidth. Determine the widest path from node 2 to node 5 using widest path algorithm, computed at node i (Dijkstra based).



c) Write a short note on similarities and differences between IS-IS and OSPF.

III. a) What are the different states in the BGP finite state machine ? **10**

b) What are the primary operational considerations in regard to the RIP protocol ? **5**

P.T.O.

SECTION – II

IV. Write answer to **any two** questions : **(2×5=10)**

a) List three differences between a distance vector protocol and a link state protocol.

b) What is the relation between an AS and an ISP ?

c) Write a preview of the main router bottlenecks together with causes and solutions and define network algorithmics.

V. Write answer to **any two** questions : **(2×5=10)**

a) How is split horizon with poisoned reverse different from split horizon ?

b) For a given IP address, how would you find out its home AS number ?

c) With diagram explain shared forwarding engine architecture of router.

VI. a) Explain the grid of tries type of two-dimensional packet classification algorithm and state its advantages. **10**

b) What are the sub-protocols of a link state protocol ? **5**

———————

SLR-KN – 67

Seat No.	

M.E. (CSE) (Semester – II) (New) (CGPA) Examination, 2015
ADVANCED DATABASE CONCEPTS (Paper – VII)

Day and Date : Wednesday, 16-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Question No.* ***4*** *from Section –* ***I*** *and Question No.* ***8*** *from Section –* ***II*** *are* ***compulsory****.*
2) Attempt ***any two*** *remaining questions from* ***each*** *Section.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. A) Explain the various types of transparency issues in distributed database design. **6**
   B) Draw and explain the reference architecture for distributed database system. **6**
2. A) Explain the recovery of distributed transaction. **6**
   B) Explain 2-phase locking as a concurrency control method. **6**
3. A) Explain pipelined and independent interoperation parallelism. **6**
   B) Define attribute-value skew and partition skew. Explain the three approaches for handling of skew in data partitioning. **6**
4. A) Discuss in detail the framework for query optimization. **6**
   B) Explain the objectives for design of data distribution. **5**

SECTION – II

5. A) What is space filling curve ? Discuss its properties and applications. **6**
   B) Explain the various types of spatial data and temporal data. **6**
6. A) Explain the various issues in the design of MDBMS. **6**
   B) Explain the segmentation process in multimedia database. **6**

P.T.O.

7. A) Explain the structure data types in ODBMS. **6**

   B) Compare with merits and demerits between RDBMS and ODBMS. Explain how to implement ORDBMS. **6**

8. Write short note on : **11**

   A) Object identifiers and reference types.

   B) Video database techniques.

———————

SLR-KN – 68

Seat No.	

M.E. (Computer Sci. & Engg.) (Semester – II) Examination, 2015
Paper – VIII : PARALLEL COMPUTER ARCHITECTURE (New CGPA)

Day and Date : Thursday, 17-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions from Section **I** and **II** are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume data **if necessary**.*

SECTION – I

1. A) Discuss the principle of the operation of ILP-Processors. **5**
   B) What are the main aspects of Data Dependencies ? **5**
   C) Draw the simplified structure of a straight forward pipeline. Explain each stage. **5**

2. Illustrate two major aspects of super scalar instruction issue. Explain in detail issue policies involved in super scalar instruction issue. **10**

3. Describe the following with respect to Operand fetch Policies. **10**
   1) Operand fetch during instruction issue, assuming a single register file for both FX and FP data.
   2) Operand fetch during instruction dispatch, assuming a single register file for both FX and FP data.

SECTION – II

4. Attempt **any three** of the following : **(5×3=15)**
   a) What are the types of branches ? Explain it in short.
   b) Write a note on branch statistics.
   c) What are the basic approaches to branch handling ?
   d) What is snoopy coherence ? Explain how it occurs.

5. Explain and assess the basic delayed branching scheme. **10**

6. Draw and explain a block diagram of IBM Power 4. Draw a pipeline layout of IBM Power 4. Explain stages of the pipeline. **10**

———————

SLR-KN – 69

Seat No.	

M.E. (Computer Science and Engineering)
(Part – I) (Semester – II) Examination, 2015
(Paper – IX) Elective – II : GRID COMPUTING
(New – CGPA)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Wherever*** *required draw appropriate and neat diagrams.*
4) If data/network topology is ***not*** *given then assume* ***suitably****.*

SECTION – I

1. Write answer to **any four** questions. **(4×5=20)**

   A) What is GRID Computing ?

   B) Compare Grid Computing and Cloud computing environments.

   C) Analyse business value of Grid Computing.

   D) What are the components of World Wide LHC Computing Grid ?

   E) In the context of OGSA what is called as virtual organizations ?

   F) List the key research issues that remain for exploiting knowledge services in the Semantic Grid.

2. Write answer to **any one** questions. **10**

   A) Describe the layered Grid architecture.

   B) Review Globus Toolkit Grid technology.

3. Write a short note on service-oriented view of the Semantic Grid. **5**

P.T.O.

SECTION – II

4. Write answer to **any four** questions. **(4×5=20)**

   A) Write a short note on parallel computing technique used for image stretching (resampling) in virtual sky application of Grid Computing.

   B) Write a short note on applications of GARUDA Grid.

   C) How security in GARUDA Grid is facilitated ?

   D) Write a short note on VOTable.

   E) Write a short note on semantic web of astronomical data.

   F) What are the challenges of the grid from the perspective of bioinformatics researchers ?

5. Write answer to **any one** questions. **10**

   A) Explain the MONTAGE architecture used for image computing application of Grid computing.

   B) What is a GARUDA Grid computing system ? Describe its architecture with core components.

6. Outline the data processing by pipeline of applications in Encyclopedia of Life (EOL) project. **5**

SLR-KN – 70

Seat No.	

M.E. (CSE) Part – I (Semester – II) (New) Examination, 2015
Paper – IX : Elective – II : REAL TIME OPERATING SYSTEM (CGPA)

Day and Date : Friday, 18-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

N.B. *: 1) Figures to the **right** indicate **full** marks.*

*2) Q. **1** from Section-**I** and Q.**5** from Section-**II** are **compulsory**.*

*3) Attempt **any two** from Q.**2** to Q.**4** for Section-**I** and Q.**6** to Q.**8** for Section-**II**.*

SECTION – I

1. When is a system real-time ? Discuss real-time system design issues and give any two examples of real time systems. **7**

2. A) Describe requirement Phase of software life cycle by explaining Functional and non-functional requirement and rules for requirements/Design documents. **7**

   B) Explain use of finite state Automata in design by drawing FSA for Automated Teller Machine. **7**

3. A) Describe Phase/state driven code and coroutines real-time kernels. **7**

   B) Explain synchronization mechanism-Event Flags and Signals with suitable example. **7**

4. A) Explain the use of mailboxes by describing mailbox implementation, operations and Queues. **7**

   B) Describe Process stock management in detail. **7**

P.T.O.

SECTION – II

5. Write a note on – scheduling is NP – Complete. **7**

6. A) Describe Analysis of memory requirements in detail. **7**

   B) Explain classical Queuing Theory. **7**

7. A) Differentiate with suitable example – Faults, Failures, Bugs and Defects. **7**

   B) Describe Unit-level Testing, Statistically based Testing and stree Testing. **7**

8. A) Describe Goals of real-time system integration. **7**

   B) Describe real-time UNIX by drawing one architecture for real time UNIX. **7**

———————

SLR-KN – 71

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) (New CGPA) Examination, 2015
Paper – IX : Elective – II : NATURAL LANGUAGE PROCESSING

Day and Date : Friday, 18-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data **where** necessary.*

SECTION – I

1. Answer briefly : **15**

   a) Illustrate DCG formalism.

   b) Illustrate Kriya Rupa Chart.

   c) Mention the types of Karaka relations.

   d) How do augmented Transition Networks work ?

   e) Give the steps in creating a Paradigm table.

2. Attempt **any two** : **10**

   a) What is Utsarga-apvaada ? Illustrate its use.

   b) Explain the semantic model of Panninian framework.

   c) What are the phrases involved in the analysis of sentences ? Give illustrations of each.

3. Attempt **any two** : **10**

   a) With an illustration explain the use of case grammars.

   b) Compare Noun groups with Verb groups.

   c) Demonstrate Constraint parser working with an illustration.

P.T.O.

SECTION – II

4. Answer briefly : **15**

   a) State the differences in North Indian and South Indian languages.

   b) Compare TAG with TSG.

   c) Illustrate the use of TAM labels.

   d) Give the language bridges in Hindi.

   e) Why does PG perform better than TAG ?

5. Attempt **any two** : **10**

   a) State and illustrate the levels of GB.

   b) How does LFG deal with Wh movements ?

   c) What are the basic goals of GB and PG ?

6. Attempt **any two** : **10**

   a) Illustrate the adjoining operation of LFG.

   b) Compare the Theta Theory with Case Theory.

   c) State the basic levels of GB. How do they Co-relate with each other ?

SLR-KN – 72

Seat No.	

M.E. (CSE) (Semester – II) (New – CGPA) Examination, 2015
Elective – II : INFRASTRUCTURE MANAGEMENT (Paper – IX)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data* ***if necessary****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Attempt **any four** : **(6×4=24)**
   a) Explain the current business demands and IT system issues.
   b) Explain the complexity of today's computing environment.
   c) Explain capacity management in detail.
   d) What are the IT services ? Explain continuity management.
   e) Explain patterns for IT system management.
   f) What is ITIL ? Explain it in detail.

2. Explain evaluation of systems from main frames-to-new age systems and their management. **6**

3. Write short note on design process for information systems. **5**

SECTION – II

4. Attempt **any four** : **(6×4=24)**
   a) Explain incident management in detail.
   b) Explain backup and restore.
   c) What is data retention ? Explain it in detail.
   d) Explain the regularity issues in infrastructure management.
   e) Explain different environmental policies.
   f) Explain configuration management.

5. Explain service level management in detail. **6**

6. Write short note on : **5**
   i) Service desk ii) Firewalls.

———————

SLR-KN – 73

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II)
(CGPA) Examination, 2015
Elective – III : WEB TECHNOLOGY (New) (Paper – X)

Day and Date : Saturday, 19-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any five*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if necessary****.*

SECTION – I

1. Design an online book selling application with database connectivity using ASP. **7**
2. Explain Adrotator and browser capability components with example. **7**
3. Design a web page of college using HTML and CSS. **7**
4. Explain DOM event handling. Give example of creating content menu. **7**
5. Explain any four HTTP request method. **7**
6. Explain Xpath nodes. **7**

SECTION – II

7. Write a servlet program for blogging. **7**
8. Explain get and post request in JSP. **7**
9. Describe servlet architecture and various interfaces invoke by servlet container. **7**
10. Describe the process of generating dynamic contents using servlets. **7**
11. How do you handle errors in JSP ? **7**
12. Explain Mashups and podcasting. **7**

———————

SLR-KN – 75

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) (New–CGPA) Examination, 2015
Elective – III : OBJECT ORIENTED SOFTWARE ENGINEERING AND DESIGN PATTERNS

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to p.m.

***Instructions** : 1) Question **1** and **5** are **compulsory**.*
*2) Answer **any three** questions in **each** Section.*
*3) Make **suitable** assumptions if **necessary** and state them **clearly.***

SECTION – I

1. Answer briefly : **15**

   a) Write a short note on building blocks of model driven design.

   b) What are relationships ? Explain different type of relationships.

   c) What is the use of Activity Diagram ?

2. a) Explain Crunching Knowledge. **5**

   b) What is global Analysis ? **5**

3. a) Write a short note on Architectural Styles. **5**

   b) What are the factors involved while practicing Domain Model Engineering ? **5**

4. What is UML ? What is the Unified Process ? Explain the requirements workflow. **10**

P.T.O.

SECTION – II

5. Write a short note on : **15**

   a) Creational Patterns

   b) Access Control Patterns

   c) Service Variation Patterns.

6. a) How is behaviour documented in software architecture design ? **5**

   b) What are component and connector view types ? Explain their styles. **5**

7. a) Compare between product and quantity archetype patterns. **5**

   b) What are communication patterns ? Give one example. **5**

8. Explain Code Architecture and Modular Architecture view in detail. **10**

SLR-KN – 76

Seat No.	

M.E. (Semester – II) (Computer Science and Engineering)
(New CGPA) Examination, 2015
Elective – III : WIRELESS AD-HOC NETWORK (Paper – X)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Question **1** and **5** are **compulsory**.*
*2) Attempt **any two** questions from remaining Sections.*
*3) Figure to **right** indicates marks.*

SECTION – I

1. A) Explain Doppler Shift and Nyquist's Theorem in short. **5**

   B) Explain following MAC layer functionalities : **6**

      i) Point coordination function

      ii) Synchronization.

2. A) Describe in details a common method used in alleviation the hidden terminal problem at the MAC layer. **6**

   B) What are the features of Ad-hoc Network because of which it has become popular ? List and explain in details the application of Ad-hoc wireless network. **6**

3. A) Explain with neat diagram Zone Routing Protocol (ZRP). **6**

   B) Explain with proper example and diagram the AODV protocol. List its advantages and disadvantages. **6**

4. A) What are the issues in designing a routing protocol for Ad-hoc WAN ? **6**

   B) Why energy management is so important in wireless Ad-hoc network ? Explain energy management challenges in wireless sensor network. **6**

P.T.O.

SECTION – II

5. A) Give the comparison of various TCP solutions for Ad-hoc wireless networks. **5**

   B) Explain in details security requirements and challenges in Ad-hoc wireless network protocols. **6**

6. A) Explain with diagram the MAC layer and application layer with its module in multicast routing reference model. **6**

   B) List and explain various network layer attacks in Ad-hoc WANs. **6**

7. A) Explain Ad-hoc TCP and split TCP in details. **6**

   B) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **6**

8. A) Why it is difficult to design a multicast routing protocol ? Explain with diagram receiver initiated multicast protocols. **6**

   B) Explain in details On-Demand Multicast Routing Protocol (Mesh Based). **6**

SLR-KN – 77

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) (Old) Examination, 2015
Paper – VII : ADVANCED DATABASE DESIGN

Day and Date : Tuesday, 15-12-2015 Total Marks : 100

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Question **1** and **5** are **compulsory**.*

*2) Attempt **any two** questions from question **2** to **4** from Section **I**.*

*3) Attempt **any two** questions from question **6** to **8** from Section **II**.*

*4) Figures to the **right** indicate marks to a question.*

*2) Assume suitable data **wherever** necessary.*

SECTION – I

1. a) Explain reference model of distributed concurrency control. **8**

   b) Explain all the criteria applied for transformation of global query to fragment query with example. **7**

   c) Explain Quorum based 3 phase commit protocol. **5**

2. a) Explain criteria for fragment allocation in distributed database. **8**

   b) Explain SDD-1 algorithm. **7**

3. a) What are the goals of transaction management ? **7**

   b) With neat diagram explain communication structures for commit protocol. **8**

4. a) Explain how inconsistencies are detected and resolved. **8**

   b) Which problems arises in authorization and protection due to distribution ? **7**

P.T.O.

SECTION – II

5. a) What are the structured types ? Explain the operations on structured data with example. **12**

   b) Explain different approaches for retrieving multimedia data. **8**

6. a) Explain quad-trees. **8**

   b) Explain storage of multimedia data. **7**

7. a) Explain Web Server Gateway Interface. **8**

   b) Explain data management issues in mobile database systems. **7**

8. a) How inheritance is handled in object database systems ? Explain with example. **8**

   b) How OQL is different than SQL ? **7**

———————

SLR-KN – 78

Seat No.	

M.E. (Computer Sci. & Engg.) (Semester – II) Examination, 2015
ADVANCED COMPUTER ARCHITECTURE (Old) (Paper – VIII)

Day and Date : Wednesday, 16-12-2015 Total Marks : 100

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q. No.* ***4*** *and Q. No.* ***8*** *are* ***compulsory****. Answer* ***any two*** *questions from Q. No.* ***1*** *to Q. No.* ***3*** *and* ***any two*** *from Q. No.* ***5*** *to Q. No.* ***7****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

3) Assume data if ***necessary****.*

SECTION – I

1. A) State types of pipelines. Explain linear pipeline in detail. **8**

   B) What are the different ways for creating and terminating thread ? **8**

2. A) What is instruction scheduling ? Explain in detail. **8**

   B) Explain principle working of Scalar ILP processors. **8**

3. A) How sequential consistency is preserved in parallel processing ? **10**

   B) Explain difference between RISC and CISC. **6**

4. Write notes on **any two** : **18**

   a) Flynn's classification scheme

   b) Data forwarding in pipelining

   c) Control dependence.

SECTION – II

5. A) What is shelving ? Discuss briefly. **8**

   B) Explain ROB used in superscalar architecture. **8**

P.T.O.

6. What is the register renaming method ? Explain in detail. **16**

7. A) Explain basic principle of VLIW. **8**

   B) What do you mean by instruction dispatch ? Explain dispatch policy in superscalar processor. **8**

8. Write notes on **any two** : **18**

   a) Load-use delay

   b) Power PC 620

   c) Trace 200 family.

SLR-KN – 79

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2015
Elective – III : WEB TECHNOLOGY (Old) (Paper – IX)

Day and Date : Thursday, 17-12-2015 Total Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Questions **1** and **8** are **compulsory**.*
*2) Solve **any five** questions from **each** Section. **Each** question carries **eight** marks.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Create a XML doc for students' mark list and DTD for that and then validate the XML. **10**
2. What is IIS ? State its purpose. **8**
3. Explain DOM event handling. **8**
4. Explain structure of HTTP request and response web page. **8**
5. Explain on-line payments. **8**
6. List any two differences between HTML and XHTML with respect to elements. **8**
7. Explain any eight CSS text properties. **8**

SECTION – II

8. Design the JSP page for Library due calculation with Enrollment No., Student Name, Book Name, Number of days as fields in JSP page. Calculate and display required information along with the total amount to be paid by student, in other JSP page using standard action only. Fine is to be calculated at rate of 50 Rs./per day basis. **10**
9. Explain in detail with example the dynamic content generation by servlets. **8**
10. Explain Web 2.0 and Web 3.0 implement strategies. **8**
11. Explain problems associated with servlets and methods to overcome. **8**
12. Explain Mashups and Widgets. **8**
13. Explain method and properties of Sever and Session objects. **8**
14. Explain the components of JSP. **8**

SLR-KN – 85

Seat No.	

M.E. (Computer Science and Engineering) (Sem. – II) (Old) Examination, 2015

NATURAL LANGUAGE PROCESSING (Elective – IV) (Paper – X)

Day and Date : Friday, 18-12-2015 Total Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data* ***where*** *necessary.*

SECTION – I

1. Answer briefly : **18**
   a) How is Karaka sharing dealt with ?
   b) Translate the sentence 'John deleted my file' in an Indian language and analyze the same.
   c) Comment on Free word order and Vibhakti.
   d) Compare Noun groups with Verb groups.
   e) Generate a Word group table.
   f) Give the basic goal of NLP.

2. Attempt **any two :** **16**
   a) Explain the semantic model of Paninian frame work.
   b) Demonstrate the working of the Constraint Parser with an appropriate illustration.
   c) What are Karaka relations ? Explain its six structures.

3. Attempt **any two** : **16**
   a) Develop an algorithm to perform morphological analysis using Paradigm tables.
   b) Illustrate the formation of Kriya Rupa charts.
   c) How is Vibhakti essential in Indian languages ?

P.T.O.

SECTION – II

4. Answer briefly : **18**

   a) Give the language bridges in Hindi.

   b) Compare GB with PG.

   c) Define the term locality and illustrate.

   d) Give the components of Anusaraka system.

   e) Why is machine translation difficult ?

   f) What are the features of South Indian Hindi ?

5. Attempt **any two** : **16**

   a) Give the basic properties of LFG.

   b) How does LFG handle Wh movements in questions ?

   c) Compare TAG and TSG.

6. Attempt **any two** : **16**

   a) What is the Theta Theory ? How is it different from the Case theory ?

   b) PG performs better than TAG. Justify.

   c) Give the characteristics of Indian languages. How do they become candidates for Pg representation ?

SLR-KN – 87

Seat No.	

M.E. (Computer Science and Engineering) (Part – I) (Semester – II) (Old) Examination, 2015
Paper – VI : COMPUTER NETWORK ADMINISTRATION

Day and Date : Saturday, 19-12-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Assume suitable data if **necessary**.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Attempt **any two** : **16**

   A) Explain encoding structure with example.

   B) Explain current status and future of network management.

   C) Explain SNMP network management architecture.

2. Attempt **any two** : **16**

   A) Explain ASN.1 in detail.

   B) Describe network management model.

   C) Write a note on communication protocols and standards.

   D) Differentiate between MIB and MDB.

3. Attempt **any three** : **18**

   A) Challenges of Information technology manager.

   B) Functional model.

   C) Explain two tier and three tier network management organizational model.

   D) Distributed Computing Environment.

P.T.O.

SECTION – II

4. Attempt **any two** : **16**

   A) Describe the major changes in SNMP v2 and v3.

   B) Explain communication and functional models.

   C) Describe SNMP Model.

5. Attempt **any two** : **16**

   A) Write a note on RMON, SMI & MIB.

   B) Explain ATM remote monitoring.

   C) Write a note on network management tools.

6. Attempt **any three** : **18**

   A) Explain commercial network management systems.

   B) What are the enterprise management solutions ?

   C) Compare RMON and SNMP.

   D) Describe and explain network statistics measurement in detail.

———————

SLR-KN – 88-A

Seat No.	

M.E. (CSE) (Part – II) (Semester – III) Examination, 2015
SELF LEARNING – BIGDATA (Paper – I)

Day and Date : Thursday, 31-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any four** : **24**
   a) Briefly explain map-reduce, Hadoop and Bigtable in Bigdata management.
   b) What is Bigdata technology stack ? Elaborate its Layer 3 and Layer 4 in detail.
   c) Where the Map-Reduce functions are used ? Specify their implementation details.
   d) How Bigdata structures are different from data warehouse data ? Elaborate.
   e) How cloud can be used for Bigdata ? List out the cloud market providers in Bigdata.

2. Answer the following : **6**
   What is Big structured data ? Elaborate with example.

3. Answer the following : **5**
   Write a short note on Bigdata analytics and Bigdata applications.

SECTION – II

4. Answer **any four** : **24**
   a) What is communication cost model ? Elaborate for task networks.
   b) What are reducer size and replication rate in complexity theory of map-reduce ? Explain.
   c) How customer experience is improved with text analytics ? Describe.
   d) Elaborate values and actions in Bigdata ethics.
   e) List and explain the seven Global Privacy Principles.

5. Answer the following : **6**
   Illustrate computation of selections and projections by map-reduce.

6. Answer the following : **5**
   What is streaming data ? Describe it with environmental impact.

SLR-KN – 88C

Seat No.	

M.E. (Computer Sci. and Engg.) (Part – II) (Semester – III) Examination, 2015
Paper – I : SELF LEARNING (Computer Network Administration)

Day and Date : Thursday, 31-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q.* ***1*** *from Section –* ***I*** *and Q.* ***5*** *from Section –* ***II*** *are* ***compulsory****.*
2) Attempt ***any two*** *questions from Q.* ***2*** *to Q.* ***4*** *for Section –* ***I*** *and* ***any two*** *questions from Q.* ***6*** *to Q.* ***8*** *for Section –* ***II****.*
3) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Draw diagram of OSI Communication Architecture and explain services provided by each layer. **7**

2. A) Describe and explain network management functional flow chart. **7**
   B) Describe Analogy of Telephone Network Management. **7**

3. A) What is ASN.1 ? Describe Terminology, Symbols and Conventions. **7**
   B) Describe Communication model of OSI Network Management. **7**

4. A) Describe SNMP Managed LAN Network and SNMP Internet Documents. **7**
   B) Describe elements of system group in MIB. **7**

SECTION – II

5. What is RMON2 ? Describe RMON2 MIB Groups and its functions. **7**

6. A) Define and explain RFC 1157 – SNMP Macro. **7**
   B) Describe with example MIB lexicographic ordering. **7**

7. A) What is Remote Monitoring ? Explain RMON SMI and MIB. **7**
   B) Describe RMON 1 groups and functions. **7**

8. A) Describe protocol analyzer tool and its basic configuration. **7**
   B) Describe fault management, performance management, accounting management and security management of NMS. **7**

SLR-KN – 89

Seat No.	

M.E. (Electronics and Telecommunication Engineering) (Semester – I) Examination, 2015
(New – CBCS)
Paper – I : RESEARCH METHODOLOGY

Day and Date : Monday, 21-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***N.B.** : **All** questions are **compulsory**.*

SECTION – I

1. Solve **any two** : **(5×2=10)**
   a) Explain extraneous variable with example.
   b) What is system and system environment ? Explain with example.
   c) State the different sample designs.

2. Solve **any one** : **(7×1=7)**
   a) Explain Monte Carlo method with example.
   b) Explain basic principles of Experimental design.

3. Solve **any three** : **(6×3=18)**
   a) State difference between :
      i) Qualitative and Quantitative Research
      ii) Conceptual and Empirical Research.
   b) With the help of Block diagram explain research process.
   c) What is technique involved in defining a problem. State example.
   d) Explain static physical model and dynamic physical model with example.

P.T.O.

SECTION – II

4. Solve **any two** : **(2×5=10)**
   1) Explain in detail types of errors.
   2) Write the various steps involved in writing report.
   3) Give comment on role of probability and statistics in simulation.

5. Attempt **any one** : **(1×7=7)**
   1) Enumerate the essential characteristics of a good experimental design and purpose in research studies.
   2) Mention the different types of report particularly pointing on the difference between a technical report and a popular report.

6. Write a short note on **any three** : **(3×6=18)**
   1) IEEE Format.
   2) E-research.
   3) Need of precision.
   4) Writing technical paper.

———————

SLR-KN – 90

Seat No.	

M.E. (Electronics & Telecommunication Engg.) (Semester – I) Examination, 2015
(New – CBCS)
ANTENNA THEORY AND DESIGN (Paper – II)

Day and Date : Wednesday, 23-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data if required.*

SECTION – I

1. Solve **any two** questions : **(5×2=10)**

   a) Explain Broadside Array radiation pattern with mathematical expression.

   b) Explain the radiation mechanism of a microstrip antenna.

   c) State and explain advantages and limitations of microstrip antenna.

2. Solve **any one** question : **(7×1=7)**

   a) Derive the expression for electric field intensity at a point due to two isotropic sources which has equal amplitude and in phase to each other.

   b) Derive the expression for electric field intensity at a point due to two non isotropic sources which has equal amplitude and in phase to each other.

3. Attempt **any three** questions : **(6×3=18)**

   a) Explain in brief microstrip line feed and coaxial feed technique of microstrip Antenna.

   b) Explain transmission line model for the analysis of microstrip antenna.

   c) Explain in brief design consideration of rectangular microstrip antenna.

   d) State importance of antenna array and explain Linear array, Planar array, Circular array.

P.T.O.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**

   a) Justify selection of shape of patch effects on bandwidth of microstrip antenna.

   b) Write a note on semiconductor substrate.

   c) Explain desirable substrate characteristics for antenna fabrication.

5. Solve **any one** question : **(7×1=7)**

   a) Explain Linear array design with microstrip patches using series feed arrays.

   b) State different techniques for bandwidth enhancement of antenna. Explain any one technique in brief.

6. Attempt **any three** questions : **(6×3=18)**

   a) Explain the role of dielectric constant and thickness of antenna at the time of designing of antenna.

   b) Explain one dimensional parallel feed excitation method for microstrip antenna.

   c) Explain how the excitation at each element of array is determined from the available and the radiated power of the element.

   d) Explain about the aperture coupled microstrip antenna for broad band antennas.

———————

SLR-KN – 92

Seat No.	

M.E. (E and TC) (Semester – I) (New – CBCS) Examination, 2015
Paper – IV : ADVANCED NETWORK SYSTEMS

Day and Date : Monday, 28-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** : **(5×2=10)**

   a) Draw and explain IP datagram format.

   b) With proper diagram explain working of Mobile IP.

   c) Explain DNS mapping process with suitable example.

2. Attempt **any one** : **(7×1=7)**

   a) Explain communication over control and data connection in FTP. Which well known port numbers are used for these connection ?

   b) Draw and explain DNS message format.

3. Write short notes on **any three** : **(6×3=18)**

   a) Internet Security

   b) Firewall Architecture

   c) ARP

   d) RPC.

P.T.O.

SECTION – II

4. Solve **any two** : **(5×2=10)**
   a) Explain the functional architecture of ITU-NGN.
   b) Define and explain different ATM source traffic descriptors.
   c) Explain the classical IP over ATM model.

5. Solve **any one** : **(7×1=7)**
   a) Explain User-Network signaling in ATM.
   b) Explain RSVP architecture.

6. Solve **any three** : **(6×3=18)**
   a) Explain the concept of TISPAN NGN.
   b) Write a note on virtual connections in ATM.
   c) How tunneling is implemented in MPLS ?
   d) Explain physical layer design guidelines for Gigabit Ethernet.

———————

SLR-KN – 93

Seat No.	

M.E. (E & TC) (Semester – I)(New – CBCS) Examination, 2015
Elective – I : OPTICAL NETWORKS (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if required****.*

SECTION – I

1. Solve **any two** : **(5×2=10)**
   a) Discuss in detail SONET multiplexing hierarchy. How does it encapsulate conventional digital multiplexing hierarchy ?
   b) Write short note on the evolution of optical systems. Illustrate the signaling multiplexing hierarchies.
   c) Write a note on WDM cross connects. What is wavelength continuity property ?

2. Solve **any one** : **(7×1=7)**
   a) Discuss at least five methods of clock exchange. What are advantages of each of these methods ?
   b) Explain the following with reference to optical networks architecture :
      - The Digital Wrapper
      - Control Planes
      - In/out of band signals

3. Solve **any three** : **(6×3=18)**
   a) Discuss major architectural components of an optical transport network.
   b) What is synchronous clock hierarchy ? What is its importance in high speed transport networks ?
   c) Discuss basic formats of :
      i) An STS-N SONET frame ii) An STM-N SDH frame
   d) Briefly explain Dense Wave Division Multiplexing.

P.T.O.

SECTION – II

4. Solve **any two** : **(5×2=10)**
   a) Explain the multiprotocol lambda switching.
   b) Compare domain service model and unified service model.
   c) Explain the concept of IP and λ forwarding with example.

5. Solve **any one** : **(7×1=7)**
   a) Explain the control element in optical router.
   b) Explain the method of label distribution with the concept of Forwarding Equivalence Class (FEC).

6. Solve **any three** : **(6×3=18)**
   a) Compare traffic oriented and resource oriented approaches for traffic engineering.
   b) Write a short note on :
      i) Generalized label
      ii) Port and Wavelength lables
   c) Explain operations of label eraser and label writer (BLUM 01) in optical router.
   d) Explain the mapping of MPLS labels to WDM channels.

———————

SLR-KN – 94

Seat No.	

M.E. (Electronics & Telecommunication Engineering) (Semester – I) Examination, 2015
(New – CBCS)
SPEECH AND VIDEO PROCESSING (Elective – I) (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) Draw ***neat*** *diagram* ***wherever*** *required.*

SECTION – I

1. Attempt **any two** : **(6×2=12)**
   a) Explain in detail digital simulation of speech signal.
   b) Describe briefly acoustic phonetics like semi vowels, nasals.
   c) Explain in detail synthesis of speech with linear predictive coding.

2. Attempt **any one** : **(7×1=7)**
   a) Explain in detail LMS filter in speech processing.
   b) Describe briefly NLMS filter.

3. Attempt **any two** : **(8×2=16)**
   a) Describe in detail adaptive noise cancellation.
   b) Describe briefly speech recognition techniques.

SECTION – II

4. Attempt **any two** : **(7×2=14)**
   a) Draw and explain 3D motion models.
   b) Explain in detail pixel based motion estimation.
   c) What are sampling structures for analog and digital video ?

P.T.O.

5. Attempt **any one** : **(7×1=7)**

   a) Explain in detail multi resolution motion estimation.

   b) Explain in detail application of motion estimation in video processing.

6. Write short note on **any two** : **(7×2=14)**

   a) Region based motion estimation

   b) Predictive coding

   c) Mesh based motion estimation

   d) Geometric image formation.

SLR-KN – 95

Seat No.	

M.E. (E & TC) (Semester – I) Examination, 2015
(New-CBCS) (Elective – I)
ADVANCED VLSI DESIGN (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: I) Q. **1** is **compulsory**.*

*II) Attempt **any two** questions from Q. **2** to Q. **4**.*

*III) Attempt **any two** questions from Q. **5** to Q. **7**.*

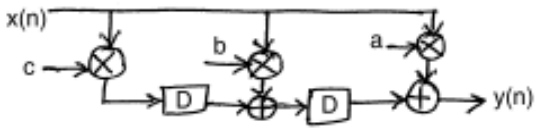
1. a) Explain Viterbi algorithm used for decoding of convolutional codes. **5**

   b) Explain slow down, retiming and pipelining. **5**

   c) Draw data dependence graph for 3 – tap FIR filter given by **4**
   $y(n) = b_0\, x(n) + b_1\, x(n-1) + b_2\, x(n-2)$.

2. a) Explain the use of pipelining for reducing power consumption and increasing speed. **8**

   b) For given structure, $T_M = 10$ units and $T_A = 2$ units. If desired clock period is 6 units, draw fine grain pipelined structure of given filter. **6**

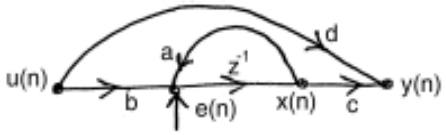


3. a) Construct a 2×2 convolution algorithm using modified Cook-Toom algorithm with $\beta_0 = 0, \beta_1 = -1$. **8**

   b) Explain Baugh Wooley multiplier for 4×4 bit multiplication. Verify its operation with example. **6**

P.T.O.

4. a) For IIR filter whose transfer function is given by $H(Z) = \frac{bcz^{-1}}{1-az^{-1}} + d$ and its SFG is find roundoff noise for unscaled and scaled system. **8**



b) What is Horner's rule ? Why its architecture is not implementable ? **6**

5. a) For given systolic array representation of carry save array multiplication following vectors are defined.

$d = (1\ \ 0)^T$ $P^T = (0\ \ 1)$ $S^T = (1\ \ 1)$

i) Give the edge mapping.

ii) Draw bit serial carry save multiplier. **8**

b) Explain synchronous pipelined system. Also explain two phase clocking strategy. **6**

6. a) Explain architecture of tspc n latch and tspc p latch. **8**

b) Write a note on switching activity. **6**

7. a) Give the FPGA implementation of c-element with and without clear. **8**

b) Draw static CMOS full adder. **6**

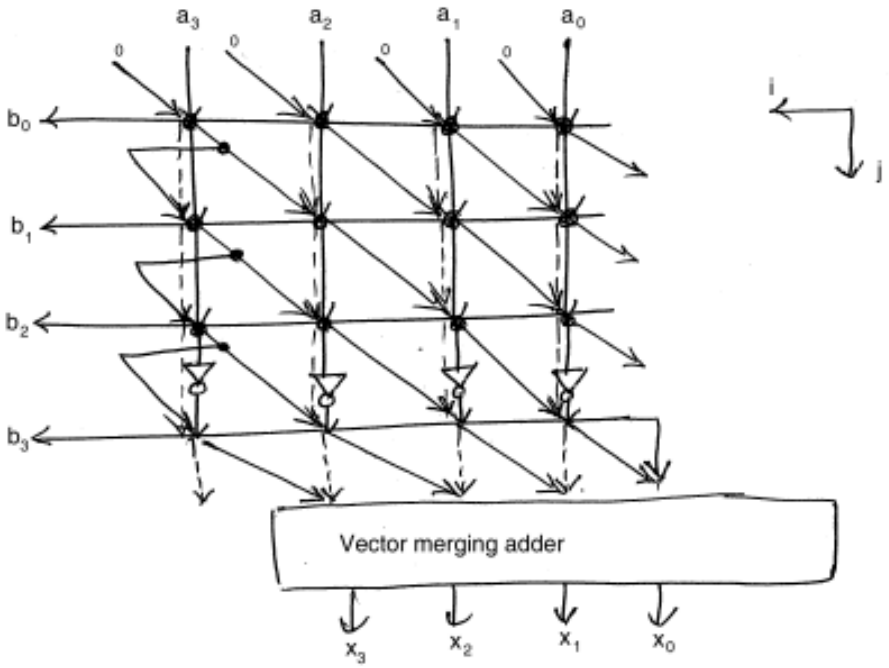


Figure for Q. 5 (a)

SLR-KN – 96

Seat No.	

M.E. (Electronics & Telecommunication Engg.) (Semester – II) (CGPA) Examination, 2015
Paper – VI : RF & MICROWAVE CIRCUIT DESIGN

Day and Date : Tuesday, 15-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **required**.*

SECTION – I

1. Solve **any two** questions : **(5×2=10)**

   a) State and explain Maxwell's Equation in point from and integral form.

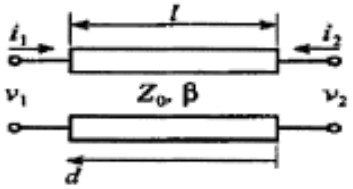
   b) Define polarization of EM Wave. Briefly explain vertical and horizontal polarization.

   c) Define the following term and their physical significance with reference to a Transmission line
      i) Characteristic impedance
      ii) Phase velocity
      iii) Phase constant

2. Solve **any one** question : **(7×1=7)**

   a) A 600 Ω lossless transmission line is fed by a 50 Ω generator. If the line is 200 m long and of 500 Ω , determine in dBs (i) Reflection loss (ii) Transmission loss and (iii) Return loss.

   b) Compute the ABCD matrix representation of following transmission line with characteristic impedance Zo, Propagation constant β and length 1.



P.T.O.

3. Attempt **any three** questions : **(6×3=18)**

   a) Explain the characteristics of the Smith chart.

   b) A Transmission line has a characteristic impedances of $50\,\Omega$ and it is terminated in a load impedance of $(50 + j\,50)\,\Omega$. The operating wavelength $\lambda = 5$ cm. Calculate SWR. Plot the normalized load impedance and the SWR Circle on the Smith Chart.

   c) Explain the parameters which play a key role while analyzing filters.

   d) For a particular Si pn-junction the doping concentration are given to $N_A = 10^{18}\ cm^{-3}$ and $N_D = 5 \times 10^{15}\ cm^{-3}$ with an intrinsic concentration of $n_i = 1.5 \times 10^{10}\ cm^{-3}$. Find the barrier voltages for T = 300° K.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**

   a) Explain Class A RF transistor amplifier design.

   b) Find ABCD parameters of a RC LPF and calculate transfer function H(w), corresponding phase ϕ (w) and the group delay.

   c) Explain the operation of BJT as active RF Element.

5. Solve **any one** question : **(7×1=7)**

   a) Discuss Richard's Transformation and Unit element matrix.

   b) Explain the use of Smith chart in case of design of L section impedance matching network.

6. Attempt **any three** questions : **(6×3=18)**

   a) Write a note on Frequency transformation.

   b) Explain about different topologies of single stub matching network.

   c) Explain design of high frequency microwave oscillator.

   d) Discuss the term insertion loss and loss factor.

SLR-KN – 97

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) (CGPA) Examination, 2015
Paper – VII : WIRELESS COMMUNICATION

Day and Date : Wednesday, 16-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions** : 1) Q. **1** is **compulsory.
*2) Solve **any four** questions from Q. **2** to Q. **6.***
*3) Figures to **right** indicate **full** marks.*
*4) **Assume** suitable data **if necessary**.*

1. Attempt the following :

   a) Explain indoor propagation model in detail. **5**

   b) Explain basic concept of cellular phone. **5**

   c) Explain the difference between wireless and fixed telephone network. **4**

2. a) Discuss channel assignment strategies and hand off strategies. **7**

   b) Assume a receiver is located 10 Km from a 50W transmitter. The carrier frequency is 6 GHz and free space propagation is assumed, Gt = 1, Gr = 1 **7**

      i) Find the power at the receiver

      ii) Find the magnitude of the E-field at the receiver antenna

      iii) Find the rms voltage applied to the receiver input, assuming that the receiver antenna has a purely real impedance of 50Ω and is matched to the receiver.

3. a) What are the types of small scale fading due to multipath as well as Doppler spread ? Explain frequency selective fading. **7**

   b) Explain with derivation and suitable waveforms free space propagation model. **7**

P.T.O.

4. a) Explain the signaling traffic in SS7. **7**

   b) In an slotted ALOHA system the packet arrival times from a Poisson process having a rate of 10^3 packets/sec. If the bit rate is 10 Mbps and there are 1000 bits/packet, find **7**

      i) normalized throughput of the system

      ii) the number of bits per packet that will maximize the throughput.

5. a) Compare TDMA and FDMA techniques. **7**

   b) If GSM uses a frame structure where each frame consists of eight time slots, and each time slot contains 156.25 bits and data is transmitted at 270.833 kbps in the channel, find **7**

      i) the time duration of a bit

      ii) the time duration of a slot

      iii) the time duration of a frame, and

      iv) how long must a user occupying a singe time slot wait between two successive transmissions ?

6. a) Explain the multiple access technique for wireless communication. **7**

   b) Write a short note on GSM. **7**

———————

SLR-KN – 98

Seat No.	

M.E. (Electronics and Telecommunication) (Semester – II) (CGPA) Examination, 2015
Paper – VIII : ADAPTIVE SIGNAL PROCESSING

Day and Date : Thursday, 17-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data, if necessary.*

1. Attempt **any two** : **15**
   a) Explain in detail adaptive systems.
   b) Derive performance function and draw performance surface for Adaptive linear combiner.
   c) Specify the error surface for input correlation matrix

   $R = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ and $P = \begin{bmatrix} 6 \\ 7 \end{bmatrix}$, $E\left[d_k^2\right] = 12$ also find optimum weight values.

2. Attempt **any two** : **10**
   a) Explain in detail gradient search algorithm.
   b) Find eigen values and eigen vectors of input correlation matrix $R = \begin{bmatrix} 4 & 1 \\ 1 & 3 \end{bmatrix}$.
   c) Compute the cross correlation of $x_1(n) = \{4, 1, 2, 0, 3\}$ and $x_2(n) = \{1, 3, 2, 3\}$.

3. Attempt **any two** : **15**
   a) Explain in detail correlation matrix and its properties.
   b) Describe briefly power spectrum estimation.
   c) Evaluate the transfer function of the following two stochastic models.
      i) Autoregressive model
      ii) Moving average model.

P.T.O.

4. Attempt **any two** : **10**

   a) State principle of orthogonality and derive necessary and sufficient condition for obtaining minimum value of cost function.

   b) Describe in detail linear optimum filtering of wiener filter.

   c) Explain in detail Wold Decomposition.

5. Attempt **any two** : **10**

   a) Compare properties of the LMS/NEWTON Algorithm.

   b) Explain in detail recursive adaptive filter.

   c) Express the LMS algorithm for an individual weight in a single-input adaptive linear combiner.

6. Attempt **any two** : **10**

   a) Explain application of adaptive signal processing as adaptive interference cancelling.

   b) Explain in brief sub-band adaptive filters.

   c) Describe in brief adaptive control systems.

SLR-KN – 100

Seat No.	

M.E. (E and TC) (Semester – II) (CGPA) Examination, 2015
CRYPTOGRAPHY AND NETWORK SECURITY (Elective – II) (Paper – IX)

Day and Date : Friday, 18-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

1. Attempt **any two** : **12**

   a) Explain what is network security attack. Discuss on related services and mechanisms.

   b) Discuss with suitable example transposition technique of cryptography.

   c) Explain with figure single round of DES.

2. Attempt **any two** : **12**

   a) Discuss on steganography with drawbacks.

   b) Explain the blowfish algorithm along with application, advantages and disadvantages.

   c) Explain the D-H algorithm with example.

3. Attempt **any two** : **12**

   a) Illustrate diagrammatically basic uses of MAC for message authentication and confidentiality.

   b) Discuss authentication requirements and authentication functions.

   c) Discuss implementation of RSA algorithm with suitable example.

P.T.O.

4. Attempt **any two** : **12**

   a) Explain MD5 (Message Digest) Algorithm.

   b) Explain S/MIME functions, and list the algorithms used in S/MIME implementation.

   c) Discuss the secure hash algorithm.

5. Attempt **any two** : **12**

   a) Explain Kerberos V4 message exchanges.

   b) List the types of viruses and write a note on antivirus approach.

   c) Draw and explain x.509 certificate format.

6. Attempt **any two** : **10**

   a) Explain three classes of intruders.

   b) Write a note on firewall.

   c) Draw and explain general format of PGP messages.

SLR-KN – 102

Seat No.	

M.E. (Electronics and Telecommunication) (Semester – II) (CGPA) Examination, 2015
Paper – X : MOBILE COMPUTING (Elective – III)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***N. B.** : **All** questions are **compulsory**.*

SECTION – I

1. Solve **any three** : **(8×3=24)**
   a) Explain classification of wireless MAC protocols.
   b) Explain dynamic source routing with respect to route discovery and route maintenance.
   c) Explain on-demand distance vector routing. Compare it with dynamic source routing.
   d) Explain I-TCP protocol. How it is different from TCP ?

2. a) Compare GSM and CDMA. **3**
   b) Explain location management in Internet with IBM proposal. **8**

   OR

   b) Explain GSM architecture with suitable block diagram. **8**

SECTION – II

3. Solve **any three** : **(8×3=24)**
   a) What are different challenges in providing the QOS in wireless network ? Explain each.
   b) Describe the Symbian OS architecture. What are the functions of different layers in the architecture.
   c) Explain attacks with respect to information security.
   d) Explain Key exchange algorithm.

4. a) What is mobile middleware ? **3**
   b) Explain data encryption standard and advanced encryption standard. **8**

   OR

   b) Explain security architecture in Symbian OS. **8**

SLR-KN – 104

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) (CGPA) Examination, 2015
Paper – X : COMMUNICATION SYSTEM DESIGN (Elective – III)

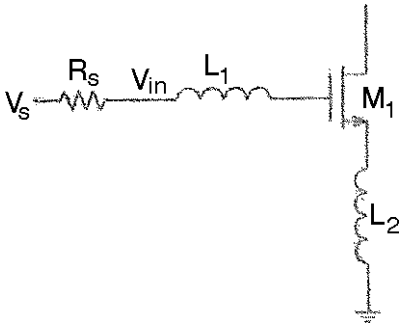
Day and Date : Saturday, 19-12-2015 Total. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q.* ***1*** *is* ***compulsory****.*
2) Solve ***any four*** *questions from Q.* ***2*** *to Q.* ***6****.*
3) Figures to the right ***indicate full*** *marks.*
4) ***Assume*** *suitable data if* ***necessary****.*

1. a) Explain the block diagram of BPSK transmitter. **5**

   b) For a Wideband Low Noise Amplifier, explain how the RF signal is prevented from being injected into the current bias chains. **5**

   c) Explain the concept of impedance matching for the following LNA. **4**



2. a) Write a note on third order intercept point. **7**

   b) For a single tone input, prove that the 1-dB compression point is given as $A_{1-dB} = \sqrt{1.145\left|\frac{\alpha_1}{\alpha_3}\right|}$. **7**

3. a) Draw the circuit diagram of a wideband LNA. What are the features of the two stages used ? **7**

   b) Explain the on-chip inductors, viz., bond wire inductor and the spiral inductors used in a narrowband LNA. **7**

P.T.O.

4. a) How does a single balanced mixer overcome the problem of RF feed through ? **7**

   b) Explain the operation of a Gilbert Mixer with help of neat waveforms. **7**

5. a) Prove that the doubling of the oversampling rate in a first order Sigma Delta modulator reduces the rms quantization noise by 9 dB. **7**

   b) Derive an expression the transfer function of a adder circuit using switched capacitor filter. **7**

6. a) Define the term Noise Figure. Derive an expression for overall Noise Figure of k cascaded stages. **7**

   b) For a Gilbert Mixer derive an expression for third order Intermodulation distortion IM_3. **7**

———————

SLR-KN – 106 A

Seat No.	

M.E. (Electronics and Telecommunication Engineering) (Semester – III)
Examination, 2015
Self-Learning Subject
MODELING AND SIMULATION OF COMMUNICATION SYSTEM (Paper – I)

Day and Date : Thursday, 31-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Solve **any two** questions : **(5×2=10)**

   a) With neat block diagram explain analytically intractable system.

   b) Explain about role of simulation in communication system.

   c) Explain System modeling and Device Modeling.

2. Solve **any one** question : **(7×1=7)**

   a) Explain multi-disciplinary aspects of simulation.

   b) Explain classification of system properties for performance evaluation technique.

3. Attempt **any three** questions : **(6×3=18)**

   a) Write a note on fixed point arithmetic.

   b) Write a note on errors in System and Device modeling.

   c) Explain the process of quantization.

   d) Explain validation processes for Random Process Models and System Model.

P.T.O.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**
   a) Explain a linear congruence technique for implementation of random number generator.
   b) Explain Histogram method.
   c) Explain frequency domain representation of periodic continuous signals.

5. Solve **any one** question : **(7×1=7)**
   a) Explain techniques for generating Uncorrelated Gaussian Random Numbers.
   b) Explain tools for generating pseudo-random number that are uniformly distributed between 0 and 1.

6. Attempt **any three** questions : **(6×3=18)**
   a) Explain Monte Carlo simulation model for communication system.
   b) Explain properties of Fourier transform.
   c) Write note on Gibbs phenomenon and Hilbert transform.
   d) Write a note on Monte Carlo estimation.

———————

SLR-KN – 107

Seat No.	

M.E. (Mechanical CAD/CAM) (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
ADVANCED MACHINE DESIGN (Paper – I)

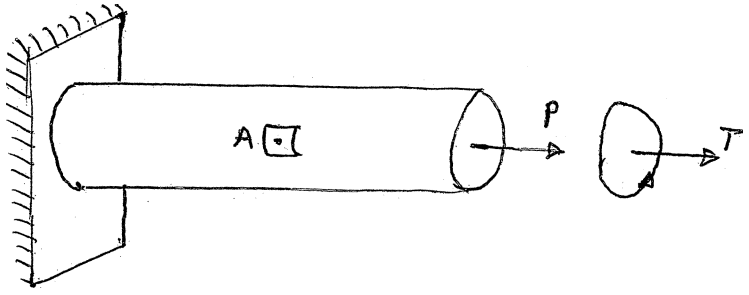
Day and Date : Monday, 21-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any three** questions from **each** Section.*
*2) Assume suitable data if **required**.*
*3) Figures to the **right** indicate **full** marks.*
*4) Use non-programmable **calculator** is **allowed**.*

SECTION – I

1. For the state of stress at a point characterised by the components (in 1000 kpa).
   $\sigma x = 12 \quad \sigma y = 4 \quad \sigma z = 10$
   $\pi xy = 3 \quad \pi yz = \quad \pi zx = 0$
   determine the principal stresses and their directions. **11**

2. a) Explain the state of strain at a point. **4**
   b) A solid shaft diameter d = $\sqrt{10}$ cm as shown in Fig. is subjected to a tensile force P = 10,000 N and a torque T = 5000 N cm. At point A on the surface. Determine the principal stresses, the octahedral shearing stresses and max. shearing stress. **8**



3. a) Explain stress-strain relations for isotropic materials. **4**
   b) The displacement field for a body is given by
   $u = (x^2 + y)i + (3+z)j + (x^2 + 2y)k$
   Write down the displacement gradient matrix of point (2, 3, 1). **8**

4. a) Explain theory of virtual work. **4**
   b) Write the displacement equation of equilibrium. **7**

P.T.O.

SECTION – II

5. a) Explain the significance of theories of failures. **4**

   b) Determine the diameter of a cold-rolled steel shaft, 0.6 m long used to transmit 50 HP at 600 rpm. The shaft is simply supported at its ends in bearings. The shaft experiences bending owing to its own weight also, use factor of safety 2. The tensile yield limit is 280×10^3 kpa and shear yield limit is 140×10^3 kpa. **8**
   Use the maximum shear stress theory.

6. Derive an expression for strain energy due to direct stress, due to pure shear stress, due to torsion and due to bending. **11**

7. a) Write a note on stresses in thick cylinder. **4**

   b) A flat steel disk of 75 cm outside diameter with a 15 cm diameter hole is shrunk around a solid steel shaft. The shrink fit allowance is 1 part in 1000 (i.e. an allowance of 0.075 cm in radius)
   $E = 2.18 \times 10^6$ kgf/cm^2 (214×10^6 kpa)
   What are the stresses due to shrink fit ? **7**

8. a) Explain the following terms : **5**
      i) Fatigue design under combined stress.
      ii) S – N diagram for steel.

   b) A solid circular shaft made of steel ($\sigma ut = 620$ N/mm^2 and $\sigma yt = 380$ N/mm^2) is subjected to an alternating torsional moment which varies from – 170 N.m to + 380 N.m. The shaft is ground having surface finish factor of 0.9. The expected reliability is 90% neglecting stress concentration, determine the diameter of shaft for infinite life using distortion energy theory and $F_{DS} = 2$. **7**

———————

SLR-KN – 108

Seat No.	

M.E. Mechanical (CAD/CAM) (Part – I) (Semester – I) (CBCS – CGPA) Examination, 2015
Paper – II : COMPUTER AIDED MANUFACTURING (New)

Day and Date : Wednesday, 23-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any five** questions.*
*2) Assume suitable data **wherever** necessary and state it **clearly**.*
*3) **Draw** appropriate sketches **wherever** required.*
*4) Figures to the **right** indicate **full** marks.*

1. a) Describe the machine control system used in CNC machine tools. **7**
   b) Write a note on tool wear and failure. **7**

2. a) Explain the parameters for selection of cutting tools in CNC machines. **7**
   b) Write a note on EDM. **7**

3. a) What is CMM software ? Explain various CMM inspection routines for measuring various parameters. **7**
   b) Enlist major categories of the commands used in APT language and explain them with suitable examples. **7**

4. a) Write a note on DFA. **7**
   b) Describe the functional importance of various types of fits. **7**

5. a) What are the major features of MAZAK CNC controller ? **7**
   b) What is a CAM package ? How does it work in a CAD/CAM environment ? Discuss some characteristics of such a package. **7**

6. a) Write a detailed note on flexible tooling. **7**
   b) Explain hardened High Speed Steel materials used in CNC machine tools. **7**

7. Explain FAPT programming (FANUC) in details considering suitable component. **14**

SLR-KN – 109

Seat No.	

M.E. Mechanical (CAD/CAM) (Part – I) (Semester – I) (New) (CBCS/CGPA) Examination, 2015

Paper – III : FINITE ELEMENT ANALYSIS

Day and Date : Saturday, 26-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Attempt **any three** questions from **each** Section.*

*2) Make suitable assumptions if **necessary** and state them **clearly**.*

*3) Figures to **right** indicate **full** marks.*

*4) Use of non programmable calculator is **allowed**.*

SECTION – I

1. a) Explain general procedure for finite element analysis. **6**

   b) Explain HRZ Lumping scheme. **6**

2. a) Derive an expression for stiffness matrix for beam element. **6**

   b) Explain factors affecting accuracy of finite element analysis. **5**

3. a) Explain weighted residual approach applied to finite element analysis. **6**

   b) Write a short note on principal of virtual work. **5**

4. Write short note on : **12**

   a) Hermite polynomials.

   b) Size and number of elements.

SECTION – II

5. a) Explain Lagrangian shape function. **6**

   b) Write a short note on software used in Finite element analysis. **5**

P.T.O.

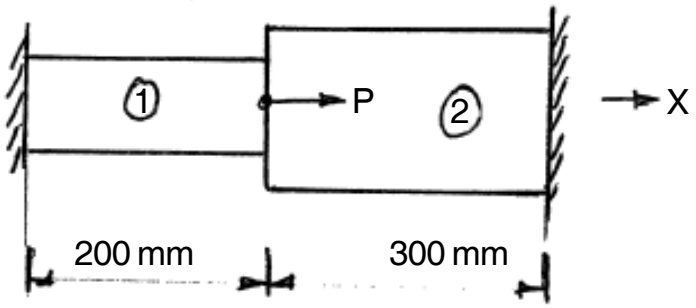
6. a) Explain Local, Global and Natural coordinate system. **6**

   b) Describe 1-D, 2-D and 3-D elements. **5**

7. An axial load P = 300 kN is applied at 20°c to the rod as shown in figure – I. The temperature is raised to 60°c. **12**

   a) Assemble the stiffness matrix (K) and Load Vector (F).

   b) Determine nodal displacement and element stresses.



$E_1 = 70 \times 10^9$ N/m^2 $E_2 = 200 \times 10^9$ N/m^2

$A_1 = 900$ mm^2, $A_2 = 1200$ mm^2

$\alpha 1 = 23 \times 10^{-6}$ per°c $\alpha 1 = 11.7 \times 10^{-6}$ per°c

8. Write short note on : **12**

   a) Spectrum Analysis.

   b) Formulation of Isoparametric elements.

SLR-KN – 110

Seat No.	

M.E. (Mechanical) (CAD/CAM) (Part – I) (Semester – I) Examination, 2015
(New – CBCS/CGPA)
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Monday, 28-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Make **suitable** assumptions **if required**.*

SECTION – I

1. a) What is research ? Explain in detail the steps involved in research with flow chart. **9**
   b) What is different type of error in research ? Explain with suitable examples. **8**
2. a) What is literature review in research ? Explain its importance and methods. **9**
   b) What are types of data ? Explain sources of data collection. **8**
3. Write short notes on **(any three)** : **(3×6=18)**
   1) Types of research
   2) Selection of samples
   3) Creative problem solving method
   4) Research design.

SECTION – II

4. a) Explain concept of robust design with suitable example. **9**
   b) Explain Taguchi method in detail. **8**
5. a) What is two factor factorial design ? Explain with suitable examples. **9**
   b) Explain writing research paper for publication. **8**
6. Write short notes on **(any three)** : **(3×6=18)**
   1) Principles of thesis writing.
   2) Parametric and non-parametric tests.
   3) Analysis of variance.
   4) Concept of design of experiments.

SLR-KN – 116

Seat No.	

M.E. (Mech. – CAD/CAM) (Semester – I) (New) Examination, 2015
Elective – I : ADVANCED MATERIALS AND PROCESSING (Paper – V)
(CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attend* ***any three*** *questions from* ***each*** *Section.*
2) Draw ***neat*** *sketches* ***wherever*** *necessary.*

SECTION – I

1. A) What are composites ? What are the different types based upon matrix materials ? **6**

   B) What is polymerization ? Explain the types of polymerization. **5**

2. Write a short note on **any 3** of the following : **12**

   a) Dual phase steel

   b) Type semiconductors

   c) HSLA steel

   d) Shape memory alloys

   e) Alluminium alloys.

3. A) What is smart material ? Explain the properties and applications. **6**

   B) Explain the heat treatments of non ferrous alloys. **5**

4. A) What are the processing techniques of metal matrix polymers ? **6**

   B) Explain in detail the criteria for selection of materials. **6**

P.T.O.

SECTION – II

5. A) What is the significance of Coating ? Explain the types in brief. **5**

   B) What are the factors concerning to Rapid Prototyping ? **6**

6. A) What is Principle of Laser Beam Machining ? What are the advantages and limitations ? **6**

   B) Explain with neat sketch the process of Ultrasonic Machining (USM). Write its advantages and limitions. **6**

7. A) Differentiate between PVD and CVD process. **5**

   B) Explain the working principles of Selective Laser Sintering (SLS). What are its advantages and disadvantages ? **6**

8. Write short notes on **any three** of the following : **12**

   a) Economic of Non-traditional manufacturing

   b) Stereolithography

   c) Electrochemical grinding

   d) Lapping and Super finishing.

———————

SLR-KN – 118

Seat No.	

M.E. (Mech.-CAD/CAM) (Semester – II) (CGPA) Examination, 2015
PRODUCT LIFECYCLE MANAGEMENT (Paper –VII)

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70
Time :11.00 a.m. to 2.00 p.m.

Instructions : *1) Question No.* ***1*** *from Section –* ***I*** *is* ***compulsory****. Solve* ***any two*** *questions out of remaining three questions from Section –* ***I****.*
2) Solve ***any three*** *questions from Section –* ***II****.*
3) Make ***suitable*** *assumptions if* ***necessary****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Assume existing single cylinder four stroke petrol engine with a new product demand from the market. Use the available products database to generate the requirements associated with new product and updates the part library.

   Systematically explain in detail the entire product data management process considering various aspects such as product structure, Bill of Materials , Part Families, Parts Library and PDM Architecture. **13**

2. a) Discuss in detail the concept of PLM. **6**

   b) Interpret the term “change management for PLM”. **5**

3. a) “Focus on the product” is one of the principle for PLM strategy, elaborate it. **6**

   b) A company is in confusion whether to implement PLM or ERP, give your opinion with comparison. **5**

4. a) What do you understand about product realization in product development process ? **6**

   b) Give outline of concurrent engineering and how it is suitable for PLM ? **5**

P.T.O.

SECTION – II

5. a) Recently Toyota Motors have decided for model standardization of its product, evaluate their decision. **6**

   b) Define Product Modeling. Discuss the various types of product models. **5**

6. a) With reference to FMECA, elaborate on Risk Priority Number (RPN). **6**

   b) What are the noise factors with reference to the Robust Design ? **5**

7. a) Compare the industry with PDM technology and without PDM technology. **6**

   b) A company has huge CAD data, they wish that all the stake holders in the product development to manufacturing of their product should access the data, comply to their requirement with example. **7**

8. a) How will you develop an intelligent information system with a suitable example ? **6**

   b) A company decided to implement the application of soft computing in product development process, defend their decision. **5**

———————

SLR-KN – 119

Seat No.	

M.E. (Mech.) CAD/CAM (Semester – II) (CGPA) Examination, 2015
INDUSTRIAL AUTOMATION AND ROBOTICS (Paper – VIII)

Day and Date : Thursday, 17-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Q. No. **4** and **8** are **compulsory**. Solve **any two** from **each** Section.*
*2) Answer to **both** the Sections are to be written in a **single** answer book.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assuming missing data if any, suitable and state **it clearly**.*
*5) **Draw** neat sketches **wherever** necessary.*

SECTION – I

1. a) Discuss the following approaches in applying automation : **7**
   1) Understand, simplify and automatic
   2) Strategies for automation and process, improvement
   3) Automation migration strategy.

   b) Discuss the basic elements of an automated system. What are the levels of automations ? **5**

2. a) With the help of neat sketches, explain various (minimum four) part feeding mechanism for automated assembly. **6**

   b) Explain in-line, segmented in line, rotary configuration of automated production lines in details. **6**

3. a) Explain different types of assembly system configurations. **7**

   b) What is a parts delivery system at the assembly work head ? With the help of neat sketches, explain vibratory bowl feeder, selectors, orienteers used in automated assembly. **5**

4. Write short notes on : **11**
   a) Continuous and discrete control system
   b) Product design for automated assembly
   c) Economic and social aspects of automation.

P.T.O.

SECTION – II

5. a) With the help of neat sketches explain the micro-switches. **7**
   i) Limit switches
   ii) Reed switches
   iii) Pressure switches with the normally open (NO) and normally closed (NC) configuration.

   b) Explain consideration in gripper selection and design. **5**

6. a) What is robotic compliance ? Explain active and passive compliance. **6**

   b) Explain various types of grippers. **6**

7. a) Explain methods of robot programming. **7**

   b) Draw neat sketches and explain the working principles of mechanical, electromagnetic and pneumatic gripper used in robots. **5**

8. Write short notes on the following : **11**
   a) Slip sensors and force sensors for robots
   b) Process tools as end effectors
   c) Robotic actuators.

SLR-KN – 120

Seat No.	

M.E. (Mechanical-CAD/CAM) (Semester – II) Examination, 2015
OPTIMIZATION TECHNIQUES (Paper – IX)
(CGPA)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instruction *:* ***All*** *questions are* ***compulsory****.*

SECTION – I

1 Solve **any two** : **11**
a) Kuhan-Tucker Conditions
b) Single-Variable Problem
c) Lagrange Multipliers Method.

2. Solve **any two** : **(6×2=12)**
a) Dichotomous Search Method
b) Fibonacci Method
c) Quasi-Newton Method.

3. Solve **any two** : **(6×2=12)**
a) Pattern Search Method
b) Simplex Search Method
c) Steepest Descent Method.

SECTION – II

4. Write note on Genetic Algorithm and Simulated Annealing Methods. **11**

5. Solve **any two** : **(6×2=12)**
a) Neural Networks
b) Exterior Penalty Method
c) Interior Penalty Method.

6. Solve **any two** : **(6×2=12)**
a) Nine Principles of OPT
b) Comparison of TOC and Local Optimization Techniques
c) Five focusing steps of TOC.

SLR-KN – 121

Seat No.	

M.E. (Mech.) – CAD/CAM- Engg.(Semester- II)(CGPA) Examination, 2015
AUTOMATIC CONTROL ENGG.
(Paper –X) (Elective – II)

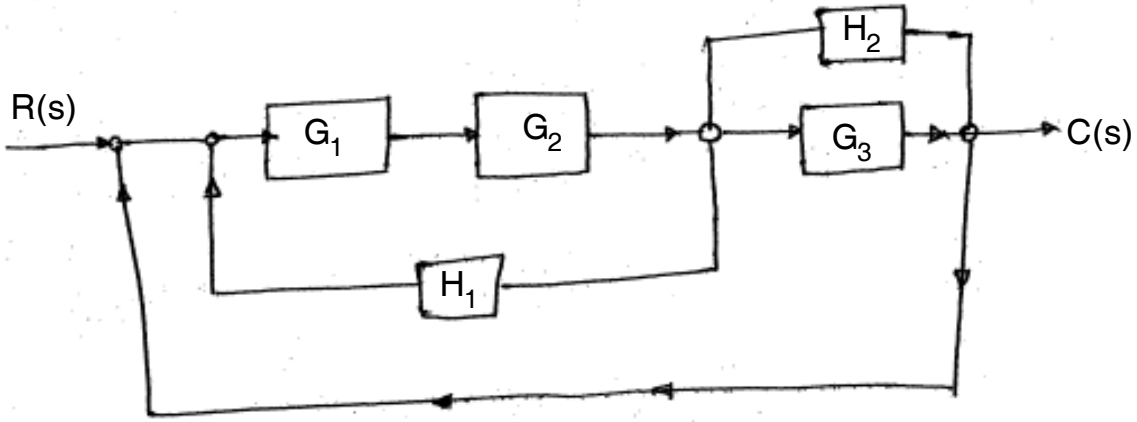
Day and Date : Saturday, 19-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any five full*** *questions.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Make suitable assumptions if ***required*** *and state them* ***clearly****.*
4) ***Use*** *of Non-programmable calculator is* ***allowed****.*

1. a) Explain the advantages and disadvantages of hydraulic system. **5**

   b) Reduce the following block diagram to its simple form and hence obtain C(s)/R(s). **9**



2. a) Describe proportional, integral, derivative control action in details. **5**

   b) Develop a Mathematical model of simple incompressible fluid system. **9**

P.T.O.

3. a) For a unity feedback control system, discuss steady state error for step input. **7**

   b) Explain disturbance in the forward path. **7**

4. Write short notes. **14**

   a) Relative stability

   b) Laplace transform properties

   c) Optimal control system.

5. a) Comment on correlation between time domain and frequency domain analysis. **6**

   b) Sketch Bode plot for the transfer function $G(s) = \frac{Ks^2}{(1+0.2s)(1+0.02s)}$

   Determine the value of K for the gain cross-over frequency of 5 rad/sec. **8**

6. a) Explain following term related to Root Locus Plots **7**

   a) Asymptotes b) Centriod.

   b) Explain the general procedure to plot bode plot. **7**

7. a) Comparision between lead, lag and lead lag compensation. **7**

   b) Explain any four theorem of Z-transform. **7**

SLR-KN – 123

Seat No.	

M.E. (Mechanical Engg.) (Semester – I) Examination, 2015
New (CBCS/CGPA)
Paper – I : COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING

Day and Date : Monday, 21-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N. B. : *1) Attempt **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Use** of non-programmable calculator is **allowed**.*
*4) Assume suitable data **if necessary** and mention **it clearly**.*

SECTION – I

1. a) Find the distance moved by a particle and its acceleration at the end of 4 seconds if time verses velocity data is as follows : **8**

t	: 0	1	3	4
v	: 21	15	12	10

b) Figure shows an arrangement of 4 springs in series being compressed with a force of F = 2000 N. At equilibrium, force balance eq^{n}. can be developed defining the interrelationship between the springs. **10**

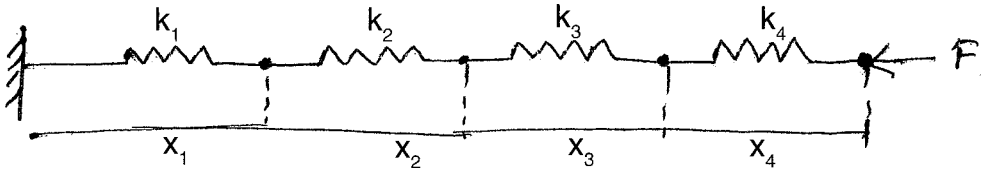


Fig. 1

$k_2 X (x_2 – x_1) = k_1 x_1$

$k_3 X (x_3 – x_2) = k_2 (x_2 – x_1)$

$k_4 X (x_4 – x_3) = k_3 (x_3 – x_2)$

$F = x_4 (x_4 – x_3)$

Where k are spring constants if $k_1 = 150$, $k_2 = 50$, $k_3 = 100$ and $k_4 = 200$ N/mm, find x_1, x_2, x_3 and x_4 by using Gauss elimination method.

P.T.O.

2. a) The values of Nussest number (Nu) and Reynolds number (Re) found experimentally are given below. If the relation between Nu and Re is of type $Nu = a.Re^b$ find the values of a and b for given values of Nu and Re. **9**

Re :	3000	4000	5000	6000	7000
Nu :	14.3575	16.6517	16.7353	17.6762	18.5128

b) A fluid is confined in a cylinder by a spring loaded frictionless piston so that the pressure in the fluid is linear function of the volume $P = a + bV$ where P is in KPa, V is in m^3. $a = -60$ kN/m^2, $b = 7667$ kN/m^2. If the fluid changes from initial condition of 0.03 m^3 to final volume of 0.06 m^3. Find the magnitude of work transfer during the process using Gauss-Legendre 3 point formula. **8**

3. a) A circular shaft having one metre length has varying radius 'r' as follows.

x(m) :	0	0.25	0.5	0.75	1
r(m) :	1	0.9896	0.9589	0.9089	0.8415

An axial pull of 300 kN is applied at one end of shaft whose modules of elasticity is 200×10^9 N/m^2. The axial elongation of shaft (Δx) is given by $\Delta x = \frac{P}{E}\int_0^1 \frac{1}{A}dx$ where A = cross sectional area of shaft, P = pull applied E = Young's modulus. Determine elongation of shaft over its entire length by using Simpson's $1/3^{rd}$ rule . **9**

b) What is curve fitting ? Derive normal equation for evaluating the parameters 'a' and 'b' to fit the data to a straight line $y = a + bx$. **8**

SECTION – II

4. a) Explain with figures types of meshing and types of shape functions. **7**

   b) Solve $U_{xx} + U_{yy} = 0$ over the square mesh of side 4 units satisfying the following boundary conditions : **10**

      i) $u(0, y) = 0$ for $0 \leq y \leq 4$

      ii) $u(4, y) = 12 + y$ for $0 \leq y \leq 4$

      iii) $u(x, 0) = 3x$ for $0 \leq x \leq 4$

      iv) $u(x, 4) = x^2$ for $0 \leq x \leq 4$.

5. a) In chemical engineering one formula is commonly used for the concentration ratio 'c' as $\frac{dc}{dt} = -kC^n$ for time 't' where k = reaction rate and n = order of reaction. If k = 0.08 and n = 1.5. Find concentration ratio at t = 2. If initial condition c(0) = 11.23 for the accuracy of 0.1 using modified Euler's method. **9**

   b) An object having surface area of 0.3 m^2 is initially at 0°C is deeped into hot water at 80°C. Find temp. of object after 4 seconds taking step size as 1 second. If mass m = 1.6 kg and convective heat transfer coefficient h = 1000 W/m^2 °K use Milne's predictor corrector method. Given t(0) = 0. Take C_p of water = 4.187 kJ/Kg°k. **9**

   The values of time 't' and temp. 'T' is given below :

t(sec) :	0	1	2	3
T(°C) :	0	3.56	7.07	10.54

6. a) Explain modelling of linear differential equations of second order. **6**

   b) Explain explicit method used to solve parabolic equation with suitable figure. **6**

   c) Explain brief history of finite element method. **5**

———————

SLR-KN – 124

Seat No.	

M.E. Mechanical Engineering (Part – I) (Sem. – I) (New) Examination, 2015
(CBCS and CGPA)
INDUSTRIAL INSTRUMENTATION (Paper – II)

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Attempt **any three** questions from Section – **I** and Section – **II**.*
*2) Figures to the **right** indicates **full** marks.*
*3) Draw **neat** sketches **wherever** necessary.*

SECTION – I

1. Define the following : **12**
   i) Accuracy
   ii) Precision
   iii) Hysteresis
   iv) Time lag
   v) Dead zone
   vi) Linearity.

2. a) Explain principle of working of self-generating and power operated type instruments with neat sketch. **6**
   b) Explain with neat sketch electromagnetic and opto electrical domain transducer. **6**

3. a) Why operational amplifiers are used ? Explain inverting and non-inverting amplifier. **6**
   b) Explain hydraulic load cell with neat sketch. **5**

4. a) Explain with neat sketch Hydraulic absorption dynamometer. **6**
   b) Explain Knudsen Gauge with neat sketch. **5**

P.T.O.

SECTION – II

5. a) Explain Seeback and Peltier and Thomson effect. **6**

   b) Explain the terms sound pressure level, sound power level and sound intensity level. **6**

6. a) Explain real time parallel analyser with neat sketch. **6**

   b) Explain ionisation gauge used for very low pressure measurement. **5**

7. a) Explain with neat sketch resistance temperature detectors. **6**

   b) Explain different sound power measurement environments. **5**

8. Write short notes on : **12**

   a) Data Acquisition system.

   b) Frequency response characteristics by Transient Testing.

   c) Piston ring wear monitoring.

SLR-KN – 125

Seat No.	

M.E. (Mechanical) (Semester – I) Examination, 2015
(CBCS/CGPA) (New)
Paper – III : SOLID MECHANICS

Day and Date : Saturday, 26-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume necessary suitable data, if **required**.*

SECTION – I

1. a) Explain plane stress and plane strain with suitable examples. **4**

   b) Derive the equation of equilibrium in Cartesian coordinates for a plane stress problem. **8**

2. Show that Airy's stress function $\phi = A\left[xy^3 - \frac{3}{4}xyh^2\right]$ represent the stress distribution in a cantilever beam loaded at free end with load P. The cross section of the beam is rectangular having width 'b' and depth 'd'. Find the stress variation for the included region $y = \pm h/2$ and $x = 0$ to 1. **11**

3. Derive the equation of equilibrium in terms of stress components for a plane stress problem in polar coordinates. **11**

4. Write a note on **any two** of the following : **12**
   i) Plane stress and plane strain
   ii) Stresses in solid disc
   iii) Pure bending of curved bar.

P.T.O.

SECTION – II

5. a) Explain the principles used in finding the shear centre. **4**

   b) Locate the shear centre for thin lipped channel as shown in Fig. 1. The thickness is 5 mm throughout. **8**

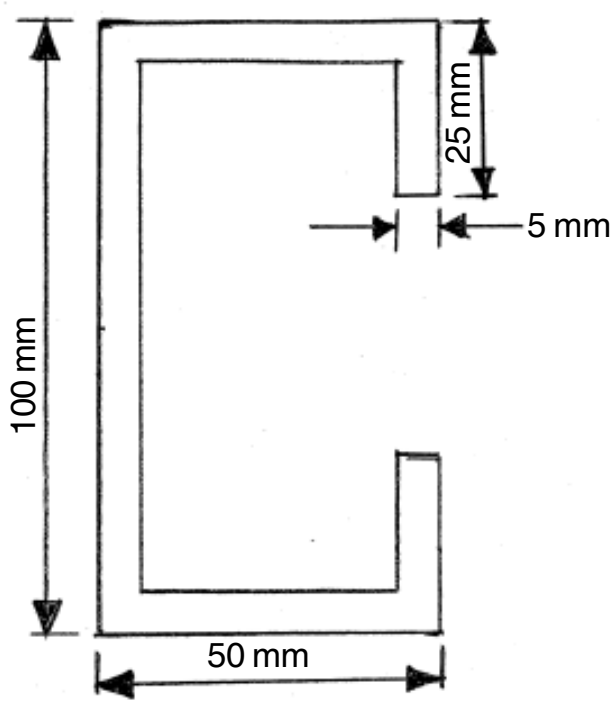


Fig. 1

6. Derive equation of torsion and angle of twist for elliptical cross section. **11**

7. a) State and explain basic assumptions made in theory of contact stresses. **3**

   b) Derive expression for area of contact and pressure distribution in case of contact between two spheres. **8**

8. Write a note on **any two** of the following : **12**

   i) Torsion of thin tubes

   ii) Membrane stresses

   iii) Contact stresses in ball bearing.

SLR-KN – 126

Seat No.	

M.E. (Mechanical Engineering) (Semester – I) (New)Examination, 2015
(CBCS – CGPA)
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Monday, 28-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve **any three** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) **Assume** suitable data **wherever** necessary and state it **clearly**.*

SECTION – I

1. a) Define research and steps involved in the process of research. **5**

   b) Explain various types of simulation. **6**

2. a) Explain how to do critical analysis for already generated facts. **6**

   b) How experimental design is done ? Give examples. **5**

3. a) Explain various types of research work with suitable examples. **6**

   b) Discuss the problems encountered by researchers in our country ? **6**

4. Write a short note on following (**any 3**) : **(3×4=12)**

   a) Approaches of research

   b) Field study for research

   c) Cause effect relation.

   d) Design feedback form

P.T.O.

e) Literature review.

SECTION – II

5. a) Explain need of writing abstract in report. **6**

   b) Explain parametric and non parametric analysis of result. **5**

6. a) Explain procedure to write a paper. **6**

   b) What is collective creativity ? Explain. **5**

7. a) What are the techniques of creativity ? **6**

   b) Explain Data processing and analysis. **6**

8. Write a short note on followings (**any 3**) : **(3×4=12)**

   a) Layout and format of report

   b) Descriptive and inferential data

   c) Dissertation and Thesis

   d) Testing linearity model

   e) Types of reports.

———————

SLR-KN – 129

Seat No.	

M.E. (Mechanical Engineering) (Semester – I) (New) Examination, 2015
(CBCS – CGPA)
Paper – V (Elective – I) : RELIABILITY ENGINEERING

Day and Date : Wednesday, 30-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data **if necessary**.*
*3) Figure to the **right** indicates **marks**.*

SECTION – I

1. A) Explain Taguchi parameter design concept with suitable example. **5**

   B) In an accelerated test to determine the time to failure of friction clutches, the results showed that the : Minimum duration = 5 hr, Maximum duration = 10 hr, Mean duration = 7 hr, Coefficient of variation = 0.1. Assuming a beta distribution, determine the probability that clutch, during the accelerated test, will fail within 9 hours. **6**

2. A) A bread stuffing producer is comparing the calorie content of the original process with a new process. Which has the lower content and what is the difference ? **6**

Original	130	135	128	127
Light	115	112	120	113

   B) In order to determine the tensile strength of the material of a supply of connecting rods, samples of tensile specimens were prepared and tests conducted. The results showed a normal distribution with a mean tensile strength of 310 Mpa and a standard deviation of 34.5 Mpa. If the consignment involved 300 connecting rods, estimate
   1) How many connecting rods can be expected to have a strength less than 275 Mpa ? And
   2) How many connecting rods can be expected to have a strength between 275 MPa and 410 Mpa ? Use data if needed for $\Phi(z = -1.01) = 0.1562$ and $\Phi(z = +2.9) = 0.9981$. **6**

P.T.O.

3. Write short note (**any three**) : **(4×3=12)**
   1) Concept of Quality Loss Function
   2) Life Cycle of Product
   3) Rayleigh Distribution
   4) Reliability allocation and its benefit.

SECTION – II

4. A) What are the important benefits of FMECA ? **5**
   B) Consider a system composed of three subsystems with the estimated failure rates of $\lambda_1 = 0.005$, $\lambda_2 = 0.003$ and $\lambda_3 = 0.001$ failure per hour, respectively. The system has a mission time of 20 hours. A system reliability of 0.95 is required. Find the reliability requirement for the subsystems. **6**
5. A) A network made up of seven independent units representing a system is shown in Figure. Each unit's reliability, Ri for i = 1, 2, 3, 4 and 5 is given. Calculate the network reliability by using the network reduction method. **6**

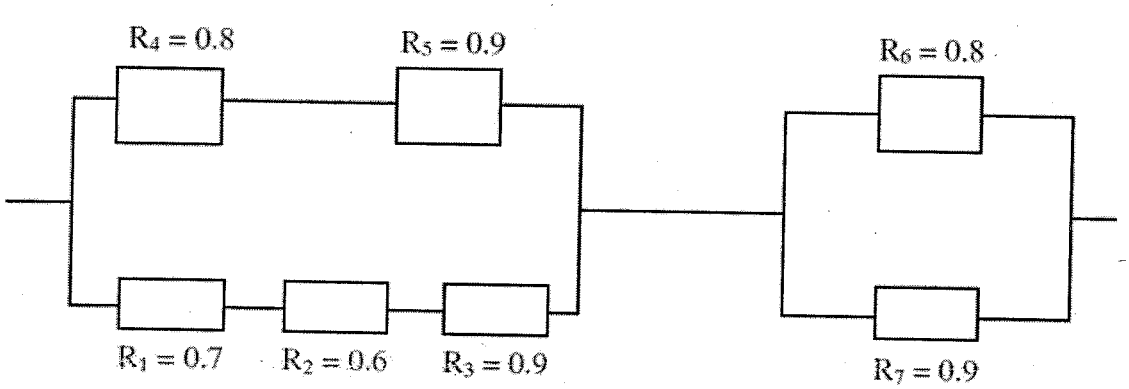


Figure : 01 A seven independent-unit reliability network

   B) Compare the two equipment condition monitoring technique.
      1) X-ray Radiography
      2) Infrared Spectroscopy. **6**

6. Write short note (**any three**) : **(4×3=12)**
   1) Discuss the need for maintainability
   2) Condition monitoring techniques
   3) Loss function concept
   4) Cause and effect diagram.

———————

SLR-KN – 130

Seat No.	

M.E. (Mechanical Engg.) (Part – I, Semester – I) (New) Examination, 2015
(CBCS/CGPA)
FINITE ELEMENT METHOD (Elective – I) (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any three*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicates* ***full*** *marks.*
3) Make suitable assumptions if ***necessary****.*
4) ***Use*** *of non-programmable calculator is* ***allowed****.*

SECTION – I

1. a) Explain advantages and disadvantages of FEM. **6**
   b) Explain in details the applications of FEM. **6**

2. a) Explain with the help of suitable examples plane stress and plane strain. **6**
   b) Explain choice of element type. **5**

3. a) Explain steps of FEM. **6**
   b) Explain different boundary conditions used in FEM. **5**

4. Write shorts notes (**any three**) : **(4×3=12)**
   a) Size of element.
   b) Simplification through symmetry.
   c) Isoparametric elements.
   d) Shape functions.

SECTION – II

5. a) Integrate the following using local integration formula. **6**
      i) $\int_L$ Ni Nj dx
      ii) $\int_A$ Ni Nj dA
   b) Explain shock spectrum analysis. **6**

P.T.O.

6. a) Explain element distortion. **6**

   b) Explain model validity and accuracy. **5**

7. a) Explain HRZ lumping scheme. **6**

   b) Explain convergence requirement of shape functions. **5**

8. Write shorts notes (**any three**) : **(4×3=12)**

   a) Herimite's interpolation formula.

   b) Role of different softwares in the use of FEM.

   c) Mesh design.

   d) Transient response analysis using FEM.

———————

SLR-KN – 131

Seat No.	

M.E. (Mechanical Engineering) (Semester – I) (New) (CBCS – CGPA) Examination, 2015
Paper – V : SYNTHESIS AND ANALYSIS OF MECHANISM AND MACHINES (Elective – I)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Que. No.* ***4*** *and* ***8*** *are* ***compulsory*** *and solve* ***any two*** *remaining questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if necessary*** *and mention* ***it clearly****.*
4) ***Use*** *of non-programmable calculators is* ***allowed****.*

SECTION – I

1. a) Discuss the effect of spacing of accuracy points on generated function and structural error. **4**

   b) A four bar mechanism is to be designed using three precision points to generate the function $y = x^{1.5}$ for the range $1 \leq x \leq 4$. Assuming 30° starting and 120° finishing position for the input link and 90° starting and 180° finishing position for output link. Find the value of x, y, $\varnothing$, φ corresponding to the three precision points. **8**

2. a) Explain synthesis of slider crank mechanism with three accuracy points. **6**

   b) Derive Freudensteins equation. **6**

3. a) Explain Robert-Chabyshev theorem. **6**

   b) Explain the procedure for construction of circle point. **6**

4. Write notes on the following : **11**

   a) Task of kinematic synthesis

   b) Ball point.

P.T.O.

SECTION – II

5. a) Explain crank and follower synthesis with help of five accuracy points. **6**

   b) To determine link of four bar mechanism that will one of its position satisfy the following specifications :

   $W_1 = 8$ rad/sec $\quad \alpha_1 = 0$

   $W_2 = 1$ rad/sec $\quad \alpha_2 = 20 \text{ rad} / \text{sec}^2$

   $W_3 = 3$ rad/sec $\quad \alpha_3 = 0$

   Comment on the resulting mechanism. **6**

6. a) Discuss the application of spatial mechanism. **6**

   b) Derive Euler-Savary equation for a Four-bar linkage. **6**

7. a) Explain industrial Robot manipulator. **6**

   b) Explain Pole triangle. **6**

8. Write notes on the following : **11**

   a) Return circle

   b) Denavit-Harternberg Parameter.

SLR- KN – 132

Seat No.	

M.E. Mechanical Engineering (Semester – II) (CGPA) Examination, 2015
Paper – VI : DESIGN ENGINEERING

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve **any three** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** necessary data **if required** and state it **clearly**.*

SECTION – I

1. a) Derive an expression for torque applied by a shaft on the cam in the analysis of a rigid eccentric cam. **6**

   b) Prove that a sine acceleration cam generates into a cycloidal displacement cam. **6**

2. a) Explain standard contour cams and standard motion cams. **6**

   b) What is meant by polynomial cams ? Explain the procedure for kinematic design of a 3-4-5 cam for a RDFD (Rise-Dwell-Fall-Dwell) cam follower system. **5**

3. a) Explain the significance of thermal stresses in design. Derive an expression for thermal stresses in flat walls subjected to temperature gradient. **6**

   b) Explain with suitable sketches methods of reducing thermal stresses. **5**

4. Write short notes on : **12**

   a) Selection of electrical drive

   b) Factors affecting form design

   c) Fracture mechanics approach to fatigue.

P.T.O.

SECTION – II

5. a) Define reliability in different terms. **6**

   b) Explain the terms MTTF and MTBF used in Reliability analysis. Derive the relation for MTTF in terms of R(t) for exponential distribution, with usual notations. **6**

6. a) Explain the term “failure probability density function”. **6**

   b) Derive expressions for : **5**

      i) R(t)
      ii) Z(t)
      iii) F(t)
      iv) MTTF for exponential probability distribution.

7. a) Derive the expression for deflection of an elastic beam subjected to concentrated load. **6**

   b) Explain the procedure for finding discontinuity stresses in case of cylindrical pressure vessel with spherical end. **5**

8. Write short notes on : **12**

   a) Laws of creep

   b) Spring back in plastic bending

   c) Reliability improvement and testing.

SLR-KN – 133

Seat No.	

M.E. (Mechanical) (Semester – II) (CGPA) Examination, 2015
Paper – VII : Theory and Analysis of Composite Materials

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*

SECTION – I

1. a) Explain classification and characteristics of Composite Materials. **9**

   b) List out the applications of Composite Materials with suitable examples. **8**

2. a) Explain strengths of an Orthotropic Lamina. **9**

   b) What is stiffness ? Explain Elasticity Approach to Stiffness. **8**

3. Write short notes on **(any three)** : **(3×6=18)**

   1) Basic terminology of fiber-reinforced composite material

   2) Stress-Strain Relations for Anisotropic Materials

   3) Comparison of Approaches to Stiffness

   4) Maximum Stress Theory.

SECTION – II

4. a) Explain Inter-laminar stresses in details. **9**

   b) Discuss Mechanics of Materials Approach to Strength. **8**

P.T.O.

5. a) What is Buckling ? Explain Governing Equations for Buckling. **9**

   b) Explain effect of discontinuity in laminates. **8**

6. Write short note on **(any three)** : **(3×6=18)**

   1) Classical Lamination Theory.

   2) Bending of laminated plates.

   3) Basic principles of fracture mechanics.

   4) Design of composite structures.

SLR-KN – 134

Seat No.	

M.E. Mechanical Engg. (Semester – II) (CGPA) Examination, 2015
Paper – VIII : MECHATRONICS SYSTEM DESIGN

Day and Date : Thursday, 17-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) Draw meaningful sketches **wherever** necessary in pencil only.*
*3) Figures to **right** indicate **full** marks*
*4) Make **suitable** assumptions, **if** required and state them clearly.*

1. a) Describe briefly pneumatic actuation systems. **7**

   b) Explain ladder programming with suitable example. **7**

2. a) Describe counters in PLC. **7**

   b) Draw and describe Pin configurations of 8051. **7**

3. a) Compare traditional design and mechatronic design approach using suitable examples. **7**

   b) Describe the performance characteristics of measurement systems. **7**

4. Describe, in details, any one automation application of PLC. **14**

5. a) Write a short note on Piezo-electric sensors. **7**

   b) Describe Signal Conditioning Process and explain Operational Amplifiers. **7**

6. Write notes on the following : **14**

   i) Mechatronic system modeling.

   ii) Timers in PLC.

   iii) Temperature sensors.

7. Write short notes on the following : **14**

   i) Fuzzy control.

   ii) Artificial Intelligence in Mechatronics.

   iii) Mechatronic on-line quality monitoring system.

8. Describe, in details, real time interfacing for stepper motor control system. **14**

SLR-KN – 135

Seat No.	

M.E. (Mechanical Engineering) (Sem. – II) (CGPA) Examination, 2015
Paper – IX : INDUSTRIAL PRODUCT DESIGN

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: i) Attempt* ***any five*** *questions from the following.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*
iii) Support the answer by neat sketches ***wherever*** *necessary.*

1. a) How creativity can be used in innovation of products ? **7**
   b) Explain maintainability considerations in product design. **7**

2. a) Explain ergonomic aspect of design of testing equipments. **7**
   b) Discuss the process of setting specifications of a product. **7**

3. a) Explain the importance of rhythm and radiance in case of consumer product. **7**
   b) Discuss the standard and legal requirements of consumer products. **7**

4. a) Explain the concept of purpose, style and environment. **7**
   b) Explain mechanics of seeing. **7**

5. a) Write a note on selection of material. **7**
   b) Discuss 'Drawing office procedure'. **7**

6. a) Explain quality considerations in product design. **7**
   b) Explain ergonomic aspects of automobiles. **7**

7. a) Write a note on modeling technique used in product design. **7**
   b) Explain how standardization can help in cost reduction. **7**

SLR-KN – 136

Seat No.	

M.E. (Mechanical Engineering) (Part – II) (Semester – II) Examination, 2015
MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II)
(CGPA) (Paper – X)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any three*** *questions from Section* ***I*** *and* ***any three*** *questions from Section* ***II****.*
2) Make suitable assumptions if ***required*** *and state them* ***clearly****.*
3) Figures to the ***right*** *indicate* ***full*** *marks.*
4) Draw ***neat*** *sketches, block diagram, flow charts etc.* ***wherever*** *necessary.*

SECTION – I

1. a) Discuss objectives of material handling systems. Explain factors influencing selection of material handling equipment. **6**

   b) Describe scope and importance of material handling in sugar industry. **5**

2. Discuss types, design considerations of various belt and bucket conveyors. **12**

3. Discuss the construction, working and below mentioned parameters for
   a) Pneumatic conveyors
   b) Vibrating conveyor.
   Parameters to be covered size, speed, power requirement, capacity, advantages and limitations. **12**

4. a) Explain material handling equation. **6**

   b) Explain stability and structural analysis of crane. **5**

P.T.O.

SECTION – II

5. Give detailed design steps for following elements (any four) of EOT crane. Assume suitable capacity, height, travel on cross beam and other required data.
   a) Lifting mechanisms
   b) Cross beam
   c) Hook
   d) Wire rope
   e) Pulley **12**

6. a) Write a note on material handling and safety. **6**
   b) Discuss fault finding and failure analysis of MHS. **5**

7. a) Describe the following gear and brakes used for hoisting machinery. **6**
      i) Arresting gear
      ii) Block brake
   b) Explain relation between material handling and productivity. **5**

8. Write note on (**4** marks **each**) : **12**
   a) Runner wheels and rails
   b) Systematic layout planning
   c) Brakes and ratchet stops.

———————

SLR-KN – 137

Seat No.	

M.E. (Mechanical Engg.) Semester – II (CGPA) Examination, 2015
(Elective – II) ROBOTICS (Paper – X)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any five full*** *questions.*
2) Draw meaningful sketches ***wherever*** *necessary in* ***pencil*** *only.*
3) Figures to ***right indicate full*** *marks.*
4) Make suitable assumptions, if required and state them clearly.

1. a) Explain the important considerations in the design of gripper. **7**
   b) Describe the working of gear operated grippers used in industrial robots. **7**

2. a) Discuss robot application for assembly and inspection. **7**
   b) Explain common software elements of a robot. Discuss what is motion programming and how it is achieved. **7**

3. Explain, in detail, various force control methods in robot manipulators. **14**

4. Describe various features of mechanical gripper. Explain the two ways of constraining the part in gripper. **14**

5. a) Explain precision of movement. **7**
   b) Describe spatial resolution in case of robots. **7**

6. a) Explain the advantages and limitations of robot programming languages. **7**
   b) Describe the various degrees of freedom associated with the following robots :
   i) GANTRY Robot ii) SCARA Robot **7**

7. Write notes on **any two** of the following : **14**
   a) Magnetic grippers
   b) Hydraulic drives
   c) Robot vision

SLR-KN – 139

Seat No.	

M.E. (Mechanical-Manufacturing Process) (Part – I) (Semester – I) Examination, 2015
(New) (CBCS – CGPA)
Paper – I : ADVANCED MANUFACTURING TECHNIQUES – I

Day and Date : Monday, 21-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory*** *from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable data if required and state clearly.*

SECTION – I

1. a) Explain with neat sketch HAZ. **5**
   b) Explain with neat sketch atomic emission spectrometer. **5**

2. a) Explain Welding defects and measurement. **5**
   b) Explain with neat sketch chemical machining. **5**

3. Write short note on : **(5×3=15)**
   i) AFM
   ii) Welding defects and measurement
   iii) Under water welding.

SECTION – II

4. a) Explain in detail submerged arc welding. **5**
   b) Explain with neat sketch FDM. **5**

5. a) Explain with neat sketch SCA. **5**
   b) Explain importance in prototyping in product development cycle. **5**

6. Write short note on : **(5×3=15)**
   i) CVD
   ii) Plasma spraying
   iii) Coating technology.

SLR-KN – 140

Seat No.	

M.E. Mech. Manufacturing Process Engg. (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
Paper – II : ELECTRO PHYSICAL PROCESSES

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Answer **any five full** questions.*
*2) Draw meaningful sketches **wherever** necessary in **pencil** only.*
*3) Figures to **right** indicate **full** marks.*
*4) Make **suitable** assumptions, if required and state them **clearly**.*

1. a) Describe various applications, advantages and limitations of AJM. **7**
   b) Explain the functions and characteristics of an electrolyte used in ECM process. **7**

2. a) Discuss applications, advantages and limitations of LBM processes. **7**
   b) Describe lasing process and photon cascade in LASER. **7**

3. Write short notes on (**any three**) : **14**
   a) ECDM.
   b) Effect of voltage on the MRR in EDM process.
   c) Sketch and explanation of EBM set-up.
   d) Microwelding by laser application.

4. a) Explain with appropriate examples, the limitations in non-traditional machining processes. **7**
   b) Give classification of modern machining processes and discuss the physical parameters for the same. **7**

P.T.O.

5. Describe EDM process with neat sketch and discuss the effect of :

   i) Charging resistance

   ii) Gap setting

   iii) Capacitance on MRR

   Employing R-C realization circuit. **14**

6. a) Explain the chemistry involved in the ECM process. **5**

   b) Describe a theoretical MRR model in AJM as suggested by Sheldon and Finnie for ductile material. **9**

7. Derive the MRR relation in USM as suggested by Cook. **14**

———————

SLR-KN – 141

Seat No.	

M.E. (Mechanical – Manufacturing Process) (Semester – I) (CBCS CGPA Pattern) Examination, 2015
Paper – III : COMPUTER AIDED MANUFACTURING (New)

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) Answer **any five full** questions.*
*2) **Draw** meaningful sketches **wherever** necessary in **pencil only**.*
*3) Figures to **right** indicate **full** marks.*
*4) Make **suitable** assumptions, **if required** and **state** them **clearly**.*

1. a) Describe various elements of FMS. **7**
   b) Describe in details different flexibilities in FMS. **7**

2. a) What is DNC ? Explain advantages of using DNC on the shop floor. **7**
   b) What is preloading of ball screw ? Explain working of re-circulating ball screw. **7**

3. a) Explain quality function deployment with suitable example. **7**
   b) Explain the obstacles in concurrent engineering implementation. **7**

4. a) Explain similarity coefficient method with suitable example. **7**
   b) Describe the inspection techniques used in process monitoring. **7**

5. a) What is Group Technology ? Explain parts classification and coding for GT. **7**
   b) Explain different types of machine cells and layouts in GT. **7**

6. a) Explain MRP with appropriate example. **7**
   b) Explain Retrieval CAPP system. **7**

7. a) What is Product Data Management ? Explain the various data required for a Product Data Management System. **7**
   b) With suitable example explain process optimization. **7**

SLR-KN – 142

Seat No.	

M.E. (Mech.) (Manufacturing Process) (Sem. – I) (New) Examination, 2015
Paper – IV : RELIABILITY AND TEROTECHNOLOGY
(CBCS/CGPA)

Day and Date : Monday, 28-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: i) Answer* ***any five full*** *questions.*

ii) Figures to ***right*** *indicate* ***full*** *marks.*

1. a) Discuss mean, median and mode. **7**
   b) What is probability ? Discuss types of probability. **7**
2. a) Discuss condition based maintenance. **7**
   b) Discuss in brief terotechnology. **7**
3. a) What is Ferro graph ? **7**
   b) What is selective inventory control ? **7**
4. a) What is spare part management ? **7**
   b) What is redundancy ? **7**
5. a) What is fault free analysis ? **7**
   b) What is series, parallel and redundant configuration ? **7**
6. a) Discuss engineering design analysis. **7**
   b) What is breakdown maintenance ? **7**

SLR-KN – 144

Seat No.	

M.E. – Mechanical (Mfg. Process) Engg. (Semester – I) (New) Examination, 2015
Paper – V : DESIGN FOR MANUFACTURING (Elective – I) (CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) Answer **any five** full questions.*
*2) Figures to the **right** indicate **full** marks.*
3) Use of nonprogrammable calculator is allowed.
*4) Make suitable assumptions **whenever** necessary and state it **clearly**.*

1. Explain product life cycle with neat sketch and also comment on expanded product life cycle. **14**

2. State importance of material selection in product development. Enlist types of material selection method. And explain any one in detail. **14**

3. With suitable examples and neat sketches explain any five DFM guidelines. **14**

4. With appropriate sketches discuss design rules for casting. **14**

5. Explain in detail Analytical Hierarchy Process (AHP). **14**

6. Write short notes on **any two** : **(2×7=14)**
   a) Design for X and design for sheet metal forming.
   b) FMEA.
   c) Life cycle design.

SLR-KN – 145

Seat No.	

M.E. Mechanical (Manufacturing Process Engg.) (Part – I) (Sem. – I) Examination, 2015
(New CBCS/CGPA)
Elective – I : MANAGEMENT OF TECHNOLOGY (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any five*** *questions.*
2) Assume suitable data ***wherever*** *necessary and state* ***it clearly****.*
3) Draw appropriate sketches ***wherever*** *required.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

1. Describe various phases of Hype Cycle. **14**

2. Explain Technology Forecasting. **14**

3. What is Technology ? Give details in terms of definition, meaning, requirement and characteristics. **14**

4. Give detailed classification of Technologies. **14**

5. What are the levels of Technology Transfer ? Explain. **14**

6. Comment on Technological environment changes. **14**

SLR-KN – 147

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2015 (CGPA)

Paper – VI : ADVANCED MANUFACTURING TECHNIQUES – II

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Q. No. **4** and Q. No. **8** are **compulsory**. Solve **any two** questions from remaining **three** questions from **each** Section.*

*2) Figure to **right** indicate **full** marks.*

*3) Assume **suitable** data if required and state **clearly**.*

SECTION – I

1 a) Explain principle, process and application of investment casting. **5**

b) Discuss different types of casting defects and remedies for the same. **5**

2. a) What are the features of shell moulding process ? **5**

b) Explain lapping process. **5**

3. a) How deburring of casting ? **5**

b) Explain inspection of casting. **5**

4. Write short note on : **(5×3=15)**

a) Honing.

b) Super finishing process.

c) Full mould casting.

SECTION – II

5. a) Explain Hydroforming process. **5**

b) Discuss solid phase welding. **5**

6. a) What are different processes of powder manufacturing ? Explain one of them. **5**

b) Explain process of powder metallurgy. **5**

7. a) Explain transfer molding process in plastic. **5**

b) Explain expansion molding in plastic. **5**

8. Write short note on : **(5×3=15)**

a) HERF.

b) Blow molding.

c) Sintering.

SLR-KN – 148

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) (CGPA) Examination, 2015
ROBOTICS AND ROBOT APPLICATIONS (Paper – VII)

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Answer **any five full** questions.*
*2) Draw meaningful sketches wherever necessary in pencil **only**.*
*3) Figures to **right** indicate **full** marks.*
4) Make suitable assumptions, if required and state them clearly.

1. a) Explain various types of actuators used for robots. Describe the working of a hydraulic actuator system. **7**
   b) Give classification of the robot end-effector from the view point of control. Sketch and describe a cam actuated gripper used for robots. **7**

2. Write notes on the following : **14**
   a) Inspection Robot.
   b) Spray painting Robot.

3. Explain the applications and working principle of : **14**
   i) Tactile sensors.
   ii) Range sensors.

4. Explain the advantages of using pneumatic drives in the robots. Explain various types of pneumatic drives used in the robots in detail. **14**

5. a) With neat sketches explain pitch, yaw and roll motions of a robot wrist. **7**
   b) Explain various generations of robots. Describe the work envelope of a cylindrical robot. **7**

6. Describe an inverse kinematics problem and explain the solution methodology of the inverse kinematics problem with an example. **14**

7. a) Explain the textual robot language used in robotics. **7**
   b) Explain the four main types of motion control used in robot programming. Which type provides the best control ? Explain. **7**

———————

SLR-KN – 149

Seat No.	

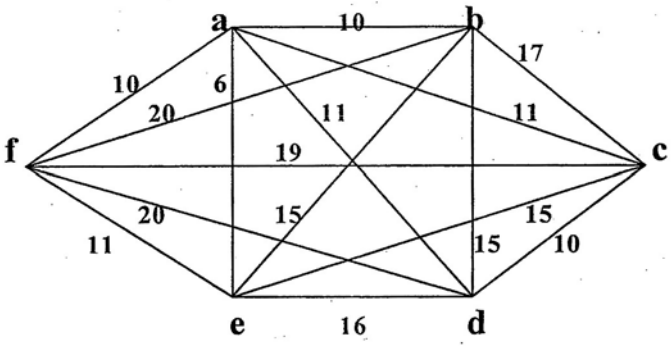
M.E. Mechanical (Mfg. Process Engg.) (Semester – II) (CGPA) Examination, 2015
MANUFACTURING PROCESS MODELLING (Paper – VIII)

Day and Date : Thursday, 17-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

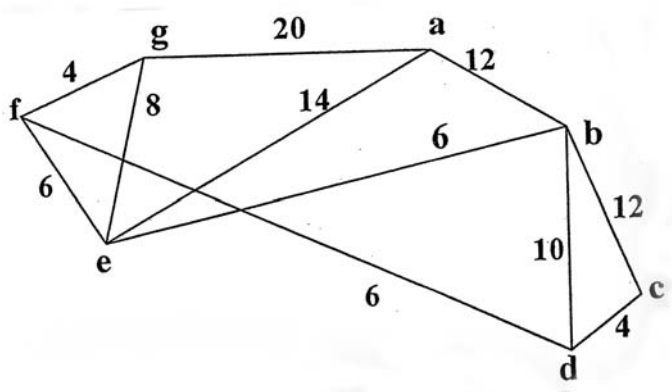
***Note** : i) Answer **any five** full questions.*
*ii) Figures to the **right** indicate **full** marks*
iii) Use of nonprogrammable calculator is allowed.
*iv) Make **suitable** assumptions **whenever** necessary and state it clearly.*

1. a) Write a note on automated manufacturing system. **8**
   b) Explain with graph high volume production plant configuration. **6**

2. a) Carry out the closest insertion method for the travelling sales man problem for the complete weighted graph shown below from vertex "a". **7**



   b) Use Dijkstra's algorithm on connected weighted graph shown below to find length of shortest paths from the vertex "a" to each of other vertices. **7**



P.T.O.

3. a) Compare fixed time setup simulation vs. next event or event to event simulation. **8**

   b) What are the advantages and applications of simulation ? **6**

4. a) Explain the multiple correlation analysis. **6**

   b) Find out regression coefficients bxy and byx, if $\sum x = 50$, **8**

   $\overline{X} = 5, \sum y = 60, \overline{Y} = 6, \sum xy = 350,$ óx = 5 and óy = 8.

5. By taking suitable example explain Fuzzy logic concept. **14**

6. a) Calculate the Karl Pearson's correlation coefficient for the following data. **8**

X :	28	41	40	38	35	33	40	32	36	43
Y :	23	34	33	34	30	26	28	31	36	38

   b) Applications of neural network, explain with examples. **6**

SLR-KN – 150

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) (CGPA) Examination, 2015
MACHINE TOOL ENGINEERING (Paper – IX)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any five full*** *questions.*
2) ***Assume*** *suitable data* ***whenever*** *necessary and state it* ***clearly****.*

1. a) Describe how to calculate power consumption and the resultant force acting on a single point tool in turning operation. **7**
   b) Name the basic features of a machine tool. Briefly explain any three. **7**

2. a) Make neat sketches showing three different forms of slide and slide ways design. Briefly explain them. **7**
   b) Describe the following types of drives used in machine tool : **7**
      1) PIV 2) Epi-cyclic drive.

3. a) What do you understand about high speed machining and machining of hard alloys steel and non-Ferro materials ? **7**
   b) Discuss advantages and disadvantages of ball recirculating lead screw in comparison with sliding friction lead screw. **7**

4. a) What are the points to be considered while designing machine tool spindle ? Briefly explain any three. **7**
   b) What are the difference between structure diagram and ray diagram ? **7**

5. a) Drive an expression for economic tool life based on total cost of machining. **7**
   b) Define FMS and compare FMS with other manufacturing systems. **7**

6. a) State the basic rules for layout of gear boxes having sliding clusters. **7**
   b) State AHP approach in analyzing the criticality of metal cutting parameters. **7**

7. Write short notes on (**any two**) : **14**
   b) Adaptive control system
   b) Forced vibrations of machine tools
   c) Design criteria for machine tool structures.

SLR-KN – 151

Seat No.	

M.E. Mechanical (Mfg Process) Engineering (Sem. – II) (CGPA) Examination, 2015
TOTAL QUALITY CONTROL (Elective – II) (Paper – X)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *i) Answer **any five full** questions.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Use of non-programmable calculator is **allowed.***
*iv) Make suitable assumptions **whenever** necessary and state it **clearly**.*

1. a) Discuss TQM philosophy by Deming and Juran. **8**
   b) Discuss Quality Assurance. **6**
2. a) What are Malcolm Baldridge award criteria ? Explain with systematic steps. **7**
   b) What are the types of advanced control charts ? Explain any one with example. **7**
3. Discuss the case study on British Airways in TQC point of view. **14**
4. a) Discuss the procedure of ISO-9000 documentation in detail. **6**
   b) Write a short note on QFD process. **8**
5. a) Discuss quality deployment in detail with example. **7**
   b) Enlist the series of standards and explain the registration procedure for quality standards. **7**
6. a) Discuss in detail quality spiral with a suitable example. **8**
   b) What are the guidelines to establish and cut-down quality costs ? Explain in brief. **6**

SLR-KN – 154

Seat No.	

M.E. (Mech.) Mfg. Processes Engg. (Semester – II) Examination, 2015
COMPUTATIONAL TECHNIQUES (Paper – X) (Elective – II)
(CGPA)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Attempt **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) Assume suitable data if **necessary** and mention it **clearly**.*
*4) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) A fluid is confined in a cylinder by a spring loaded frictionless piston so that the pressure in a fluid is a linear function of the volume p = a + bv where p = pressure (kpa), v = volume (m^3) a = – 60 kN/m^2, b = 7667 kN/m^2. If the fluid changes from initial condition of 0.03 m^3 to final volume 0.06 m^3. Find the magnitude of work transfer during the process using Gauss quadrature 3 point formula. The work done is given as (w) = $\int$ Pdv. **9**

   b) In a spring mass system three blocks are supported by three springs. Find out the displacement of each block by Gauss-Seidal method. The governing equations are

   $3 K_1x_1 – 2 K_2x_2 = W_1$

   $– 2 K_1x_1 + 3 K 2x_2 – K_3x_3 = W_2$

   $– K_2x_2 + K_3x_3 = W_3$

   Where K_1, K_2, K_3 are stiffness of springs in N/mm. x_1, x_2, x_3 are displacement in mm. W_1, W_2, W_3 are weight of blocks in N. Consider W_1 = 20 N, W_2 = 30 N and W_3 = 25 N. $K_1 = K_2 = K_3$ = 10 N/mm. **9**

2. a) The value of Nusselt numbers (Nu) and Reynolds numbers (Re) found experimentally are given below. If the relation between Nu and Re is of type $Nu = aRe^b$. Find the values of a and b for given values of Nu and Re.

Re :	3000	4000	5000	6000	7000
Nu :	14.3575	16.6517	16.7353	17.6762	18.5128

8

P.T.O.

b) The rate of emission of a radioactive substance is proportional to the amount N of the substance remaining at any instant t, governed by the equation $\frac{dN}{dt} = -kN$ where –ve sign indicates that radioactivity decreases with time. Taking K = 0.01 and at t = 0, N = 100 gm. Find how mush material remains when t = 100 sec. Using Runge-Kutta 4^{th} order method with h = 50. **9**

3. a) Explain false position method. **7**

b) The temperature of the slab at one end is 1000°C. The ambient temperature is 45°C. Heat flow from one end to other end of the slab is 20.4 kW for area of $1m^2$. The thermal conductivity of slab is given by K = 0.8 [1 + 0.025T] where T is tempeature at the other end. If thickness of slab is 40 mm find temperature at other end ? Use Euler's method. Take h = 0.01 mm. The heat flow through slab is given as $q = -KA\frac{dT}{dx}$ where q = heat flow. A = Area of slab, K = thermal conductivity. **10**

SECTION – II

4. A) Explain perspective projections with suitable example. **8**

B) Explain properties of Bezier surfaces. **9**

5. A) Consider the line segment in the xy plane and parallel to the y-axis defined by end points P1[0 0 0] and P2 [0 3 0]. Determine the point at t = 0.5, s = 0.5 on the sweep surface generated by simultaneously translating the line 10 units along the x axis and rotating it through 2Π about x axis. **10**

B) Explain coon bi cubic surfaces. **8**

6. A) Determine the point at t = $\Pi/2$ and $\Phi = \Pi/6$ on a surface of revolution formed by totating an ellipse with major axis inclined to the axis of revolution. The axis of revolution pases through the centre of the ellipse and lies in the plane of the ellipse. The angle of inclination is I = $\Pi/4$. The semi major and semi minor axes are a = 5, b = 1 respectively. The axis passes through the points a_0[0 10 10] and a_1[10 10 0]. The centre of the ellipse at a_1. First the direction cosines of the axis rotation are $[C_x \quad Cy \quad Cz] = [1/\sqrt{2} \quad 0 \quad -1/\sqrt{2}]$. **10**

B) Explain axonometric projections. **7**

———————

SLR-KN – 155

Seat No.	

M.E. (Mech. / Thermal Engineering) (Part – I) (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
Paper – I : ADVANCED FLUID MECHANICS AND CFD

Day and Date : Monday, 21-12-2015 Total Marks : 70
Time : 11.00 a.m. too 2.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Assume** suitable data if **necessary.***
*4) **Use** of non-programmable calculator is **allowed.***

SECTION – I

1. a) Oil of specific gravity 0.82 is pumped through a horizontal pipe line 15 cm in diameter and 3 km long at the rate of 900 liters per minute. This pump has an efficiency of 68% and requires 7.35 kW to pump the oil. Determine the dynamic viscosity of oil and verify whether the flow is laminar. **8**

   b) Find the thickness of the boundary layer at end of the flat plate and the drag force on one side of a plate 0.9 m long and 0.6 m wide when placed in water flowing with a velocity of 0.12 m/s. Find also the value of coefficient of drag. For the following velocity profile : **9**

   $u/U = 2\,(y/\delta) - (y/\delta)^2$.

2. a) Explain the difference between wall turbulence and free turbulence shear flow. Give two examples of each. **9**

   b) For the velocity profile in laminar boundary layer as, $\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \left(\frac{1}{2}\right)\left(\frac{y}{\delta}\right)^3$ find the thickness of the boundary layer and the shear stress 1.5 m from the leading edge of a plate. The plate is 2 m long and 1.4m wide and is placed in water which is moving with a velocity of 200 mm per second. Find the total drag force on the plate if μ for water = 0.01 poise. **9**

P.T.O.

3. Write note on the following : **17**

   a) Reynolds theory for turbulent shear stress. **6**

   b) Methods of preventing the separation of boundary layer. **6**

   c) Classification of Turbulence. **5**

SECTION – II

4. a) Explain the impact of CFD in automobile and engine applications. **8**

   b) State the physical principle of momentum equation and derive the Navier-stokes equations in conservation forms space. **9**

5. a) State the physical principle of continuity equation and derive the continuity equation using model of the finite control volume fixed in space. **9**

   b) Explain the Lax-Wendroff techniques. **9**

6. a) Explain divergence of the velocity. **6**

   b) Discuss in detail shock capturing. **5**

   c) Write short note on characteristics of hyperbolic equations. **6**

———————

SLR-KN – 156

Seat No.	

M.E. (Mechanical) Thermal Engineering (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
MEASUREMENT IN THERMAL SYSTEMS (P – II)

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) **Use** of non-programmable calculator is **allowed**.*
*3) **Assume** suitable data **wherever** necessary.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Define types of errors. **6**

   A voltmeter having a sensitivity of 1000 Ω/V reads 100 V on its 150 V scale when connected across an unknown resistor in series with a milli-ammeter. When milli-ammeter reads 5 mA, calculate error due to loading effect of voltmeter.

   b) Define dispersion, range, standard deviation, a table given below lists a sample of experimental data.

Value	3	4	5	6	7	8	9	10	11
Frequency of occurrence	1	2	3	6	7	6	4	2	1

   Calculate :
   a) Arithmetic mean
   b) Standard deviation
   c) Standard deviation of standard deviation. **6**

   c) Explain normal or Gaussian curve of errors. **6**

2. a) Explain generalised measurement system with one example from thermal engineering. **6**

   b) Explain bimetallic thermometers and solve a bimetallic strip is constructed of strips of yellow brass and invar bonded together at 30° C. Each has a thickness of 0. 3 mm. Calculate the radius of curvature when a 60 mm strip is subjected to a temperature of 100°C. One end of bimetallic strip is fixed. The thermal coefficient of expansion of yellow brass and invar are respectively 20.2×10^{-6}/°C and 1.7×10^{-6}/°C and their modulus of elasticity are respectively 96.5 GN/m^2 and 147 GN/m^2. **11**

P.T.O.

3. a) Explain the procedure of calibrating thermocouples.

A thermocouple arrangement of the copper constantan thermocouple consists of three junction pairs and has the reference junction at 150°C. If the output voltage is 3.3 mV, determine the temperature of the detecting junction. The calibration chart for a theromocouple junction is

Temperature °C	100	200	250
Voltage mv	4.22	9.23	11.95

8

b) Fit a straight line for the following values : **9**

T in °C	0	10	20	30	40	50	60	70	80	90	100
h_f (kJ/kg)	– 0.04	41.9	83.86	125.66	167.45	209.26	251.09	292.97	334.92	376.94	419.06

SECTION – II

4. a) Explain Knudsen gauge of pressure measurement with neat sketch. **8**

b) A manometer uses transformer oil of specific gravity 0.8 as the manometric liquid. However, the scale is graduated in mm of water. If the diameter of one leg is 2 mm and of the other 20 mm. Calculate the angle to the horizontal at which the tube and the scale must be inclined to give a reading of 5 mm on the scale for pressure difference equivalent to 1 mm head of water. **9**

5. a) Explain the set up to determine heat transfer coefficient of liquid with appropriate equations. **8**

b) How newly purchased differential pressure measuring device can be calibrated ? **9**

6. Write a short note on following : **(6×3=18)**

i) Gas chromatography

ii) Transient hot wire method

iii) Hot wire anemometer.

———————

SLR-KN – 157

Seat No.	

M.E. Mechanical (Thermal Engineering) (Semester – I) (New) Examination, 2015
CBCS/CGPA
ADVANCED HEAT AND MASS TRANSFER (Paper – III)

Day and Date : Saturday, 26-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data if ***necessary****.*
3) ***Use*** *of non-programmable calculator is* ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Write a note on experimental method to determine thermal conductivity of solids. **8**

   b) A fuse wire of diameter 2 mm and $\rho = 5\,\mu\Omega$cm is used in circuit. The convective coefficient to surrounding at 30 °C is 6 W/m^{2}K. If wire melts at 850 °C, determine current rating take k = 350 W/mK. **9**

2. a) A long cylindrical shaft of radius 7.5 cm comes out of an oven at 815 °C throughout and is cooled by quenching it in a large bath of 38 °C coolant. If the surface co-efficient of heat transfer between the bar surface and the coolant is 175 W/m^2 °C. Assume that k = 17.5 W/m °C, α = 0.0185 m^2/hr.

      i) Calculate the time it takes for the shaft center to reach 116 °C

      ii) What would be the surface temperature of the shaft when its center temperature is 116°C. **9**

   b) Explain the difference between fin effectiveness and fin efficiency. Hence discuss their usefulness in employing the fin in practice. **9**

P.T.O.

3. Write notes on :

   a) Write note on Schmidt's plot. **6**

   b) Hydrodynamic and thermal boundary layers. **6**

   c) Reynolds number, Prandtl numbers. **5**

SECTION – II

4. a) What is shape factor ? Explain in detail. Write various remarks of shape factor. **6**

   b) Explain in detail space resistance and surface resistance. **6**

   c) Explain the theory of thermal radiation by using electromagnetic spectrum. **6**

5. a) Explain the NTU-Effectiveness method of heat exchanger analysis. Write expression for effectiveness of parallel flow heat exchanger. **8**

   b) A concentric tube counter flow heat exchanger has length 500 mm with a thin walled inner tube of 60 mm diameter. The blood enters the heat exchanger at 20°C and 0.05 kg/s is warmed by water at 60°C and 0.12 kg/s. Determine the temperature of blood at exit from the heat exchanger and heat flow rate. Assume the following data :

   c_p of blood = 3500 J/kgK, Overall heat transfer co-efficient U_o = 475 W/m^{2}K. **9**

6. Write short note on :

   a) Difference between Drop wise and film wise condensation. **4**

   b) Drop condensation promoters. **4**

   c) Design consideration of shell and tube heat exchanger. **5**

   d) Condensation number. **4**

SLR-KN – 158

Seat No.	

M.E. (Mechanical) Thermal Engineering (Semester – I) (New) Examination, 2015
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY
(Paper – IV) (CBCS/CGPA)

Day and Date : Monday, 28-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Attempt **any two** questions from **each** Section.*

*2) Figures to the **right** indicate **full** marks.*

*3) Assume suitable data **if necessary**.*

*4) Draw **neat** sketches, flow diagram **whenever** required.*

*5) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) What is significance of research and role of research in different fields ? **9**

   b) Explain collection and analysis of data. **9**

2. a) Write note on objectives and functions of modelling. **8**

   b) Explain strategies to set up simple models. **9**

3. a) Write note on selection of appropriate method for data collection. **8**

   b) A steel supplier buys bars of 25 mm diameter in bulk from steel plants. Cut to the size and sells to his customers, he supplies any lengths upto 60 cm. Bars are available in 100 cm standard length. Present order is listed in Table III-b. He wishes to cut enough at least to fill all the orders using least possible numbers of 100 cm bars. If he has to supply expensive Nickel Chromium bars then his consideration will be not least number of bars but he has to minimize the trim loss. Formulate the problem : **9**

P.T.O.

Size in cm	45	36	31	14
Quantity	862	341	87	216

Table III-b
(Steel Bar Size and Quantity)

SECTION – II

4. a) Explain ANOCOVA technique. **9**

   b) Describe briefly the technique of analysis of variance for two way classification. **9**

5. a) What are the steps involved in decision orientated technical report ? **8**

   b) Explain multiregression model with suitable examples. **9**

6. a) Explain details of spacing within sentences. **8**

   b) What are the different forms of research work to be report ? **9**

———————

SLR-KN – 159

Seat No.	

M.E. Mechanical (Thermal Engineering) (Part – I) Semester – I (New) Examination, 2015
(CBCS/CGPA)
ADVANCED THERMODYNAMICS
Paper – V (Elective – I)

Day and Date : Wednesday, 30-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Answer **any two** questions from **each** Section.*
*2) Assume suitable data **if necessary**.*
*3) Use of non programmable calculator is **allowed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

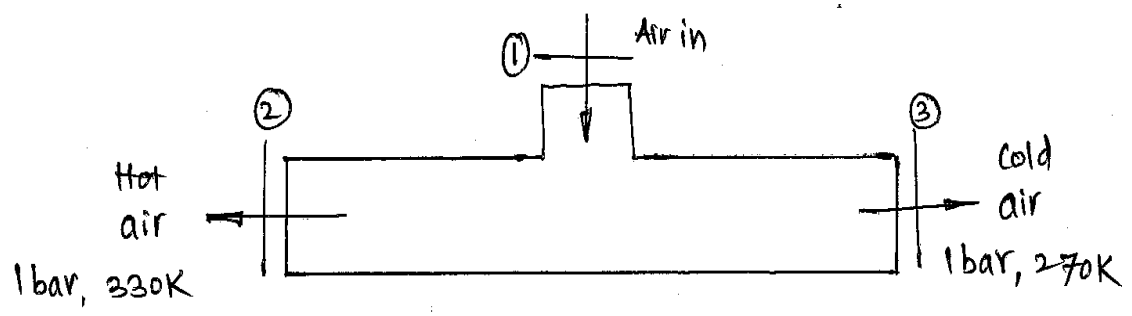
1. a) With usual notation derive following relations

1) $du = Cv.dt + \frac{(\beta T - P)}{k} dv$ 2) $dh = Cp.dt + V(1 - \beta T)\, dp.$ **9**

b) Derive an equation – $\left(\frac{\partial u}{\partial p}\right)_t = p_v.k - T.v.\beta$. **8**

2. a) What are reversible and irreversible thermodynamics process ? What condition must be satisfied for reversible process ? Give example of both type of process. **9**

b) A hypothetical device is supplied with 2 Kg/s of air at 4 bar, 300 K. Two separate stream of air leaves the device as shown in figure. Each stream is at an ambient pressure of 1 bar and mass flow rate is same for both streams. One of the exit streams is said to be at 330 K, while the other is at 270 K. The ambient temperature is at 300 K. Determine whether such device is possible. **8**



P.T.O.

3. a) Write note on entropy and disorder. **6**

   b) Write note on difference between ideal gas and perfect gas. **6**

   c) State the third law of thermodynamic and discuss its importance. Also state the important corollaries of the third law. **6**

SECTION – II

4. a) Explain in detail volumetric analysis. Also explain energy changes and entropy changes of mixture. **8**

   b) Calculate decrease in available energy when 25 Kg of water at 95° C mix with 35 Kg of water at 35° C, the pressure being taken as constant and the temperature of surrounding beings 15° C (Cp of water = 4.2 KJ/Kg K). **9**

5. a) Derive expression for maximum reversible work by open system exchanging heat only with the surrounding. **9**

   b) Discuss standard Gibb's function of formation and chemical equilibrium. **8**

6. Write short note on :

   a) Amgat's model and Dalton's model. **6**

   b) Law of equilibrium of energy. **6**

   c) Second law efficiency and its importance. **6**

———————

SLR-KN – 163

Seat No.	

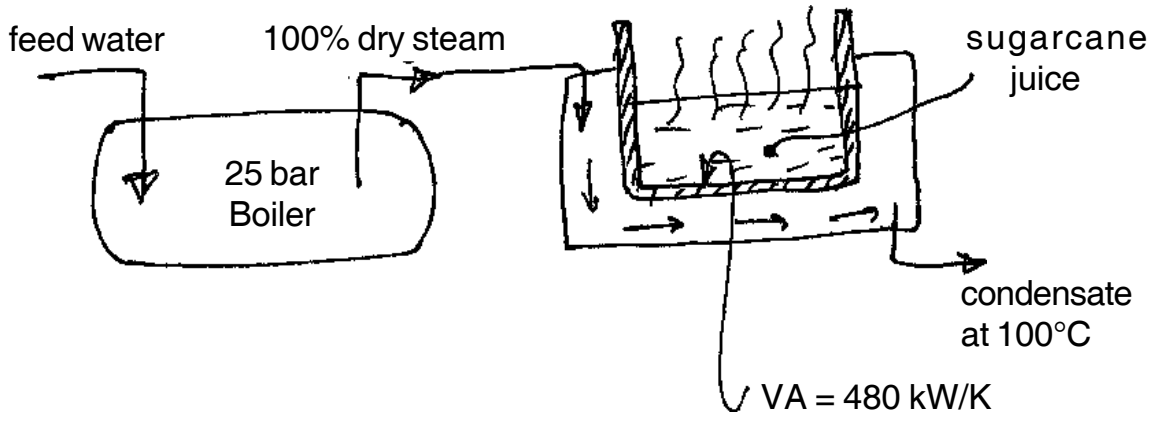
M.E. (Mechanical) Thermal Engineering (Semester – II) (CGPA) Examination, 2015
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. *: 1) Question no.* ***1*** *is* ***compulsory*** *and solve* ***any two*** *questions from* ***each*** *Section.*
2) Use of nonprogrammable calculator is ***allowed****.*
3) Assume suitable data ***wherever*** *necessary.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
5) Use of steam table, refrigeration chart, heat transfer data book is ***allowed****.*

SECTION – I

1. Design a system shown in figure to evaporate water content in the sugarcane juice at the rate of 2 kg/minute. **18**



2. a) A condenser having VA value of 480 kW/K condenses steam at a temperature of 40°C. The cooling water enters at 20°C with a flow rate of 160 kg/sec. What is outlet temperature of the cooling water ? Specific heat of water is 4.19 kJ/kgk. **10**

   b) Derive the relation for effectiveness of heat exchanger by NTV method. **7**

P.T.O.

3. a) The operating point of a fan and duct system is to be determined. The equations for the two components are :

   Duct : $SP = 80 + 10.73\ Q^{1.8}$

   Fan $Q = 15 - (73.5 \times 10^{-6})\ (SP)^2$

   Where SP = static pressure, Pa

   Q = air flow rate, m^3/sec.

   Use successive substitution to solve for the operating point, choosing as trial values SP = 200 Pa and Q = 10 m^3/sec. **10**

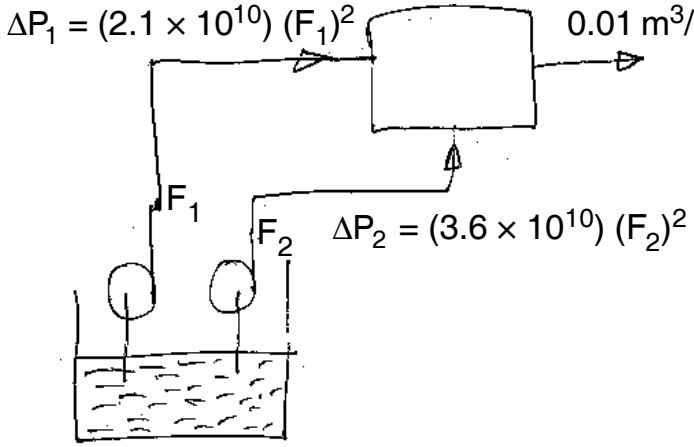
   b) Define coefficient of correlation and explain the step by step procedure to fit power law relation amongst the experimental values. **7**

SECTION – II

4. a) Two parallel pump pipe assemblies shown in fig. deliver water from a common source to common destination. The total volume flow rate required at the destination is 0.01 m^3/sec. The drops in pressure in the two lines are functions of the square of the flow rates $\Delta P_1,\ P_a = 2.1 \times 10^{10}\ F_1^2$ and $\Delta P_2,\ P_a = 3.6 \times 10^{10}\ F_2^2$. Where F_1 and F_2 are the respective flow rates in cubic meters per second. The two pumps have the same efficiency, and the two motors that drive the pumps also have the same efficiency.

   a) It is desired to minimize the total power equipment set up the objective function and constraints in terms of F_1 and F_2.

   b) Solve the optimal value of the flow rates that result in minimum total water power using the method of Lagrange multipliers. **12**



   b) Explain the methods of optimization of thermal systems with one example. **5**

5. a) The furnace serving a certain steam generating plant is capable of burning coal, oil and gas simultaneously. The heat release rate of the furnace must be 2400 kW, which with the 75% combustion efficiency of this furnace requires a combined thermal input rate in the fuel of 3200 kW. Ordinances in certain cities impose a limit on the average sulfur content of the fuel mixture, and in the city where this plant is located the limit is 2% or less. The sulfur contents, costs and heating values of the fuels are shown in the table.

Fuel	Sulfur content %	Cost per megagram	Heating value kJ/kg
Coal	3.0	$24	35000
Oil	0.4	36	42000
Gas	0.2	42	55000

Using the simplex algorithm of linear programming determine the combination of fuel rates that results in minimum costs and yet meets all constraints. **12**

b) With one example explain the dynamic programming method of optimization. **5**

6. a) Consider a resistance furnace mathematically model it and prepare block diagram and write a equation for transfer function in Laplace form. Plot the response for a step input signal. **12**

b) Write a note on dynamic behaviour of Thermal Systems. Draw a dynamic response of underdamped systems with transient response specifications. **5**

———————

SLR-KN – 164

Seat No.	

M.E. (Mechanical – Thermal Engg.) (Semester – II)
(CGPA) Examination, 2015
Paper – VII : COMPUTATIONAL TECHNIQUES IN THERMAL ENGG.

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

N.B. *: 1) Answer **any two** questions from **each** Section.*

*2) Assume suitable data **if necessary**.*

*3) **Use** of non-programmable calculator is **allowed**.*

*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Find the eigen values and eigen vectors of the matrix. **9**

$$A = \begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

b) Solve by Gauss elimination method. **9**

$10X - 7Y + 3Z + 5U = 6$

$-6X + 8Y - Z - 4U = 5$

$3X + Y + 4Z + 11U = 2$

$5X - 9Y - 2Z + 4U = 7$

2. a) Write algorithm for solution of a system of equation by Gauss-Seidal method. **9**

b) Use the Trapezoidal rule to estimate the integral $\int_0^2 e^{x^2}\,dx$ by taking 10 intervals. **8**

P.T.O.

3. a) Solve the Taylor's series method of third order, the equation **8**

$$\frac{dy}{dx} = x^3 + xy^2 / e^x$$

y(0) = 1 for y at x = 0.1, x = 0.2 and x = 0.3.

b) Fit a second degree parabola to the following data : **9**

X	0	1	2	3	4
Y	1	1.8	1.3	2.5	6.3

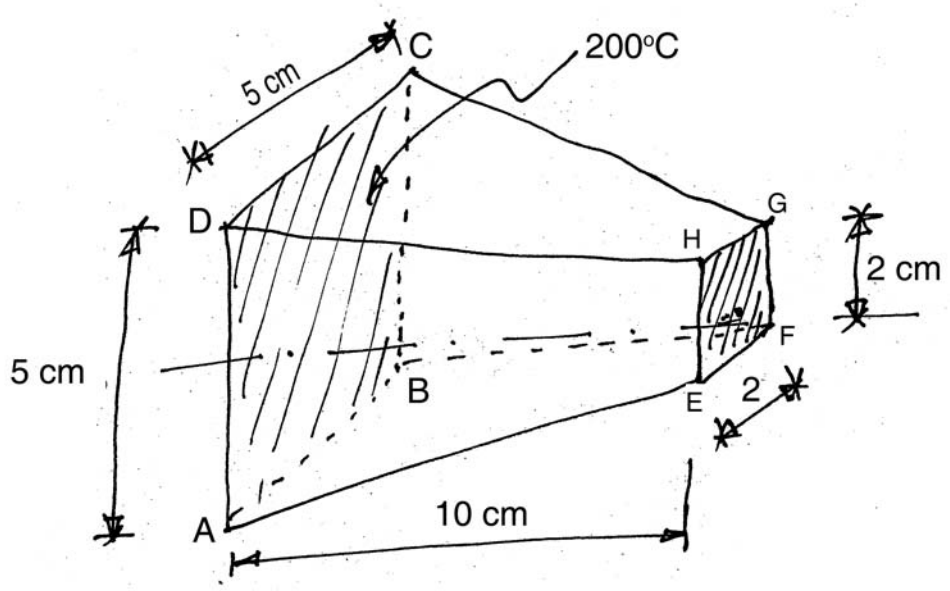
SECTION – II

4. a) Compare with one thermal example forward and backward difference techniques. **9**

b) If $y = a(3)^x + b(-2)^x$ and h = 1, prove that $\left(\Delta^2 + \Delta - 6\right) y = 0$. **9**

5. a) Explain application of finite difference techniques in 2D heat conduction problem. **9**

b) **8**



With finite difference method find the temp. of the face at a distance 2 cm from ABCD. If ABCD is maintained at 200°C and EFGH is insulated. Ambient temperature is at 25°C with h = 10 W/m^2k.

6. Write short notes on **any three** of the following :

a) Galerkin method. **6**

b) With steam table values (assumed) find by interpolation the value of latent heat of vaporization at 30.5°C and 10 bar. **6**

c) Rayleigh Ritz method. **5**

d) Applications of curve fitting in thermal engineering. **5**

SLR-KN – 165

Seat No.	

M.E. (Mechanical-Thermal Engineering) (Sem. – II) (CGPA) Examination, 2015
Paper – VIII : THEORY AND DESIGN OF I.C. ENGINE

Day and Date : Thursday, 17-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer* ***any two*** *questions from* ***each*** *Section.*
2) Assume suitable data if ***necessary****.*
3) Use of non-programmable calculator is ***allowed****.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) Explain construction and working of Atkinson engine. **8**

   b) A single cylinder four stroke cast iron diesel engine has following data :
   Cylinder bore = 300 mm
   Length of stroke = 450 mm
   Speed = 300 rpm
   Indicated mean effective pressure = 0.85 MPa
   Maximum gas pressure = 5 MPa
   Fuel consumption = 0.30 kg per BP per hr
   Higher calorific value of fuel = 44000 kJ/kg
   Permissible tensile stress = 40 N/mm^2
   Mechanical Efficiency = 80%
   Ratio of heat absorbed by piston to the total heat developed = 0.05
   Temperature difference $T_c - T_e = 220° C$
   Thermal conductivity factor k for cast iron = 46.6 W/m/° C
   Number of radial ribs = 4
   Determine : i) Thickness of piston head by strength and thermal consideration
   ii) Thickness of rib
   iii) State whether cup is required, if yes determine cup radius. **9**

P.T.O.

2. a) What are the abnormal combustion in the SI engine ? Explain any one in detail. **9**

   b) Design a center crankshaft for single cylinder vertical engine considering case of the crank is at top dead center position and subjected to maximum bending moment

   Cylinder bore = 125 mm

   L/r ratio = 4.5

   Maximum gas pressure = 2.5 MPa

   Length of stroke = 150 mm

   Weight of flywheel cum belt pulley = 1 KN,

   Total belt pull = 2 KN

   Width of hub for flywheel cum belt pulley = 200 mm

   Allowable bending stress = 75 N/mm^2

   Allowable compressive stress = 75 N/mm^2

   Allowable shear stress = 40 N/mm^2

   Allowable bearing pressure for the crank pin bushing = 10 N/mm^2

   The center to center distance between the main bearings 1 and 2 is twice of piston diameter. The belts are in horizontal direction, assume l/d ratio = 1 for crank pin.

   Assume suitable data if necessary. **9**

3. a) Explain principle of combustion chamber design in CI engine. **8**

   b) The cylinder of four stroke diesel engine has the following specification :

   Cylinder bore = 150 mm

   Maximum gas pressure = 3 MPa

   Allowable tensile stress = 50 N/mm^2

   Poison's ratio = 0.25

   Factor of safety = 5

   Determine the thickness of cylinder wall. Also calculate apparent and net circumferential and longitudinal stresses in cylinder wall. **9**

SECTION – II

4. a) Classify lubrication system used for I. C. Engine and explain with figure pressure lubrication system. **9**

   b) Determine the dimensions of small and big end bearing of the connecting rod for a diesel engine with following data :

   Cylinder bore = 100 mm

   Maximum gas pressure = 2.45 MPa

   (l/d) ratio for piston pin bearing = 1.5

   (l/d) ratio for crank pin bearing = 1.4

   Allowable bearing pressure for piston pin bearing = 15 MPa

   Allowable bearing pressure for crank pin bearing = 10 MPa. **9**

5. a) Write note on computer aided design of engine component. **8**

   b) Explain pressure cooling system with thermostatic valve. **9**

6. a) Discuss in detail importance of balancing of IC engine. **8**

   b) Design exhaust valve for a horizontal diesel engine from the following data :

   Cylinder bore = 250 mm

   Length of stroke = 300 mm

   Engine speed = 600 rpm

   Maximum gas pressure = 4 MPa

   Seat angle = 45°

   Mean velocity of gas through port = 50 m/s

   Allowable bending stress for valve = 50 N/mm^2

   K for steel valve = 0.42

   Calculate : i) Diameter of valve port

   ii) Diameter of the valve head

   iii) Thickness of the valve head

   iv) Diameter of valve stem

   v) Maximum lift of valve. **9**

Data for solving problems

Reboring allowance for I.C. Engine cylinder

D	75	100	150	200	250	300	350	400	450	500
C	1.5	2.4	4.0	6.3	8.0	9.5	11.0	12.5	12.5	12.5

Note : D and C are in mm

Allowable mean velocities of the gas (υ_p)

Types of Engine	**Mean velocity of gas (m/s)**	
	Inlet Valve	Exhaust Valve
Low speed engine	33-40	40-50
Medium speed engine	35-45	50-60
High speed engine	80-90	90-100

SLR-KN – 166

Seat No.	

M.E. (Mech. – Thermal Engineering) (Part – II) (Semester – II) (CGPA) Examination, 2015
Paper – IX :DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume **suitable** data if **necessary**.*
*4) Use of steam tables, psychrometric chart, refrigeration Property charts is **allowed.***
*5) Use of non-programmable calculator is **allowed.***

SECTION – I

1. a) A vapour compression refrigeration plant operates between evaporation and condensation temperature of –10° C and 45° C respectively. The refrigerant is dry and saturate vapour at entry to the compressor. It is discharge at102°C from the compression. The bore and stroke of the compressor are 80 mm each. It runs 720 r.p.m. with a volumetric efficiency of 80%. The liquid refrigerant enters the expansion valve at 35° C. Determine. **10**

i) C.O.P.
ii) Mass flow rate of refrigerant
iii) Capacity of the plant in TR.

Take Specific heat of liquid refrigerant = 1.62 KJ/Kg K

Use following data :

T(°C)	Sp. Volume M^3/Kg	h_f (KJ/Kg)	h_g (KJ/Kg)	S_f (KJ/Kg)	S_g (KJ/Kg)
–10	0.233	45.4	460.7	0.183	1.762
45	0.046	133	488.6	0.485	1.587

b) What is degree of saturation ? Derive the relationship between relative humidity (ϕ) and degree of saturation (μ) in the form

$$\phi = \frac{\mu}{1-(1-\mu)\frac{P_s}{P_b}}$$ **8**

2. a) The humidity ratio of atmospheric air at 28° C DBT and 760 mm of Hg is 0.016 kg/kg of dry air. Determine

   i) Partial pressure of water vapour

   ii) Relative Humidity

   iii) Dew point temperature

   iv) Specific enthalpy and

   v) Vapour density. **9**

   b) Explain various types of RAC controls. **8**

3. a) Compare the performance of reciprocating and centrifugal compressor. **9**

   b) Explain different application of air conditioning. **8**

SECTION – II

4. a) The following data refer to summer air conditioning of a building.

   Indoor design conditions : 25° C DBT and 50% RH

   Outside design conditions : 43° C DBT and 27° C WBT

   Room latent heat gain = 21000 kJ/h

   Room sensible heat gain = 84000 kJ/h

   BPF of the cooling coil used = 0.2

   The air is supplied to the building at 14.6° C

The return air from the room is mixed with the outside air before entry to cooling coil in the ratio of 4:1 by mass. Determine :

i) ADP of the cooling coil

ii) Entry condition of cooling coil

iii) Fresh air mass flow rate

iv) The refrigeration load on the cooling coil. **12**

b) Explain Electrolux vapour absorption refrigeration system. **6**

5. a) Explain thermoelectric refrigeration system. **8**

b) What are general rules for duct design ? Explain velocity reduction method for duct design. **9**

6. a) Design of cooling and dehumidifying coils. **9**

b) Explain passive cooling systems. **8**

SLR-KN – 167

Seat No.	

M.E. (Mechanical) (Thermal Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – X : POWER PLANT ENGINEERING (Elective – II)

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions from* ***each*** *Section are* ***compulsory****.*
2) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*
3) Make suitable ***assumptions*** *if necessary and mention them* ***clearly****.*
4) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Solve **any two** (**8** marks **each**) :

1) It is proposed to utilize the energy of the monsoon stream by constructing a dam across it. The stream discharge during the monsoon season of four months (June to September) is 20 m^3/sec. and for the remaining year, it should be taken as 2.5 m^3/sec.
Find :

a) The minimum capacity required of reservoir on the upstream side in day-sec-meter.

b) If the head loss in the pipe is 3% of the actual head and overall efficiency of generation is 90%. Find output of the station. Take mean level of water in reservoir above the tail race level as 80 meter. Take monsoon period from 1st June to 30th September and take the year of 365 days.

2) Steam at 20 bar, 360°C is expanded in a steam turbine to 0.08 bar. It then enters a condenser, where it is condensed to saturated liquid water. The pump feeds back the water into boiler :

a) Assuming ideal processes, find per kg of steam, the network output and cycle efficiency

P.T.O.

b) If the turbine and pump have each 80% efficiency, find the reduction in the network output and cycle efficiency.

Property table :

Pressure (bar)	V_f (m^3/kg)	Enthalpy (kJ/Kg)				Entropy (KJ/Kg K)			
		h_f	h_{fg}	h_g	At 360°C	s_f	s_{fg}	s_g	At 360°C
20	–	–	–	–	3159.3	–	–	–	6.9917
0.08	0.001008	173.88	2403.1	–	–	0.5926	7.6361	8.2287	–

3) Describe different safety protections provided in nuclear power plant.

2. Solve **any three** :

1) List out different boiler accessories. Explain any one in detail. **6**

2) Explain working of cyclone burner with neat sketch. **6**

3) Write note on fast breeder reactor. **6**

4) Explain working of ball and race mill with neat sketch. **7**

SECTION – II

3. Solve **any two** (**8** marks **each**) :

1) The following data relate to a 10 MW power station :

Cost of plant	=	Rs. 1,200 per kW
Interest, insurance and taxes	=	5% per annum
Depreciation	=	5%
Cost of primary distribution	=	Rs. 5,00,000
Interest, insurance taxes and depreciation	=	5%
Cost of coal including transportation	=	Rs. 4.4 per KN
Operating cost	=	Rs. 5,00,000

Plant maintenance cost

i) Fixed	=	Rs. 20,000 per annum
ii) Variable	=	Rs. 30,000 per annum
Installed plant capacity	=	10000 KW
Max demand	=	9000 KW
Annual load factor	=	0.6
Consumption of coal	=	255000 KN

Determine :

i) Cost of power generation per KW per year

ii) Cost per kWh generated

iii) Total cost of generation per kWh.

Transmission or primary distribution chargeable to generation.

2) In combined Gas Turbine (GT)-Steam Turbine (ST) plant, the exhaust gas from open cycle gas turbine is the supply gas to the steam generator of steam cycle at which additional fuel is burned in the gas. The pressure ratio for the GT is 7.5, the air inlet temperature is 15°C and the maximum cycle termperature is 750°C.

Combustion of additional fuel raises the gas temperature to 750°C and the gas leaves the steam generator at 100°C. The steam is supplied to the turbine at 50 bar, 600°C and the condenser pressure is 0.1 bar. The total power output of plant is 200 MW. The Calorific value of fuel is 43.3 MJ/Kg. Neglecting the effect of mass flow rate of fuel on air flow. Determine :

a) Flow rates of air and steam required

b) Power output of GT and ST

c) Thermal efficiency of combined plant

d) A : F ratio.

Take C_P = 1.11 KJ/Kg K and γ = 1.33 for combustion gases and C_P = 1.005 KJ/Kg K and γ = 1.4 for air. Neglect pump work.

Draw T-S diagram.

Property table for steam :

Pressure (bar)	Enthalpy (KJ/Kg)			Entropy (KJ/Kg K)			V_f m^3 /Kg
	h_f	h_g	At 600°C	s_f	s_g	At 600°C	
50			3670				
0.1	192	2583.9	–	0.6492	8.1488		0.001010

Take Enthalpy of steam at inlet of condenser = 2305 KJ/kg for steam turbine plant.

3) List out number of electrical equipment which are available in a power plant. And explain double bus bar system with sketch.

4. Solve **any three** :

1) Combined power plants are more advantageous over single power plant. Justify. **6**

2) Describe any two types of commonly used relays with neat sketch. **6**

3) Explain the functions of switch gear and explain auxiliary switches. **6**

4) Write note on – Pollution from nuclear power plant. Elaborate – Radioactive pollution, waste from reactor (solid, liquid, gases). **7**

———————

SLR-KN – 171

Seat No.	

M.E. E&TC (Digital Electronics and Communication Systems)
Semester – I (New) Examination, 2015
(CBCS)
RESEARCH METHODOLOGY (Paper – I)

Day and Date : Monday, 21-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figure to ***right*** *indicates* ***full*** *marks.*
3) Assume ***suitable*** *data if* ***necessary****.*
4) Use of non-programmable calculator is ***allowed****.*

SECTION – I

1. a) Explain research process with flowchart. **9**
   b) Explain the difference between research method and methodology. **8**

2. a) What is research proposal ? Explain in detail. **9**
   b) What is literature review ? Explain its importance models and source. **9**

3. a) Explain the model to minimize make span. **8**
   b) What is operation research model ? Explain important topics in operation research. **9**

SECTION – II

4. a) Explain significance of report writing. Which are the steps in writing report ? **8**
   b) Explain layout of research report. **9**

5. a) Explain some typical applications of experimental design. **8**
   b) Explain guidelines for designing experiments. **9**

6. a) What is ethics in search and why it is important ? **9**
   b) Explain guidelines for writing abstract. **9**

———————

SLR-KN – 172

Seat No.	

M.E. (E & TC – Digital Electronics and Communication Systems)
(Semester – I) (New) Examination, 2015
(CBCS)
COMMUNICATION NETWORKS (Paper – II)

Day and Date : Wednesday, 23-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Figures to **right** indicate **full** marks.*
*2) **All** questions are **compulsory**.*

SECTION – I

1. a) What is IPV6 ? Explain it in brief. **10**
   b) Draw and explain DHCP. **10**
   OR
   b) Write a note on B-ISDN.

2. Attempt **any two** : **10**
   a) Explain ARP datagram format.
   b) Explain UDP in detail.
   c) Explain TCP with state machine diagram.

3. Attempt **any one** : **5**
   a) Explain Kern's algorithm.
   b) What are the different functions of ATM layers ?

SECTION – II

4. a) Explain Gigabit Ethernet architecture. **10**
   b) Draw and explain domain names used in internet. **10**
   OR
   b) Explain principle of FTP in detail.

5. Attempt **any two** : **15**
   a) Explain Address to Name resolution (mapping).
   b) Explain primary and secondary servers defined by DNS.
   c) Draw block and transfer modes format for FTP.

SLR-KN – 173

Seat No.	

M.E. (E and TC) (Digital Electronics and Communication System)
(Semester – I) Examination, 2015
Paper – III : CMOS VLSI DESIGN (New CBCS)

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any three** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*

SECTION – I

1. a) Draw and explain physical structure of an NMOS transistor. **6**

   b) Explain technology scaling for MOS transistor. **5**

2. a) Explain static CMOS Inverter and Switch model of CMOS Inverter. **5**

   b) Explain dynamic dissipation due to charging and discharging capacitances in CMOS inverter. **6**

3. a) Draw and explain pass Transistor Logic. **6**

   b) Design full Adder using CMOS logic. **6**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Issues in dynamic design.

   b) Leakage in dynamic circuits.

   c) Accumulation, depletion and inversion modes of MOS transistor.

   d) Comparison of static and dynamic designs in CMOS.

P.T.O.

SECTION – II

5. a) Draw and explain NOR based and NAND based SR flip-flop and Ratioed CMOS SR latch. **5**

   b) Explain Master – Slave positive edge triggered resistor using multiplexers. **6**

6. a) Explain with neat schematic True Single Phase Clocked Resistor (TSPCR). And write transistor sizing issues in TSPCR. **6**

   b) Explain any two timing classification methods of digital systems. **5**

7. a) Explain any one method of designing fast adder. **6**

   b) Explain how PLL can be used for clock synchronization. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Designing arithmetic building blocks

   b) Latch based clocking

   c) Arbiters

   d) Sources of Skew and Jitter.

SLR-KN – 174

Seat No.	

M.E. (E & TC) (Digital Electronics and Comm. System) (Part – I)
(Sem. I) (New) Examination, 2015
(CBCS)
MODERN DIGITAL SIGNAL PROCESSING (Paper – IV)

Day and Date : Monday, 28-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Attempt **any two** questions from **each** Section.*
*2) Figure to **right** indicates **full** marks.*
*3) Assume suitable data if **necessary**.*
*4) Use of non programmable calculator is **allowed**.*

SECTION – I

1. a) Design an ideal differentiator with frequency response $H(e^{j\omega}) = j\omega, -\pi \le \omega \le \pi$. Using hamming window with N = 8. **9**
   b) Explain Levinson Durbin algorithm. **8**

2. a) Design an ideal bandreject filter with a desired frequency response
   $H_d(e^{j\omega}) = 1 \quad \text{for} |\omega| \le \pi/3 \text{ and } |\omega| \ge 2\pi/3$
   $= 0$ otherwise
   Find the values of h(n) for N= 11. Find H(z) **9**
   b) Explain with block diagram forward and backward predictor. **8**

3. a) Explain any four identifies used in scaling of discrete time signal. **9**
   b) Explain with diagram analysis and synthesis filter banks. **9**

SECTION – II

4. a) What is need of frequency transformation ? How to convert Low Pass to Low Pass and Low Pass to High Pass in digital domain ? **8**
   b) Convert the analog filter with system function $H_a(s) = \dfrac{S + 0.1}{(s + 0.1)^2 + 16}$ into a digital IIR filter by means of bilinear transformation. The digital filter is to have resonant frequency of $\omega_r = \pi/2$. **9**

P.T.O.

5. a) Explain the relationship between auto correlation and model parameters in detail. **8**

   b) Explain design of IIR filter using impulse invariance technique. Also explain mapping of poles with respect to unit circle. **9**

6. a) Explain factors that influence the selection of DSP processor in accordance with architectural features, execution speed, type of arithmetic and word length. **9**

   b) Explain with diagram Barrel shifter. **9**

———————

SLR-KN – 175

Seat No.	

M.E. (E & TC – Digital Electronics and Communication Systems) (Sem. – I) Examination, 2015
(New – CBCS)
Elective – I : Paper – V : COLOR IMAGE AND VIDEO PROCESSING

Day and Date : Wednesday, 30-12-2015 Total. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Figure to **right** indicates **full** marks.*
*2) **All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two**. **20**
   a) Explain image smoothing and sharpening filters in detail.
   b) Explain different color models in detail.
   c) Explain in detail noise removal method for image.

2. Attempt **any two**. **15**
   a) Explain image acquisition and sensing.
   b) Explain Euclidian distance used image processing.
   c) Classify edges in detail.

SECTION – II

3. Attempt **any two**. **20**
   a) Explain color consistency in color image processing.
   b) Explain block based method for motion detection.
   c) Explain optical flow segmentation.

4. Attempt **any two**. **15**
   a) Explain types of videos.
   b) Explain two dimensional motion estimation in detail.
   c) Explain MAP detection.

SLR-KN – 176

Seat No.	

M.E. (E&TC) (Digital Electronics & Communication Systems)
(Semester – I) (New) (CBCS) Examination, 2015
(Elective – I) FUZZY LOGIC (Paper – V)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *side indicate the maximum marks.*

SECTION – I

1. Attempt **any three** of the following : **(3×5=15)**
   a) Explain the properties of classical sets.
   b) Explain features of membership function.
   c) Explain rule based fuzzy system.
   d) Explain Fuzzy Ranking with example.

2. Attempt **any two** : **(2×10=20)**
   a) Explain Crisp relation in brief.
   b) Explain fuzzy relation.
   c) Suppose we have a universe of integers, Y = {1, 2, 3, 4, 5}. We define the following linguistic terms as a mapping onto Y : "Small" = (1/1) + (0.8/2) + (0.6/3) + (0.4/4) + (0.2/5), and "Large" = (0.2/1) +(0.4/2) + (0.6/3) + (0.8/4) + (1/5), Now modify these two linguistic terms with hedges.

SECTION – II

3. Attempt **any three** of the following : **(3×5=15)**
   a) Explain pattern recognition
   b) Draw and explain simple fuzzy logic system.
   c) Explain fuzzy logic in aeroplane landing system.
   d) Explain terms related to FCM.

4. Attempt **any two** : **(2×10=20)**
   a) Explain Fuzzy classification by equivalence relations.
   b) Explain Fuzzy logic application in liquid level control.
   c) Explain Cognitive map.

SLR-KN – 177

Seat No.	

M.E. (E&TC-Digital Electronics and Communication Systems)
(Semester – I) Examination, 2015
(New – CBCS)
Elective – I : SPEECH PROCESSING (Paper – V)

Day and Date : Wednesday, 30-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Figures to **right** indicate full marks.*
*2) **All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** : **20**
   a) Explain Speech enhancement algorithm in detail.
   b) Explain Discrete Wavelet Transform (DWT). Also enlist different types of DWT.
   c) Explain basic speech processing concept.

2. Attempt **any two** : **15**
   a) Explain different types of speech signals in detail.
   b) Explain speech enhancement techniques.
   c) Explain Formant Frequency Estimation.

SECTION – II

3. Attempt **any two** of the following : **20**
   a) Explain HMT algorithm in details.
   b) Explain concatenation of word and subword.
   c) Explain dimensionality reduction technique for speech recognition.

4. Attempt **any two** of the following : **15**
   a) Explain sampling and quantization of speech signal.
   b) Explain Digital speech coding in detail.
   c) Explain the use of ANN in speech recognition technique.

SLR-KN – 178

Seat No.	

M.E. (E&TC – Digital Electronics and Communication Systems)
(Semester – II) (CGPA) Examination, 2015
Paper – VI : RF AND MICROWAVE CIRCUIT DESIGN

Day and Date : Tuesday, 15-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Figure to **right** indicates **full** marks.*
*2) **All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** : **20**
   a) Derive the equation for characteristic impedance and wave propagation in transmission line.
   b) State and explain Maxwell's equation for air and time harmonic field.
   c) Derive and explain EM wave equation for conducting media.

2. Attempt **any two** : **15**
   a) Explain Schottky barrier diode.
   b) Explain Scattering parameter. Also give the properties for scattering parameter.
   c) Give the properties of network in terms of S parameter when ports are matched terminated.

SECTION – II

3. Attempt **any two** : **20**
   a) Explain different types of Microwave field effect transistors. Explain any one with characteristics curve.
   b) Explain MMIC manufacturing in brief.
   c) Draw and explain single diode mixer circuit.

4. Attempt **any two** : **15**
   a) Explain stability criteria for microwave amplifier.
   b) Explain the characteristics of high power amplifier.
   c) Explain HEMTS in brief.

———————

SLR-KN – 179

Seat No.	

M.E. (E and TC) Digital Electronics and Communication System (Semester – II) (CGPA) Examination, 2015
Paper – VII : HIGH SPEED DIGITAL DESIGN

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

1 a) How high a range of frequencies matters for high speed digital design ?

Answer this question graphically illustrating the relationship between a random digital pulse train and its frequency spectrum. **6**

b) Explain the following electrical properties of wires :

i) Resistance

ii) Capacitance

iii) Inductance. **5**

2. a) Explain with neat circuit diagram typical power supply network or power distribution network. **6**

b) Explain with neat diagram buck-type switching regulator, its Intuitive model and its necessary waveforms. **5**

3. a) Explain is signalling, signalling convention and signalling mode. Also draw and explain typical transmission line signalling system. **6**

b) Explain power supply isolation and single ended supply isolation. **6**

4. Write short note on **any three** of the following : **(4×3=12)**

a) Lossless LC transmission lines.

b) Speed and power of high speed digital design.

c) Cross talk.

d) Signalling over lumped transmission media.

P.T.O.

SECTION – II

5. a) Explain Grounding in High speed systems. **6**
   b) Explain prototyping circuits in high speed electronics. **5**

6. a) Explain different noise reduction tools related to power supply. **6**
   b) Explain power supply conditioning with low dropout references. **5**

7. a) What is sampling and Nyquest bandwidth ? Explain effect of antialiasing filters on system dynamic range. **6**
   b) What is undersampling and harmonic sampling ? Explain antialiasing filters in undersampling applications. **6**

8. Write notes on **any three** of the following : **(4×3=12)**
   a) Simulation tools.
   b) Shielding concepts related to power supply.
   c) Distortion and noise in an ideal N bit ADC.
   d) Latency of ADCs.

———————

SLR-KN – 180

Seat No.	

M.E. (E & TC Digital Electronics and Communication Systems)
(Semester – II) (CGPA) Examination, 2015
ADVANCED EMBEDDED SYSTEMS (Paper – VIII)

Day and Date : Thursday, 17-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. : *1)* ***All*** *questions are* ***compulsory****.*
2) Figures to right indicate ***full*** *marks.*
3) Assume suitable data ***wherever*** *necessary.*

SECTION – I

1. a) What is SOC ? Explain in detail . **7**
   b) What are different specifications of D-A convertor ? **7**
2. a) Explain interfacing of memory with processor. **6**
   b) Explain construction of RAM and SRAM. **6**
3. a) What are advantages of writing embedded software in Assembly Language ? What are advantages of writing embedded software in 'C' language ? **5**
   b) Explain interrupt handling in 'C' . **4**

SECTION – II

4. a) What is function of watch dog timer ? **4**
   b) Define real time system. Explain basic models of real time system. **5**
5. a) What is real time task shedulling ? Explain terms task instance, response time, task precedence. **7**
   b) Explain debug and test features of embedded system. **7**
6. a) Explain addressing modes of ARM-g. **6**
   b) Explain bus structure of embedded processor. **6**

———————

SLR-KN – 181

Seat No.	

M.E. (E & TC Digital Electronics and Communication Systems)
(Semester – II) (CGPA) Examination, 2015
Paper – IX : WIRELESS AND MOBILE NETWORKS

Day and Date : Friday, 18-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Figure to **right** indicates **full** marks.*

*2) **All** questions are **compulsory.***

SECTION – I

1. Attempt **any two** : **20**

   a) What are the different types of fading ? Explain any one in brief.

   b) Explain Rayleigh's fading.

   c) Consider a transmitter which radiates a sinusoidal carrier frequency of 900 MHZ. For a vehicle moving 60 kmph, compute the received carrier frequency in mobile is moving :

      a) directly toward the transmitter

      b) directly away from the transmitter and

      c) in a direction which is perpendicular to the direction of arrival of transmitted signal.

2. Attempt **any two** : **15**

   a) Explain the impulse response model for multipath channel

   b Explain RAKE receiver in brief

   c) Explain in brief Antenna diversity.

P.T.O.

SECTION – II

3. Attempt **any two** : **20**

   a) Draw and explain DHCP in brief.

   b) Explain Mobile IP. Also explain tunneling used in Mobile IP.

   c) Explain TCP segment format for mobile communication.

4. Attempt **any two** : **15**

   a) Explain 802.11 protocols.

   b) Explain MAC protocol frame format for 802.11.

   c) Explain Wireless Application Protocol.

SLR-KN – 182

Seat No.	

M.E. (E & TC) - Digital Electronics and Communication Systems
(Sem. – II) (CGPA) Examination, 2015
Paper – X (EL- II) : IMAGE AND VIDEO PROCESSING AND BROADCASTING

Day and Date : Saturday, 19-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B *: 1)* ***All*** *questions are* ***compulsory****.*
2) ***Assume*** *suitable data if* ***required****.*

SECTION – I

1. a) Write a short note on temporal properties of vision. **6**

   b) Explain the difference between filtering and restoration. **6**

   OR

   b) Explain Fast KL transform.

2. a) Explain DCT with its properties. **5**

   b) Explain SVD and discuss its properties. **5**

   OR

   b) For the 2×2 transform A and image U $A = \frac{1}{\sqrt{2}}\begin{bmatrix} \sqrt{1} & 1 \\ 1 & -1 \end{bmatrix}$ $u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$ calculate transformed image V and basis images.

3. a) If $S(z) = \frac{4.25 - \left(z + z^{-1}\right)}{2.5 - \left(z + z^{-1}\right)}$, show that this is an ARMA model and find its order. **7**

   OR

   a) Explain Least square filters in detail.

   b) Explain in detail smoothing Spline and interpolation. **6**

P.T.O.

SECTION – II

4. Write short note on **any two** : **(5×2=10)**
   1) Radon transform
   2) SVC
   3) Coding of two tone images.

5. a) Explain the importance of projection in medical imaging. **7**

   b) Discuss Projection Theorem in detail. **6**

   OR

   b) What are the different image analysis methods ? Discuss structure and shape features.

6. Answer **any two** :
   a) Explain Image segmentation techniques. **6**

   b) Explain interframe coding. **6**

   c) Explain in detail MPEG-4. **6**

———————

SLR-KN – 185A

Seat No.	

M.E. (Electronics and Telecommunication Engineering-Digital Electronics and Communication System) (Semester – III) Examination, 2015

Self-learning Subject

Paper – I : MODELING AND SIMULATION OF COMMUNICATION SYSTEM

Day and Date : Thursday, 31-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Solve **any two** questions. **(5×2=10)**
   a) What is performance estimation ?
   b) Explain multi-disciplinary aspects of simulation.
   c) Explain errors in system and device modeling.

2. Solve **any one** question. **(7×1=7)**
   a) Explain key steps in the design flow and role of simulation in communication system engineering.
   b) Explain link budget and system level specification process in the design of communication system.

3. Attempt **any three** questions. **(6×3=18)**
   a) Explain the process for simulation sampling frequency.
   b) Write a note on floating point arithmetic format.
   c) Explain the classification of system properties for performance evaluation techniques.
   d) Write sources of error in simulation.

P.T.O.

SECTION – II

4. Solve **any two** questions. **(5×2=10)**
   a) Explain seed numbers and vectors.
   b) Explain minimum standard algorithm.
   c) Derive equation for correlation coefficient relating to X and Z.

5. Solve **any one** question. **(7×1=7)**
   a) Explain multiplicative algorithm with prime and non-prime modules.
   b) Explain Hilbert transform and write its properties.

6. Attempt **any three** questions. **(6×3=18)**
   a) Explain how Monte Carlo technique is used to estimate the value of pie.
   b) Write a note on Monte Carlo integration.
   c) Explain block diagram representation of systems.
   d) Write a note on rejection technique for generating random variables.

———————

SLR-KN – 186

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2015
New (CBCS/CGPA)
Paper – I : POWER ELECTRONICS

Day and Date : Monday, 21-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : Attempt **all** questions.*

SECTION – I

1. Explain the following applications related to power electronics converters. **9**
   i) Power extraction from non-conventional energy sources.
   ii) Automotive electronics
   iii) High energy physics.
2. What are the different semiconductor devices that are used as switches in power converter systems ? Classify these devices based on their switching control characteristics. **9**
3. Explain single phase full bridge rectifier with an inductive load and output capacitive filter. **9**
4. Mention and explain the various methods of turn-ON and turn-OFF of an SCR. **8**

SECTION – II

5. Draw the relevant circuit diagram and waveforms of a three phase full controlled rectifier system, supplying a pure resistive load. Explain the gating signal sequence to be used in such systems. **9**
6. Discuss the operation of boost converter with help of neat circuit diagram and waveforms. **9**
7. Give the comparison between single phase half bridge and full bridge inverter. **9**
8. A three phase fully controlled converter is operating with a highly inductive load. Assume load current is continuous and ripple free. Determine
   i) RMS current ii) Displacement factor
   iii) Distortion factor iv) Power factor. **8**

SLR-KN – 187

Seat No.	

M.E. (Electrical) (Part – I) (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
POWER SYSTEM DYNAMICS AND CONTROL (P – II)

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m

SECTION – I

1. Applying Euler's method to the equation $\frac{dy}{dx} = \lambda x$, given $y(x_0) = y_0$ determine its stability zone. **18**

   OR

   Explain the stability problem faced by power system in detail :
   a) Voltage instability
   b) Frequency instability
   c) Loss of synchronisation of synchronous generator
   d) Mechanical-electrical system interaction instability.

2. a) Explain the concept of equilibrium. **8**
   b) Give the assumption for synchronous machine modelling and write the stator and rotor flux linkage equation. **9**

SECTION – II

3. a) Explain the bahaviour of synchronous machine connected to infinite bus bar. **9**
   b) Write the advantage of the unit-exciter scheme over the common exciter bus scheme. **8**

4. a) Explain the effect of change in excitation on stability. **9**

   OR

   a) Explain D-Q transformation using $\alpha - \beta$ variables.
   b) Explain the effect of change in prime mover input on synchronous generator connected to infinite bus bar by keeping field excitation constant. **9**

SLR-KN – 188

Seat No.	

M.E. (Electrical Engineering) (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
DC DRIVES (Paper – III)

Day and Date : Saturday, 26-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all**.

   a) Describe classification of dc drive based on quadrant operation. **8**

   b) Define base of dc drive show the variation of following quantities with respect to speed for variable speed dc shunt motor
      a) armature voltage
      b) armature current
      c) field current
      d) torque
      e) output power. **9**

      OR

      Compare the performance of single phase converter fed dc drive with 3-phase converter fed dc drive.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) Draw the speed torque characteristics of separately exited dc motor in constant torque and constant HP region.

   b) Draw and explain speed torque characteristics single phase full wave half control converter fed dc drive in continues and discontinues mode for various value of firing angle.

   c) A 220 V, 1500 rpm, 10 A separately exited dc motor is fed from single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz, $R_a = 2$ Ohm, conduction can be assume to be continuous. Calculate firing angle for a) Half the rated motor torque and 500 rpm. b) Rated motor torque and – 1000 rpm.

P.T.O.

SECTION – II

3. Attempt **all**.

   a) Explain with neat sketch the operation of three phase dual converter fed dc drive. **8**

   b) Draw and explain the speed torque characteristics of single quadrant chopper fed dc drive. **9**

   OR

   What are the objectives of closed loop control ?

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Compare the chopper fed dc drive with converter fed dc drive in following point
      i) Supply power factor
      ii) Ripple current frequency
      iii) Motor torque and Armature cu loss.

   b) Explain with neat sketch and waveform the operation of single quadrant chopper fed dc drive.

   c) Draw the block diagram torque control drive and state the application of torque control drive.

SLR-KN – 189

Seat No.	

M.E. Electrical (Semester – I) Examination, 2015
New (CBCS – CGPA)
Paper – IV : CONTROL ENGINEERING

Day and Date : Monday, 28-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any four** : **(4×6=24)**

   a) What are the different kinds of control systems ? Explain in detail.

   b) Explain with the aid of a sketch, the construction and operation of a Linear Variable Differential Transformer (LVDT).

   c) Explain the characteristics of the proportional controller.

   d) Explain the effect of feedback on system sensitivity in control systems.

   e) Derive an expression for the transfer function of an armature controlled dc servo motor.

2. Attempt **any one** : **(1×11=11)**

   a) Obtain the transfer functions for the following mechanical translational systems.

i)

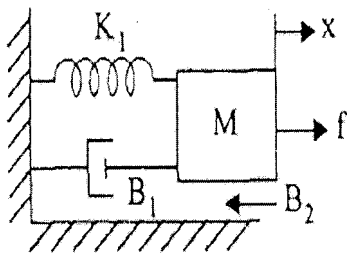


Fig. (a)

ii)

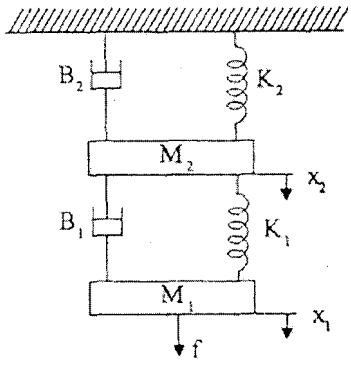


Fig.(b)

   b) Using appropriate diagrams, give the constructional and operational features of a hydraulic actuator. Derive the transfer function of the actuator.

P.T.O.

SECTION – II

3. Attempt **any four** : **(4×6=24)**

a) State space representation of speed control system.

b) Explain the performance specifications in frequency domain.

c) Obtain the state-space representation of the systems using controllable canonical form

i) $\dfrac{2}{s^3+2s^2+4s+8}$ ii) $\dfrac{10(s+4)}{s(s+1)(s+3)}$

d) A unity feedback system is characterized by the open loop transfer function

$$G(s)=\frac{1}{s(0.5s+1)(0.2s+1)}$$

i) Determine the steady state errors to unit step, unit ramp and unit parabolic inputs.

ii) Determine the rise time, peak time, peak overshoot and settling time of the unit step response of the system.

e) Determine the breakaway points, angles of departure and centroid of the root locus for the system,

$$G(s)H(s)=\frac{k(s+3)}{2s(s+5)(s+6)(s+2s+2)}.$$

4. Attempt **any one** : **(1×11=11)**

a) The block dia. of fig. (c) shown below represents a position control system. The open-loop transfer function of the uncompensated system is

$$G(s)=\frac{k}{s(s+1)(s+4)}$$

The specifications of the system are as follows :

Damping ratio, $\xi = 0.5$, undamped natural frequency , ω_n =2 rad/sec, velocity error constant, $K_v \geq 5 \text{ sec}^{-1}$

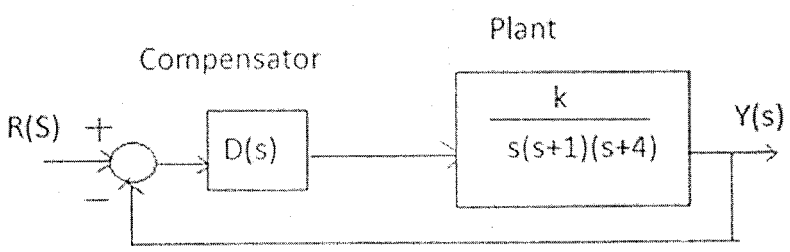


Fig. (c)

b) Explain the concept of controllability and observability.

Determine whether the following systems are completely state controllable and observable using

i) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} X + \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix} U \quad Y = [\,1 \;\; 1 \;\; 0\,] X$

ii) $\dot{X} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} X + \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} U \quad Y = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} X$

SLR-KN – 190

Seat No.	

M.E. (Electrical Engineering) (Semester – I) (New) Examination, 2015
Paper – V : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS
(Elective – I) (CBCS/CGPA)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all**.
   a) What are the different mechanical considerations in EHV line performance ? **8**
   b) Inductance and Capacitance calculations for single and multi-conductor line for calculation of Maxwell's potential coefficients. **9**

   OR

   Derive an expression for Maximum Charge Condition on a 3-phase line.
2. Solve **any two** questions from the following : **(2×9=18)**
   a) What are the various types of conductor vibrations in a transmission line ? Explain how they are measured and controlled.
   b) What are the Conductor configurations used for bundles in e.h.v. lines and also explain properties of Bundled conductors.
   c) Derive the expression $Pc = \frac{1}{2} KC \left(V^2_m - V^2_0\right)$ for the energy loss from charge-voltage diagram.

SECTION – II

3. Attempt **all**.
   a) What is the purpose of reflection and refraction coefficients of travelling waves and its significance explain in detail. **8**
   b) What are the general principles of the lightning protection problem ? **9**

   OR

   What is the purpose of synchronous condenser and how voltage profile increases using synchronous condenser also the design of the rating of the synchronous phase modifier (or condenser for short) ?
4. Solve **any two** questions from the following : **(2×9=18)**
   a) Obtain the time function of open end voltage equation using step response considering :
      i) Omit losses ii) Omit only g.
   b) Explain insulation coordination based on lightning.
   c) What is the purpose and significance of power circle diagram and its uses and also explain in detail the receiving end circle diagram for calculating reactive compensation for voltage control buses.

———————

SLR-KN – 193

Seat No.	

M.E. (Electrical Engineering) Semester – II (CGPA) Examination, 2015
Paper-VI : POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM

Day and Date : Tuesday, 15-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all**

   a) Explain facts technology in brief. **8**

   b) Explain midpoint regulation for line segmentation. **9**

   OR

   Explain thyristorized controlled series capacitor (tcsc) in detail.

2. Solve **any two** questions from the following. **(2×9=18)**

   a) Explain power flow and dynamic stability consideration of a transmission interconnection.

   b) Explain static VAR compensation and advanced static VAR compensation in detail.

   c) The particulars of the uncompensated transmission line are V = 220V, F = 60 Hz, X = 1.8 ohm and $\delta = 70^0$. Find

      i) The line current

      ii) The active power

      iii) The reactive power.

P.T.O.

SECTION – II

3. Attempt **all**

a) Explain the principle of phase compensation in detail. **8**

b) Compare shunt compensation, series compensation and phase angle compensation in detail. **9**

OR

Explain IPFC in detail.

4. Solve **any two** questions from the following. **(2×9=18)**

a) Explain UPFC in detail.

b) The particulars of a series compensated with a TCSC are V = 480V, F = 60 Hz, X = 16 ohm, and P_P = 96kw. The particulars of the TCSC are $\delta = 80^0$, C = 25μF and L = 0.4 mh. Find

i) The compensated capacitance reactance

ii) The degree of compensation

iii) The line current

iv) The reactive power

v) The delay angle α of the TCSC if the effective capacitive reactance is X_t = –40 ohm

c) Explain load compensation in details.

SLR-KN – 194

Seat No.	

M.E. (Electrical Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – VII : POWER QUALITY

Day and Date : Wednesday, 16-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. a) Define power quality. What are the main objectives of power quality standards ? **9**

   b) What are the causes of sags and swell ? Mention the types of sag and swell. **9**

2. a) Explain the responsibilities of the suppliers and users of electrical power. **8**

   b) What are harmonics ? Explain harmonic distortion with relevant waveforms. **9**

SECTION – II

3. Explain in detail about general procedure for harmonic distortion evaluation at the point of coupling, utility systems, customer facility and industrial facility. **18**

   OR

   What is the need of locating harmonic sources ? How will you find the harmonic sources from point of common coupling ? Give the identification procedure on the basis of voltage indices. **18**

4. a) Explain briefly about the following harmonic filters : **8**

      i) Active filters

      ii) Passive filters.

   b) Explain the role of combined series and shunt controller for voltage mitigation. **9**

   OR

   b) Explain design philosophy of filters to reduce harmonic distortion. **9**

SLR-KN – 195

Seat No.	

M.E. (Electrical Engineering) (Semester – II) (CGPA) Examination, 2015
Paper – VIII : AC DRIVES

Day and Date : Thursday, 17-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all**.

   a) Derive torque expression for a three phase induction motor and draw its torque-slip characteristic. **8**

   b) Compare stator voltage control and E/f control strategies for speed control of a three phase induction motor. **9**

   OR

   Explain effect of voltage drop across stator impedance on E/f control strategy for speed control of a three phase induction motor.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) Draw torque slip characteristic of a three-phase induction motor. Also draw motor current on the same characteristic. Explain the shape of torque slip characteristic.

   b) Show that under variable frequency control (E/f control), torque produced by a three phase induction motor depends on "s.k" where s = slip and k = fraction of frequency.

   c) Draw and explain torque and power capability curves for a three phase induction motor. Hence explain constant torque and constant power regions of its operation.

P.T.O.

SECTION – II

3. Attempt **all**.

   a) With a neat block diagram, explain closed loop V/f control scheme for three phase induction motor. **8**

   b) With neat circuit schematic explain static Scherbius drive. State basic philosophy used for operating induction motor in variable speed mode in this drive. **9**

OR

State advantages of three phase synchronous motor over three phase induction motor. With simple equivalent circuit and phasor diagrams explain its operation in variable power factor mode. Derive its torque equation.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Draw and explain typical power circuit configuration used for three phase induction motor speed control. Explain need of dynamic braking resistance in this configuration.

   b) Draw a neat equivalent circuit diagram for current fed induction motor drive. How do we decide the magnitude of current to be fed from source to such a drive ? Why starting torque is much lower in case of current fed drives than that for voltage fed drives ?

   c) With neat block diagram explain true synchronous mode of speed control in synchronous motor.

———————

SLR-KN – 196

Seat No.	

M.E. Electrical (Semester – II) (CGPA) Examination, 2015
Paper – IX : ADVANCED CONTROL ENGINEERING

Day and Date : Firday, 18-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** : **(2×9=18)**

   a) Design the feedback-compensation scheme having the process model and the controller transfer function be G(s) = $\frac{4}{s(2s+1)}$ and $G_c(s)$ = 2s+1 for unit step input.

   b) Design the series-compensation scheme having the process model and the controller transfer function be G(s) = $\frac{4}{s(2s+1)}$ and $G_c(s) = 2\left(1+\frac{1}{2s}\right)$ for unit step input.

   OR

   Explain relay control systems for off-line and on-line identification in detail.

2. What are the control structures for controlling various plants ? Explain in detail. **(1×8=8)**

3. Explain the drawbacks of off-line identification relay test. How to overcome these drawbacks ? **(1×9=9)**

   OR

   Determine the unknown plant dynamics be G(s) = $\frac{1}{(s+1)^5}$. A symmetrical relay with height h = 1 produces a sustained symmetrical process output with A= 0.474 and P_u = 8.732. Assuming the steady state gain to be K = 1.

SECTION – II

1. Attempt **all** : **(2×9=18)**

   a) How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

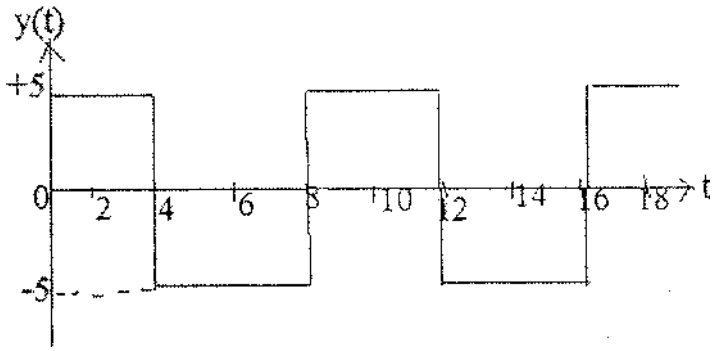
   b) Estimate the parameters of the dynamics of the plant $G(s) = \frac{ke^{-\theta s}}{Ts \pm 1}$ and the dynamics of the controller $G_c(s) = K_c \left(1 + \frac{1}{T_i s} + T_d s\right)$ by using DF based on-line identification process.

   OR

   What are the conditions for sustained oscillatory output of FOPDT transfer function model ?

2. Obtain the analytical expressions for the SOPDT transfer function model. **(1×8=8)**

3. Find the system model for given the output waveform **(1×9=9)**



Given relay height h = 1.

OR

How to identify the FOPDT model by using state-space analysis ?

SLR-KN – 199

Seat No.	

M.E. (Electrical Engineering) (Semester – II) (CGPA) Examination, 2015

Paper – X : HIGH VOLTAGE DC TRANSMISSION (Elective – II)

Day and Date : Saturday, 19-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :

   a) What are the equipment used in hvdc transmission system explain in detail ? **8**

   b) With the help of neat sketches, analyze a six pulse rectifier bridge circuit with an overlap angle greater than 60°. Deduce the relevant equations and draw the necessary graphs. **9**

   OR

   Explain in detail the converter control characteristics of HVDC systems.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) Explain firing angle control in detail.

   b) With block diagram, discuss the principle of operation of a basic power controller.

   c) With the help of a neat diagram explain converter operation in 3 and 4 conduction mode.

P.T.O.

SECTION – II

3. Attempt **all** :

   a) Discuss the various faults exist in converter station. **8**

   b) What are the various types of filters that are employed in HVDC converter station ? Discuss them in detail. **9**

   OR

   Write a short notes on :

   i) Modelling of H.V.D.C. links

   ii) P.U. system for d.c. quantities.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Explain protection against over voltages.

   b) Give in detail the different sources of reactive power.

   c) What are the types of MTDC systems and explain each in detail.

SLR-KN – 200

Seat No.	

M.E. (Electrical Engineering) (Sem. – III) Examination, 2015
Self Learning Subject : SMART GRID (Paper – I)

Day and Date : Thursday, 31-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : Attempt **all** questions.*

SECTION – I

1. Explain the following terms related to Smart-Grid : **11**
   i) Objectives
   ii) Functions
   iii) Challenges.
2. Enlist energy storage technologies and explain the concept of Superconducting Magnetic Energy Storage (SMES). **8**
3. Explain the term Wide Area Measurement System (WAMS). **8**
4. Write a note on Substation Automation equipments. **8**

SECTION – II

5. Explain concept of microgrid and its need and application. What are the key differences between a microgrid and a conventional power plant ? **11**
6. Explain about protection and control of microgrid. **8**
7. Explain PV system and also write down the types of PV cell. **8**
8. Explain power quality problems disturbances in smart grid. **8**

———————

SLR-KN – 201

Seat No.	

M.E. Mechanical Manufacturing Engineering (Semester – I) (New) Examination, 2015
CBCS/CGPA
MATERIAL REMOVAL PROCESSES (Paper – I)

Day and Date : Monday, 21-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve* ***any three*** *questions from Q.* ***1*** *to Q.* ***4****.*
2) Q. ***5*** *is* ***compulsory****.*
3) ***Draw*** *sketches, diagrams, flow charts etc.* ***wherever*** *necessary.*
4) Figures to the ***right*** *indicate* ***full*** *marks.*
5) Make suitable assumptions if ***required*** *and state them* ***clearly****.*

1. a) Write note on motion generation in machine tools. Also classify the machine tool in details. **8**

   b) Determine the three components of the machining force when shaping a cast iron block with depth of cut = 4 mm, feed = 0.25 mm/stroke, normal rake angle of tool = 10°, principal cutting edge angle = 30°, coefficient of friction between the chip and tool = 0.6, and ultimate shear stress of cast iron = 340 N/mm^2. **10**

2. a) During an orthogonal machining operation on mild steel the results obtained are, t_1 = 0.25 mm, t_2 = 0.75 mm, w = 2.5 mm, oe = 0°, F_C = 950 N, F_T = 475 N.
      i) Determine the coefficient of friction between the tool and the chip.
      ii) Determine the ultimate shear stress of the work material. **10**

   b) Explain forces acting on chip and derive the expression for average coefficient of friction. **8**

P.T.O.

3. a) Explain in detail surface roughness depends on cutting fluid. **8**

   b) Selection criteria for cutting speed, feed, tool life for minimum cost and minimum production time. **10**

4. a) Write in detail thermal effects in grinding. **8**

   b) Write short note on cutting fluids in grinding. **10**

5. Write short note on (**any two**) : **(8×2=16)**

   a) Plasma Arc machining.

   b) Electrochemical machining.

   c) Electrical discharge machining.

SLR-KN – 202

Seat No.	

M.E. Mechanical (Manufacturing Engineering) (Semester – I)
(New) Examination, 2015
(CBCS/CGPA)
CNC AND ADAPTIVE CONTROL (Paper – II)

Day and Date : Wednesday, 23-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Solve* ***any two*** *questions from* ***each*** *Section.*

2) Figures to ***right*** *indicate* ***full*** *marks.*

3) ***Assume*** *suitable data* ***if necessary*** *and mention it* ***clearly****.*

SECTION – I

1. a) What are the different drives for a CNC ? Explain in detail the drive systems with their features. Enumerate the benefits of each drive system. **11**

   b) Discuss the accessories of a CNC milling machine. **6**

2. a) What are the different types of position sensors ? Explain any three position sensors with diagram. **12**

   b) What are the accessories of a CNC turning centre ? **5**

3. Write short note on (**any three**) : **(3×6=18)**

   1) Feedback system in CNC

   2) Interpolators in CNC

   3) ATC

   4) Linear Variable Differential Transformer (LVDT).

P.T.O.

SECTION – II

4. a) Explain the CAD/CAM based part programming. Enumerate the benefits of the same. **5**

   b) Discuss the significance of adaptive control with a suitable example. **12**

5. a) Explain the CNC program verification in detail. **9**

   b) What is the part program format ? Explain the different types of formats. **8**

6. Write short note on (**any three**) : **(3×6=18)**

   1) Computer assisted part programming

   2) Adaptive control

   3) Part program format

   4) Utilisation of CNC machine.

———————

SLR-KN – 203

Seat No.	

M.E. Mechanical Manufacturing Engineering (Semester – I) (New) Examination, 2015
(CBCS/CGPA)
Paper – III : ADVANCED JOINING TECHNOLOGY

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Solve **any three** questions from Q. **1** to Q. **4.***
*2) Q. **5** is **compulsory**.*
*3) Draw sketches, diagrams, flow charts, etc., **wherever** necessary.*
*4) Figures to the **right** indicate **full** marks.*
*5) Make suitable assumptions if **required** and state them **clearly**.*

1. a) Why coating of electrodes is necessary ? What are the different types of coating ? **8**
   b) Explain SAW with advantages, disadvantages and applications. **10**

2. a) Explain diffusion bonding process with advantages, disadvantages and applications. **10**
   b) Write short note on LBW with its advantages, disadvantages and applications. **8**

3. a) Explain different methods used for welding of plastics. **10**
   b) Explain pulsed current welding process with the help of neat sketch and applications. **8**

4. a) Explain various heat treatments carried on welded component. **8**
   b) Write short note on residual stresses and stress relief methods in welded component. **10**

5. Write short note on **any four** : **(4×4=16)**
   a) Inspection codes for weldments.
   b) Soldering.
   c) Brazing and its different types.
   d) Adhesive bonding.
   e) Arc blow.

SLR-KN – 205

Seat No.	

M.E. (Mechanical Manufacturing Engineering) (Semester – I) (New) (CBCS/CGPA) Examination, 2015
Paper – IV : MACHINE TOOL DESIGN (Elective – I)

Day and Date : Monday, 28-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) Answer **any two full** questions in **each** Section.*
*2) **Draw** meaningful sketches **wherever** necessary in pencil **only**.*
*3) Figures to **right** indicate **full** marks.*

SECTION – I

1. a) What are the essentials of Machine Tools ? Explain. **5**
   b) Name the Basics of Machine Tools. Explain any five. **12**

2. a) Explain the Basic principles of machine tool design. **8**
   b) Explain with a neat sketch the rotary and translator hydraulic drive. **10**

3. a) Describe the hydrostatic bearing used in machine tool spindle with neat sketch. **10**
   b) Explain in detail the effect of radial forces on spindle deflection when bearing is assembled with interference. **7**

SECTION – II

4. a) Give details of bed section and wall arrangement with their application. **8**
   b) Explain the design criteria for selection of material for machine tool structure. **10**

5. a) Explain the concept of modular design and integration of SPM's, to machine tools. **7**
   b) Explain in brief the concepts of aesthetic and ergonomics applied to machine tools. **10**

6. a) Write a note on latest trend in machine tool design. **8**
   b) Explain various standard acceptance tests of machine tools. **10**

SLR-KN – 213

Seat No.	

M.E. Mechanical (Manufacturing) (Sem. I) (New) (CBCS/CGPA) Examination, 2015
Paper – V : MANUFACTURING PLANNING AND CONTROL (Elective – II)

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70
Time :11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Assume** suitable data if **necessary** and mention it **clearly**.*

SECTION – I

1. a) What are the features of aggregate planning ? Discuss the steps involved in aggregate planning process. **10**

   b) Discuss the relevance of line balancing in manufacturing system. Enumerate the objectives of line balancing. **7**

2. a) Explain the significance of production quantity and product variety with the different manufacturing systems. **12**

   b) What do you mean by Group Technology Layout ? How will you decide the scope of a GT layout in a manufacturing system ? **5**

3. Write short notes on **(any three)** : **(3×6=18)**
   1) Batch manufacturing system
   2) JIT
   3) Code structures in GT
   4) CIM wheel.

P.T.O.

SECTION – II

4. a) Discuss the concept of MRP. Explain the components of MRP. **11**

   b) What is cost planning ? Discuss the need for the same. **6**

5. a) What do you mean by production scheduling ? Explain the importance of production scheduling in a manufacturing system. **10**

   b) Discuss the scope of simulation analysis in manufacturing system. **7**

6. Write short note on **(any three)** : **(3×6=18)**

   1) Dedicated FMS

   2) Cost of quality

   3) Hierarchical planning system

   4) Material handling in FMS.

———————

SLR-KN – 217

Seat No.	

M.E. Mechanical (Manufacturing) (Semester – II) (CGPA) Examination, 2015
METAL FORMING PROCESSES (Paper – VI)

Day and Date : Tuesday, 15-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

***Note** : 1) Answer **any five full** questions.*

*2) Figures to **right** indicate **full** marks.*

*3) Make suitable assumptions, if required and state them **clearly**.*

1. A) Explain the classification of metal forming processes in detail. **7**

   B) Explain the properties of Hot forming with advantages and limitations. **7**

2. A) What is cold forming. Explain with suitable example. **7**

   B) What is isothermal forging, explain its significance. **7**

3. A) State the upper bound theorem and explain the various terms associated with it. **7**

   B) Explain the Roll pass for billet rolling. **7**

4. A) How elastic deformation affects cold rolling processes. **7**

   B) Explain the term barreling and bulging in connection with forging of non circular shapes between two flat dies. **7**

5. A) Write a note on Near Net shape manufacturing. **7**

   B) In detail explain the Hydrostatic Extrusion process. **7**

6. A) What are slip lines ? Give the Henkeys stress equation along slip line. **7**

   B) Explain the lubrication in extrusion process. **7**

———————

SLR-KN – 218

Seat No.	

M.E. (Mechanical – Manufacturing Engineering) (Semester – II) (CGPA) Examination, 2015
FINITE ELEMENT METHODS (Paper – VII)

Day and Date : Wednesday, 16-12-2015 Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*

2) Make ***suitable*** *assumptions if necessary and state them clearly.*

SECTION – I

1. a) Explain properties of global stiffness matrix for one dimensional bar element. **6**

   b) Briefly explain the steps involved in FEM with example. **6**

2. a) Derive Element Stiffness matrix and element load vector by direct method for one dimensional bar element. **6**

   b) Explain principal of minimum potential energy and principal of Virtual work. **5**

3. a) Derive strain displacement [B] matrix for triangular bar element. **6**

   b) Explain Rayleigh Ritz method with example. **5**

4. Write short note on : **12**

   a) Weighted Residual method.

   b) Collocation method.

P.T.O.

SECTION – II

5. a) Explain convergence criterion of Isoparametric elements. **6**

   b) Explain the element matrix, using Galerkin approach for one dimensional bar element. **5**

6. Explain with suitable example governing equation of one dimensional heat transfer problem. Discuss various types of boundary conditions used in solving heat transfer problems. **12**

7. a) Explain in detail finite element analysis of metal drilling process. **6**

   b) Derive shape function of one dimensional linear bar element in global coordinate system. **5**

8. Write short note on : **12**

   a) Axisymmetric field problems in FEM.

   b) Structural beam, plate and shell element.

SLR-KN – 225

Seat No.	

M.E. (Mechanical – Manufacturing Engineering) (Semester – II) (CGPA) Examination, 2015
Elective – III : FLEXIBLE MANUFACTURING SYSTEM (Paper – VIII)

Day and Date : Thursday, 17-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any two** questions from **each** Section.*
*2) Figures to **right** indicate **full** marks.*
*3) **Assume** suitable data **if necessary** and mention it **clearly**.*

SECTION – I

1. a) Define manufacturing system. Classify it and explain FMS. **9**
   b) Classify FMS and discuss the scope. **8**
2. a) Why today FMS is integral part of manufacturing system and what are problems for implementation ? Explain layout of FMS system. **9**
   b) Explain role of programmable controller in FMS. **8**
3. Write short notes on **(any three)** : **(3×6=18)**
   1) FMS Vc FMC
   2) FMS software
   3) Distributed numerical control
   4) Hardware configuration in FMS.

SECTION – II

4. a) Discuss Design and modelling of FMS. **9**
   b) Simulation and analysis plays a vital role in FMS design – Discuss. **8**
5. a) Explain the principles of material handling. **9**
   b) Explain different queuing models. **8**
6. Write short note on **(any three)** : **(3×6=18)**
   1) Benefits and limitations of FMS.
   2) Tool monitoring and fault detection.
   3) Group technology.
   4) FMS installation.

SLR-KN – 227

Seat No.	

M.E. (Mechanical – Manufacturing Engg.) (Sem. – II) Examination, 2015 (CGPA)
QUALITY CONTROL AND RELIABILITY (Elective – IV) (Paper – IX)

Day and Date : Friday, 18-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: i) Attempt* ***any five full*** *questions.*
ii) Figures to the ***right*** *indicate* ***full*** *marks.*

1. a) Discuss culture of TQM and TQM axioms. **7**
   b) Explain cost of total quality. **7**

2. a) Discuss Demings fourteen points for management. **7**
   b) Discuss design and analysis of experiments. **7**

3. a) Explain in brief control charts. **7**
   b) Discuss in brief statistical quality control. **7**

4. a) What is reliability ? What is bath tub curve ? **7**
   b) Discuss system reliability. **7**

5. a) Explain QFD. **7**
   b) What is Scatter diagram ? **7**

6. a) Discuss Kaizen concept of quality. **7**
   b) Explain Crossby's absolutes for quality management. **7**

SLR-KN – 232

Seat No.	

M.E. (Electronics and Telecommunication Engineering) (Semester – I) (CGPA) Examination, 2015
Paper – I : ADVANCED LIGHT WAVE COMMUNICATION (Old)

Day and Date : Monday, 21-12-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume suitable data ***if*** *required.*

SECTION – I

1. Solve **any one** question : **(7×1=7)**

   a) Explain the following terms :
      i) Critical angle and acceptance angle
      ii) Numerical Aperture
      iii) Step Index Fiber.

   b) When the mean optical power launched into 8 Km length of fiber is 120 microwatt, the mean optical power at fiber o/p is 3 microwatt.

      Determine :
      i) The overall fiber attenuation or loss in Decibels through the fiber assuming there are no splices or connectors
      ii) The signal attenuation per Km
      iii) The overall signal attenuation for 10 Km fiber link using same fiber with splices at 1 Km interval each giving attenuation of 1 Decibel.

2. Solve **any two** questions : **(5×2=10)**

   a) Compare LED and LASER as an optical source.

   b) Explain LASER characteristics.

   c) Explain scattering losses in optical fiber.

P.T.O.

3. Write a short note (**any three**) : **(6×3=18)**

   a) Bending losses in optical fiber.

   b) Optical fiber cable design.

   c) Dispersion in optical fibers.

   d) Surface emitting LED.

SECTION – II

4. Attempt the following (**any one**) : **(7×1=7)**

   a) Explain with suitable diagram a WDM system with facility for add as well as drop wavelengths.

   b) Discuss rise time budget of point to point optical link.

5. Attempt the following (**any two**) : **(5×2=10)**

   a) With a neat structure explain working of PIN and avalanche photo detector.

   b) What is Soliton ? Explain why soliton pulses are used.

   c) With a suitable diagram explain working principle of WDM system.

6. Write a note on (**any three**) : **(6×3=18)**

   a) Avalanche multiplication noise.

   b) Hybrid and Planar waveguide devices.

   c) Design consideration of Optical multiplex/Demultiplex.

   d) Active WDM devices.

———————

SLR-KN – 233

Seat No.	

M.E. (Electronics and Telecommunication) (Semester – I) (Old) Examination, 2015
Paper – II : LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES (CGPA)

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory**.*
*2) **Assume** suitable data **if necessary**.*

SECTION – I

1. Attempt **any two** : **15**

   a) Prove that there exists a basis for each finite dimensional vector space. Show that the vectors (1, 2, 1), (2, 1, 0), (1, –1, 2) form a basis for R^3.

   b) Prove that the intersection of any two subspaces W_1 and W_2 of a vector space V(F) is also a subspace of V(F). Under what condition is the union of two subspaces is a subspace ?

   c) Let V(F) be a vector space and O be the zero vector of V. Then prove the following :

      i) $a0 = 0$

      ii) $0\alpha = 0$

      iii) $a(-\alpha) = -(a\ \alpha)$

      iv) $(-a)\ \alpha = -(a\ \alpha)$

      v) $a\ (\alpha - \beta) = a\alpha - a\beta$

      vi) $a\alpha = 0 \Rightarrow a = 0$ or $\alpha = \forall a \in F$ and $\alpha, \beta \in V(F)$.

2. Attempt **any two** : **10**

   a) Define linear transformation. Show that the mapping $T : V_2(R) \rightarrow V_3(R)$ defined as T(a, b) = (a + b, a – b, b) is a linear transformation from $V_2(R)$ into $V_3(R)$. Find the range, rank, null space and nullity of T.

P.T.O.

b) If T is a linear transformation on a vector space V such that $T^2 - T + I = \hat{0}$. Then show that T is invertible.

c) Show that the mapping $f : V_3(F) \rightarrow V_2(F)$ defined by f(a1, a2, a3) = (a1, a2) is a homomorphism of $V_3(F)$ into $V_2(F)$.

3. Attempt **any two** : **10**

a) If $\alpha = (a1, a2), \beta = (b1, b2) \in V_2(R)$, define $(\alpha, \beta) = a_1 b_1 - a_2 b_1 - a_1 b_2 + 4a_2 b_2$. Show that all the postulates of inner product hold good.

b) If α and β are vectors in an inner product space then show that

i) $\| \alpha + \beta \|^2 + \| \alpha - \beta \|^2 = 2 \| \alpha \|^2 + 2 \| \beta \|^2$, what is geometrical interpretation.

ii) $\| a\alpha + b\beta \|^2 = | a |^2 \| \alpha \|^2 + a\bar{b} (\alpha, \beta) + \bar{a}b (\beta, \alpha) + | b |^2 \| \beta \|^2$.

c) Define orthogonality of set of vectors in an inner product space. Show that any orthogonal set of non-zero vectors in an inner product space V is linearly independent.

SECTION – II

4. Attempt **any two** : **15**

a) For a convolutional encoder, rate = $\frac{1}{2}$, generator sequences are $g_1 = 111$ and $g_2 = 110$.

i) Draw encoder trellis diagram.

ii) Calculate free distance.

b) The parity check matrix for (7, 4) block code is given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Draw the encoder and decoder.

c) For (7, 3) cyclic code, check whether given generator polynomial $g(x) = 1 + x + x^2 + x^4$ generates cyclic code or not. Encode the message 110 using systematic method.

5. Attempt **any two** : **10**

a) Find the generator polynomial for R-S code which has double symbol error correcting capability.

b) The primitive polynomial of GF(2^4) is $f(x) = 1 + x + x^4$. Find minimal polynomials of α^5 and α^7 for BCH code.

c) For a (6, 3) systematic linear block code, the three parity check digits are P_4, P_5 and P_6 given by

$P_4 = m_1 \oplus m_2 \oplus m_3$

$P_5 = m_1 \oplus m_2$

$P_6 = m_1 \oplus m_3$

i) What is the generator matrix for this code ?

ii) What are the valid codewords ?

6. Attempt **any two** : **10**

a) Check the given polynomial $f(x) = 1 + x + x^2 + x^3 + x^4$ is primitive or not.

b) Explain Reed Muller codes used in encoding and decoding.

c) For a cyclic code, generator polynomial is $g(x) = 1 + x + x^3$. If received vector is r(x) = 1001011, draw circuit for syndrome calculation and check whether it is valid codeword or not.

SLR-KN – 234

Seat No.	

M.E. (E and TC) (Semester – I) (Old) Examination, 2015
Paper – III : ADVANCED NETWORK SYSTEM (CGPA)

Day and Date : Saturday, 26-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instruction** : **All** questions are **compulsory**.*

1. Attempt **any two** : **10**
   a) What is TFTP ? What are different messages used by TFTP ? Explain each.
   b) Explain IP address acquisition in DHCP with suitable figure.
   c) How mobile host communicate with remote host ? With a three phase diagram explain it.

2. Attempt **any two** : **10**
   a) Explain in detail message format of ARP.
   b) With respect to electronic mail explain following terms :
      i) User agent ii) Message access agent
   c) What are different types of commands used on control connection ? Explain each in brief with some example.

3. Attempt **any three** : **15**
   a) NFS Implementation
   b) IPV6
   c) MIME
   d) Three and four way hand shaking in TCP.

4. Attempt **any two** : **10**
   a) Draw B-ISDN reference model and explain function of each layer.
   b) Draw and explain physical layer architecture of Gigabit Ethernet.
   c) What is PNNI ATM network ? Explain.

P.T.O.

5. Attempt **any two** : **10**

   a) What are different encoding techniques ? Explain encoding techniques in IEEE802.3z and IEEE802.3ab standards.

   b) What is security ? What are different security aspects ? Explain.

   c) What is label switching ? How it is implemented for MPLS ? Explain.

6. Write short notes on **(any three)** : **15**

   a) AAL layers

   b) RSVP

   c) Firewall

   d) ATM signalling.

———————

SLR-KN – 235

Seat No.	

M.E. (E & TC) (Semester – I) (CGPA) Examination, 2015
RANDOM PROCESSES (Paper – IV) (Old)

Day and Date : Monday, 28-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Q. **1** is **compulsory**.*
*2) Solve **any four** questions out of Q. **2** to Q. **6**.*
*3) Figures to **right** indicate **full** marks.*
*4) Assume suitable data **wherever** necessary.*
*5) Normal probability density function table **allowed**.*

1. Attempt the following :

   a) State and prove Baye's theorem. **5**

   b) The relay network shown in fig. 1 operates if and only if there is a closed path of relays from left to right. Assume that the relay fails independently and that probability of failure of each relay as shown. What is the probability that the relay network operates ? **5**

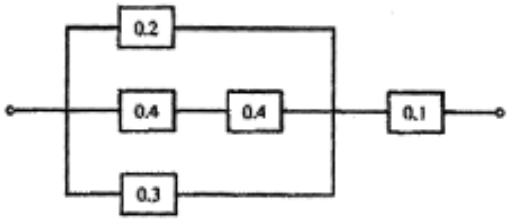


Fig. 1

   c) Show that if three events A, B and C are independent then A and (B $\cup$ C) are independent. **4**

2. a) In a certain binary communication system the message are coded into 0 and 1. After coding, the probability of a 0 being transmitted is 0.55, while the probability of a 1 is 0.45. In the communication channel the probability that a transmitted 1 is erroneously received as a 0 is 0.1, while the probability of a 0 being received as a 1 is 0.2.

      i) Find the probability that a received 0 was transmitted as a 0.

      ii) Find the probability that a received 1 was transmitted as a 1.

      iii) Find the total probability of error in the system. **7**

P.T.O.

b) Let X be a continuous random variable has the PDF

$$f_X(x) = \begin{cases} k(x - x^2) & 0 < x < 1 \\ 0 & \text{other wise} \end{cases}$$

Where k is constant.

Find the value of k and the cdf of X. **7**

3. a) The joint pdf (X, Y) is given by

$$f_{XY}(x, y) = \begin{cases} ke^{-(x+2y)} & x > 0, y > 0 \\ 0 & \text{other wise} \end{cases}$$

Where k is constant

i) Find the value of k

ii) Find P (X > 1, Y < 1) and P (X $\leq$ 2). **7**

b) Let Y = aX + b where a and b are constants. Show that

i) E (Y) = a E(X) + b

ii) V ar (Y) = a^2 V ar (X). **7**

4. a) Define the terms covariance and correlation between the two random variables, show that the correlation coefficient lies between +1 and – 1. **7**

b) Consider a random process X(t) defined by X(t) = Y cos ($\omega t + \theta$)

Where Y and θ are independent random variables and are uniformly distributed over (– A, A) and $(-\pi, \pi)$ respectively.

i) Find the mean of X(t)

ii) Find the autocorrelation function Rx(t, s) of X(t). **7**

5. a) The power spectral density of a random process is given by

$$Sx(\omega) = \frac{10\omega^2 + 35}{(\omega^2 + 4)(\omega^2 + 9)}$$

Find the average power from i) Sx (ω) ii) R_X (τ). **7**

b) Suppose there are two urns labeled 0 and 1. Urn 0 contains 3 balls of which 2 are marked with number 1 and third is marked with number 0. The urn 1 contains 4 balls, of which 3 are marked with number 1 and fourth is marked with number 0. From an urn ball is drawn the number on the ball is noted and the ball is returned to the urn. The urn from which the first ball is drawn selected by tossing a fair coin. If the outcome is head, then the urn 0 is selected and if the outcome is tail, then the urn 1 is selected. Thereafter the urn shown by the number of the ball on the previous draw is chosen for the next draw i.e. if the balls shows numbers 0 then the next ball drawn is from urn 0 if the balls shows number 1 then the next ball drawn is from urn 1 is selected for the next draw of ball.

Write the transition probability matrix and also draw the transition diagram. Find the probability of the event 100100. **7**

6. a) A post office has three clerks serving at the counter. Customers arrive on the average at the rate of 30 per hour, and arriving customers are asked to form a single queue. The average service time for each customer is 3 minutes. Assuming that the arrivals process is Poisson and the service time is an exponential r.v., find :

   a) the probability that all the clerks will be busy

   b) the average number of customers in the queue, and

   c) the average length of time customers have to spend in the post office. **7**

b) In a university computer center, 80 jobs an hour are submitted on the average. Assuming that the computer service is modeled as an M/M/1 queueing system, what should the service rate be if the average turn around time (time at submission to time of getting job back) is to be less than 10 minutes ? **7**

———————

SLR-KN – 237

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – I) (CGPA) (Old) Examination, 2015
Paper – V (Elective – I) : DIGITAL DATA COMPRESSION

Day and Date : Wednesday, 30-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1)* ***All*** *questions are* ***compulsory****.*

2) Figures to the ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. Attempt **any one** : **8**

   a) Explain Prefix codes. What is mean by uniquely decodable code ?

   b) What is finite context modeling ? Explain.

2. Attempt **any one** : **9**

   a) Find the set of code words and average length using Huffman coding scheme for the set of input symbol and corresponding probabilities are given below :

Input	A1	A2	A3	A4	A5	A6	A7	A8
Probability	0.12	0.14	0.04	0.15	0.05	0.2	0.1	0.2

   b) What is Entropy ? State Shanon's first theorem. State Shanon Fano algorithm.

3. Attempt **any two** : **18**

   a) Explain how tag is generated in Arithmetic coding.

   b) Explain coding redundancy with one example.

   c) Explain Adaptive modeling.

P.T.O.

SECTION – II

4. Attempt **any one** : **8**

   a) Compare static and Adaptive compression.

   b) Explain motion compensation with one example.

5. Attempt **any one** : **9**

   a) Explain rate distortion theory. How it is utilized for coding ?

   b) Explain the transform, quantization and coding with reference to JPEG.

6. Attempt **any two** : **18**

   a) With the help of block diagram explain MPEG-2 Advanced Audio Coding encoder.

   b) Explain sliding window compression with reference to LZ77.

   c) Explain fractal compression with one example.

———————

SLR-KN – 238

Seat No.	

M.E. (E & TC – Digital Electronics and Communication Systems)
(Semester – I) (Old) Examination, 2015
Paper – I : COMMUNICATION NETWORKS

Day and Date : Monday, 21-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Figure to* ***right*** *indicates* ***full*** *marks.*

2) ***All*** *questions are* ***compulsory****.*

SECTION – I

1. a) What is ARP ? Explain it in brief. **8**
   b) Draw and explain DHCP. **10**

   OR

   b) What is routing ? Explain RIP. **10**

2. Attempt **any two** : **12**
   a) Explain class full addressing scheme.
   b) Explain fully qualified domain name space.
   c) What is IP in IP encapsulation ? Explain.

3. Attempt **any one** : **5**
   a) Explain datagram format.
   b) Explain pining in detail.

SECTION – II

4. a) Draw ATM cell header format and explain it. **10**
   b) Draw and explain Gigabit Ethernet architecture. **10**

   OR

   b) Explain B-ISDN with structure in brief. **10**

5. Attempt **any two** : **15**
   a) Explain RSVP message format.
   b) Explain signaling used in ATM.
   c) Explain structure of 802.32.

———————

SLR-KN – 239

Seat No.	

M.E. (E&TC) Digital Electronics and Communication System
(Semester – I) (Old) Examination, 2015
Paper – II : CMOS VLSI DESIGN

Day and Date : Wednesday, 23-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any three*** *questions from* ***each*** *Section.*
2) Figures to ***right*** *indicate* ***full*** *marks.*

SECTION – I

1. a) What are different scaling principles ? How different parameters get scaled in constant field, constant voltage and lateral scaling methods ? **6**

   b) With the help of physical structure of NMOS enhancement transistor, explain accumulation, depletion and inversion modes. **5**

2. a) Draw and explain dynamic behavior of CMOS inverter. **6**

   b) Draw and explain load curves of NMOS and PMOS transistors of static CMOS inverter. Also draw Voltage Transfer Characteristics (VTC) of static CMOS inverter. **5**

3. a) Design 2 : 1 MUX using CMOS logic gates. **6**

   b) Draw and explain complex complementary CMOS gate. And what are the static properties of complementary CMOS gates ? **6**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Power and energy delay.

   b) Signal integrity issues in dynamic circuits.

   c) Leakage in dynamic circuits.

   d) Pass transistor logic.

P.T.O.

SECTION – II

5. a) Explain C2MOS Register. **6**

   b) What is bitable circuit ? Explain met stable versus stable operation. **5**

6. a) Explain sources of skew and jitter. **6**

   b) With the necessary schematic explain latch based clocking. **5**

7. a) Explain with necessary diagram following timing classification of digital system. **6**
      i) Synchronous Interconnect
      ii) Mesochronous Interconnect.

   b) What is PLL ? Explain how PLL can be used for clock synchronization. **6**

8. Write notes on **any three** of the following : **(4×3=12)**
   a) Master – slave edge triggered register.
   b) Synchronizers.
   c) Clock distribution techniques.
   d) Designing of arithmetic building blocks.

———————

SLR-KN – 240

Seat No.	

M.E. (E & TC) (Digital Electronics and Communication System)
(Semester – I) Examination, 2015
Paper – III : MODERN DIGITAL SIGNAL PROCESSING (Old)

Day and Date : Saturday, 26-12-2015 Max. Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to ***right*** *indicates* ***full*** *marks.*
3) ***Assume*** *suitable data* ***if required****.*

SECTION – I

1. Design an ideal low pass filter with a frequency response

$H_d(e^{jw}) = 1$ for $\frac{-\pi}{2} \le w \le \pi/2$

$= 0$ for $\pi/2 \le |w| \le \pi$

Find values of h(n) for N = 11. Also find H(z). **9**

2. a) Design an ideal differentiator with frequency response

$H(e^{jw}) = jw \qquad -\pi \le w \le \pi$

Using rectangular window for N = 7. **7**

b) Derive the equation of reflection coefficient from the sequence of function using Schur algorithm. **7**

3. a) Explain the method of periodogram for the estimation of Power Density Spectrum (PDS). **6**

b) Compare different types of windows used for FIR filter design. **6**

P.T.O.

SECTION – II

4. Design a butterworth filter using BLT method for the following specifications. **9**

   $0.8 \leq |H(e^{jw})| \leq 1 \quad 0 \leq w \leq 0.2\pi$

   $|H(e^{jw})| \leq 0.2 \qquad 0.6\pi \leq w \leq \pi$

5. a) Explain polyphase structures in detail. **6**

   b) Draw the timing diagram related to sampling rate conversion. Derive the fundamental equation for implementing sampling rate conversion. **7**

6. a) What is need of frequency transformation ? How to convert low pass to low pass, low pass to high pass, low pass to bandpass and low pass to band stop in digital domain. **6**

   b) Explain multiresolution analysis using wavelet. **7**

SLR-KN – 241

Seat No.	

M.E. (E and TC) (Digital Electronics and Communication Systems) (Semester – I) (Old) Examination, 2015
PROBABILITY AND RANDOM PROCESS (Paper – IV)

Day and Date : Monday, 28-12-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. a) In a game of Poker, you are dealt five cards from a standard 52 card deck. What is the probability that you are dealt a flush in spades ? What is the probability of flush in any suit ? **6**

OR

b) Explain the concept of discrete random variable with atleast three examples. **6**

c) A certain auditorium has 30 rows of seat, row 1 has 11 seats while row 2 has 12, row 3 has 13 seats and so on to the back of the auditorium where row 30 has 40 seats. A Door prize is to be given away by randomly selecting a row and randomly selecting seat within row.

i) Find the probability that seat 15 was selected given row 20 was selected.

ii) Find the probability that row 20 was selected given seat 15 was selected. **7**

2. a) A random variable has the following exponential PDF.

$$F_x(X) = f(x) = \begin{cases} a^{-bx}, & x \le 0 \\ 0, & \text{otherwise} \end{cases}$$

Where 'a' and 'b' are constant

i) Determine the relationship between 'a' and 'b'

ii) Determine the corresponding CDF. **6**

P.T.O.

b) Derive the moment generating function for Rayleigh random variable. **6**

OR

c) Prove the properties of Gamma functions **6**

i) $\Gamma(n) = (b-1)!$ for n = 1, 2, 3 . . .

ii) $\Gamma(x+1) = x\Gamma(n)$

iii) $\Gamma(1/2) = \sqrt{\pi}$.

3. a) Write a note on Entropy and source coding. **5**

b) Calculate the mean value second moment and variance of following **5**

i) Binomial $P_X(K) = \binom{n}{k} P^K (1-P)^{n-k}$ Where K = 0, 1, 2, 3, . . .n

ii) Laplace $F_X(X) = \frac{1}{2b} \exp\left(-\frac{|X|}{b}\right)$.

SECTION – II

4. a) A pair of random variable has a joint PDF specified by $F_{X,Y}(X, Y) = d \exp(-(ax + bxy + cy^2))$. **6**

i) Find the constant d in term of a, b and c also find any restriction needed for a, b and c.

ii) Find marginal PDF $F_X(X)$ and $F_Y(Y)$.

b) Write a note on joint and conditional PMF, PDF, CDF. **7**

OR

c) Let X and Y be independent zero mean unit variance Gaussian random variable. Consider forming new random variable U and V according to

$U = X\cos\theta - Y\sin\theta \qquad V = X\sin\theta + Y\cos\theta$

Note that this coordinates produce coordinate rotation through angle of θ find joint PDF of U and V. **7**

5. a) A three dimensional vector random variable X has a covariance matrix of

$$C = \begin{bmatrix} 3 & 1 & -1 \\ 1 & 5 & -1 \\ -1 & -1 & 3 \end{bmatrix}$$

Find a transformation matrix A such that the new random variable Y = AX will be uncorrelated. **6**

b) Consider a vector of N random variable $X = [X_1, X_2, \ldots X_N]^T$ Suppose we form a new random variable Z by performing a weighted average of the components of X that is

$Z = \sum_{i=1}^{N} b_i X_i$ Where $b_i \geq 0$ and $\sum_{i=1}^{N} b_i = 1$.

Find the value of constants b_i such that variance of Z is minimized. **6**

OR

c) Write a note on stationary and ergodic random processes with atleast two examples. **6**

6. a) Define auto covariance function and cross correlation function with example. **5**

b) Write a note on computer networks. **5**

———————

SLR-KN – 242

Seat No.	

M.E. (E & TC-Digital Electronics and Communication System)
Semester – I Examination, 2015
Paper-V : Elective – I : OPTICAL COMMUNICATION NETWORK (Old)

Day and Date : Wednesday, 30-12-2015 Total Marks : 70

Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Write a short note on (**any two**). **(5×2=10)**
   1) Basic Optical Communication System.
   2) WDM
   3) Raman Amplifier

2. A) Explain gain spectrum and bandwidth **6**

   OR

   B) Explain different optical transmitters.

   C) An Uncoated FPA has facet reflectivities of 30% and a single pass gain of 4.8 dB. The amplifier has a $300\mu m$ long active region, a mode spacing of 1nm and a peak gain wavelength of $1.5\mu m$. Determine the refractive index of active medium and the 3 dB spectral bandwidth of the device. **7**

3. A) Explain SCM in detail. **6**

   B) Explain Erbium doped fiber amplifier. **6**

   OR

   C) Explain the gain mechanism in EDF and derive the expression for small signal gain in steady state. **6**

P.T.O.

SECTION – II

4. Write a short note on (**any two**) **(2×5=10)**

   1) SONET

   2) Broadcast Network

   3) Point to point link system

5. A) A 2 km length of multimode fiber is attached to apparatus for spectral loss measurement. The measured output voltage from the photo receiver using the full 2 km fiber length is 2.1 V at a wavelength of $0.85\mu m$. When the fiber is then cut back to leave a 2 m length the output voltage increases to 10.7 V. Determine the attenuation per kilometer for the fiber at a wavelength of $0.85\mu m$ and estimate the accuracy of the result. **6**

   B) Explain the FDDI reference model and its relation with OSI model. **6**

   OR

   C) Explain Rise-Time budget. **6**

6. A) Explain SDH in detail. **6**

   OR

   B) Explain OTDR in detail. **6**

. C) Explain Time domain measurement with necessary diagram and equation. **7**

———————