Seat No.

M.E. (Civil-Structures Engineering) (Semester – I) Examination, 2017
Paper – I : THEORY OF ELASTICITY AND PLASTICITY (CBCS/CGPA)

Day and Date : Friday, 12-5-2017   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) Explain Airy's stress function and write the stress system.   **5**

   b) Derive six strain compatibility equations for in Cartesian coordinate for 3-D
      problem in Elasticity.   **12**

2. a) Find stress distribution in a thick cylinder subjected to internal bursting pressure
      15 Mpa. Take inner and outer radii as 250 mm and 350 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.   **12**

      $\sigma_x = 110$ MPa, $\sigma_y = 80$ MPa, $\sigma_z = 100$ MPa

      $\tau_{xy} = 70$ MPa, $\tau_{yz} = 40$ MPa, $\tau_{zx} = 60$ MPa

   b) Write Generalized Hooke's law.   **6**

P.T.O.

SECTION – II

4. a) Define and explain-partial collapse, complete collapse and over complete collapse. **6**

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

5. a) Write various empirical stress-strain relations. **5**

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

   c) Write Drucker's Postulate. **5**

6. a) Design comparison between elastic design and plastic design. **6**

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

   $\sigma_x = 100$ MPa, $\sigma_y = 80$ MPa, $\tau_{xy} = 60$ MPa

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

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Seat No.

M.E. (Civil-Structures) (Semester – I) (CBCS/CGPA) Examination, 2017
MECHANICS OF STRUCTURES (Paper – II)

Day and Date : Saturday, 13-5-2017   Max. Marks : 70
Time : 11 a.m. to 3.00 p.m.

Instructions : 1) Solve ***any 3*** questions from ***each*** Section.
2) Figures to the **right** indicates **full** marks.
3) Assume suitable data **if** necessary.

SECTION – I

1. A structural frame ABC consists of a horizontal beam AB of length 4 m and vertical column BC of height 5 m. End A is fixed and C is supported on hinged support. Draw ILD for shear force and Bending moment for the midpoint of the beam. Assume $I_{AB} = 2\,I_{BC}$.   **12**

2. A quadrant of circle of radius R having uniform c/s is curved in plan. It is fixed at B and free at A. It carries vertically downward udl of 'w' on whole length. Draw SFD, BMD and TMD. Also find vertical deflection of point A.   **12**

3. Draw BMD and TMD for a semicircular beam curved in plan and having radius 'R'. The c/s of the beam is circular with radius 'r'. It is loaded with udl of 'w' throughout the length as shown in figure 1.   **11**
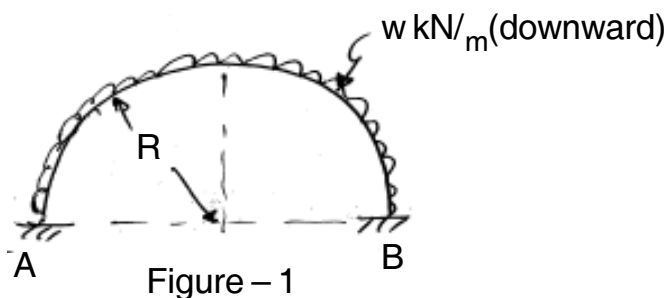

Figure – 1

4. Draw SFD, BMD, deflection and foundation pressure diagram for a semi infinite beam on elastic foundation hinged at one end and subjected to uniformly distributed load 'w' throughout the length.   **11**

SECTION – II

5. A propped cantilever beam column is subjected to an anticlockwise moment 'M$_0$' at it's propped end and axial compressive force P at both the ends. Derive expression for slope at the propped end and the fixed end moment at other end. **12**

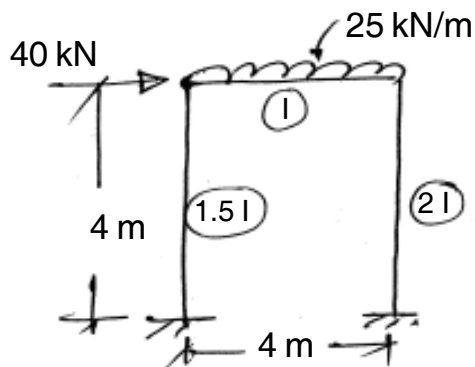6. Analyze the frame shown in fig 2 by stiffness method. Draw BMD. **12**

Figure – 2

7. Analyze simple truss as shown in fig. 3 by member oriented stiffness method. All members have identical properties. **11**
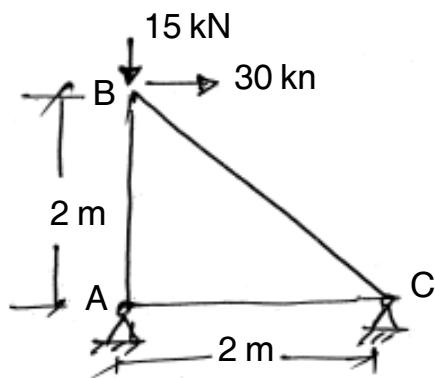

Figure – 3

8. A) Discuss in detail the merits of stiffness method. **6**

   B) What is transformation matrix ? Explain it's necessity. **5**

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Seat
No.

M.E. (Civil- Structures) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : ADVANCED DESIGN OF CONCRETE STRUCTURES

Day and Date : Monday, 15-5-2017   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. A reinforced concrete grid floor is to be designed to cover a floor area of size $12m \times 18$ m. The spacing of ribs in mutually perpendicular direction being 2m c/c. Live load to be considered is 1.5 kN/m^2. Materials to be used are M_{20} concrete and Fe_{415} steel. Analyse the grid floor for moments and shears using approximate method and design suitable reinforcements at critical section. **17**

2. Design a circular tank of capacity 1,50,000 litres of total height 3.2 m, which will be resting on firm ground, if joint between wall and tank is fixed. Use I.S method and consider M_{25} concrete and Fe_{415} steel. **17**

3. Two reinforced concrete columns 450 mm $\times$ 450 mm are to carry a load of 1200 kN each, inclusive of self weights. 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 M_{20} concrete and Fe_{500} steel. **18**

SECTION – II

4. 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. **17**

P.T.O.

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 = 2×10^5 mm^2, Ec 3×10^{-4} mm^2, relaxation loss = 5%, shrinkage strain = 1.9×10^{-4}, creep strain = 28×10^{-6} per N/mm^2 of stress. **9**

   b) The end block of a post tensioned member is 300 mm wide and 600 mm deep is subjected to an axial prestress force 1200 kN. Design the end block by Guyon's method. **8**

6. a) Design prestressed concrete beam of I section to the following particulars.
   i) Span = 16 m
   ii) Superimposed load = 35 kN/m
   iii) Safe stress in concrete in compression at transfer at stress = 0.5 f$_{ck}$
   iv) Safe stress in concrete in compression at service = 0.4 f$_{ck}$.
   v) Allowable tensile stress in concrete = 0.129 $\sqrt{f_{ck}}$
   vi) Total loss of stress = 18%
   vii) Ultimate stress in steel = 1500 N/mm^2
   viii) Safe stress in steel = 60% of ultimate stress.
   ix) Cube strength of concrete at 28 days = 35 N/mm^2. **10**

   b) Explain in brief strength concept, stress concept and load balancing concept with neat sketch. **8**

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SLR-VC – 4

Seat
No.

M.E. (Civil-Structures) (Semester – I) (CBCS-CGPA) Examination, 2017
DYNAMICS OF STRUCTURES (Paper – IV)

Day and Date : Tuesday, 16-5-2017   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 first principle derive the governing differential equation for undamped free vibration. Obtain the solution if SDOF is given an initial displacement yo and initial velocity Vo. Plot the graph of y vs t, v vs t and a vs t. **18**

2. Derive an expression for force transmitted to foundation by a reciprocating type of machine exerting an external force $F(t) = Fosin(\omega_f t)$. Plot the graph of transmissibility vs frequency ratio for the damping ratio R = 5% and 10%. **17**

3. A structure modelled as a damped spring mass system with mass 1150 kg, k =1548465.1 N/m and C = 15.3 N sec/mm is subject to a harmonic exciting force. Determine : **17**

   a) The natural frequency

   b) The damping ratio

   c) The amplitude of the existing force when the amplitude of the vibrating mass is measured to be 8.398 mm and

   d) The amplitude of the existing force when the amplitude measured is at the peak frequency assumed to be the resonant frequency.

SECTION – II

4. From the first principle derive the governing differential equation of damped forced vibration of a four storey building. **18**

5. Differentiate between proportional damping and non proportional damping. Further explain concept of Rayleign damping. **17**

6. Determine the frequencies and mode shapes of a uniform simply supported beam. **17**

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Seat
No.

M.E. (Civil Structures) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : DESIGN OF FOUNDATIONS (Paper – V)

Day and Date : Wednesday, 17-5-2017   Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

Instructions : 1) ***All*** questions are ***compulsory***.
                    2) *Make suitable assumption is necessary and mention it* ***clearly***.
                    3) *Figures to the* ***right*** *indicates* ***full*** *marks*.

SECTION – I

1. A) Explain the types of bearing capacity failures with neat sketches.   **5**

   B) A square footing located at a depth of 1.3 m below the ground has to carry a safe load of 800 kN. Find the size of the footing if the desired factor of safety is 3. The calculated bulk unit weight of the soil is 18.64 kN/m^3. For $\phi = 30°$, Nc = 37.2, Nq = 22.5, Nγ = 19.7.   **7**

2. A) Discuss the various types combined footing and explain the situations in which they are used.   **5**

   B) A trapezoidal footing is to be produced to support 2 square columns of 30 cm and 50 cm sides respectively. Columns are 6 m apart and the safe bearing capacity of the soil is 400 kN/m^2. The bigger column carries 5000 kN and the smaller one carries 3000 kN. Design a suitable size of the footing so that it does not extend beyond the faces of the column.   **6**

3. A) Compare rigid raft and flexible raft foundations.   **5**

   B) Design a raft foundation for 4 columns spaced at a distance of 5m c/c in either direction (Square pattern). All four columns carry an equal load of 700 kN. SBC = 110 kN/m^2. Use M20 concrete and Fe415 steel.   **7**

P.T.O.

SECTION – II

4. A) How the efficiency of pile group is calculated ? Explain various formulae used to calculate the pile group efficiency. **5**

   B) A group of 16 piles of 600 mm diameter is arranged in a square pattern with c/c spacing of 1.2 m. The piles are 10 m long and are embedded in soft clay with cohesion of 30 kN/m^2. Adhesion factor is 0.6. Determine the ultimate load bearing capacity of the pile group, if the end beam resistance is neglected. **7**

5. A) Describe the merits and demerits of drilled piers. **5**

   B) Describe and explain a typical section through well foundation showing its various components. **7**

6. A) What do you understand by vibration isolators ? Describe them. **5**

   B) Draw the sketch of block foundation with all 6 degrees of freedom (3 translations and 3 rotations) and explain it. **6**

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Seat No.

M.E. (Civil Structures) (Semester – I) (CBCS/CGPA) Examination, 2017
ADVANCES IN CONCRETE COMPOSITES (Elective – I) (Paper – V)

Day and Date : Wednesday, 17-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

            2) Draw *neat* sketches *whenever* necessary.

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

SECTION – I

1. Attempt **any four** :

   a) What is fiber reinforced concrete ? State the applications of fiber reinforced concrete. **5**

   b) Explain the workability test on fiber reinforced concrete. **5**

   c) Explain the behaviour of fiber reinforced concrete under compression. **4**

   d) Explain the behaviour of fiber reinforced concrete under tension. **4**

   e) Explain the behaviour of fiber reinforced concrete under flexure. **4**

2. Attempt **any four** :

   a) What is ferrocement ? What are the applications of ferrocement ? **4**

   b) Explain casting techniques used for ferrocement. **4**

   c) Explain mechanical properties of ferrocement. **4**

   d) Explain design of ferrocement. **5**

   e) Explain properties of materials used in ferrocement. **4**

SECTION – II

3. Attempt **any four** :

   a) What is silica fume concrete ? Explain advantages of silica fume concrete. **5**

   b) Explain the effect of silica fume on workability of concrete. **4**

   c) Explain the physical and chemical properties of silica fume concrete. **5**

   d) Explain the mechanical properties of silica fume concrete. **4**

   e) Explain the reaction mechanism of silica fume concrete. **4**

4. Attempt **any four** :

   a) What is polymer concrete ? What are its application ? **4**

   b) What is polymer impregnated concrete ? **4**

   c) Draw the stress strain relationship for MMA impregnated concrete. **5**

   d) State the role of polymer in concrete. **4**

   e) Explain the general characteristics and applications of polymer concrete products. **4**

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Seat No.

**M.E. (Civil-Structures) (Semester – II) Examination, 2017
(CBCS/CGPA)
THEORY OF PLATES AND SHELLS (Paper – VI)**

Day and Date : Thursday, 18-5-2017   Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

Instructions : 1) Solve **any three** 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 calculator is **allowed**.

SECTION – I

1. a) Give classification of plates. What are the assumptions made in thin plate theory ?   **6**

   b) Derive moment-curvature relation in case of pure bending of rectangular plates.   **6**

2. Obtain fourth degree governing differential equation for the deflection surface of simply supported rectangular plates.   **11**

3. A simply supported rectangular plate is subjected to uniformly distributed load of intenisty 'w' per unit run in both directions. Obtain expression for maximum deflection of the plate. Use Levy's solution.   **11**

4. Write short notes (**any two**) :   **12**

   1) Governing differential equation for bending of circular plates.

   2) Use of potential energy principle for plate problems.

   3) Navier's solution.

   4) Finite difference method for solution of plate problems.

SECTION – II

5. a) Explain applications of shells in civil engg. with sketches.   **6**

   b) Explain the trueness of the statement : 'Shell elements are stronger and economical as compared to plate elements'.   **6**

P.T.O.

6. a) Describe membrane theory of Synclastic shells. **6**

   b) Describe shells with closed circular directrix. **6**

7. Derive equation of equilibrium for cylindrical shells. **11**

8. Write short notes (**any two**) : **12**

   1) Beam theory

   2) Donnell's equation

   3) Stress-displacement relations in case of shells.

   4) Classification of shells on geometry.

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Seat No.

M.E. (Civil – Structures) (Semester – II) (CBCS/CGPA) Examination, 2017
FINITE ELEMENT METHOD (Paper – VII)

Day and Date : Saturday, 20-5-2017   Max. 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**, quesiton number **4** is **compulsory**. Solve **any one** from the remaining **two** questions.
3) **Use** of non-programmable calculator is **allowed**.
4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

1. a) Find stresses using FEM is each element of a member as shown in fig. 1. Element 1 is fixed at left end, 15 kN load is acting at the end of element 2 and 25 kN load is acting at the end of element 3. **12**
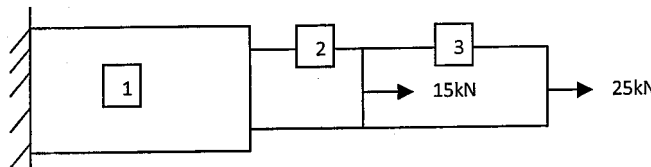

Fig. 1

Elastic constants and dimensions related to fig. 1, are as given in following table.

Element 1	Element 2	Element 3
Young's modulus 200 GPa	Young's modulus 250 GPa	Young's modulus 250 GPa
Diameter 50 mm	Diameter 30 mm	Diameter 30 mm
Length 150 mm	Length 75 mm	Length 125 mm

b) Write a short note on Pascal's triangle. **5**

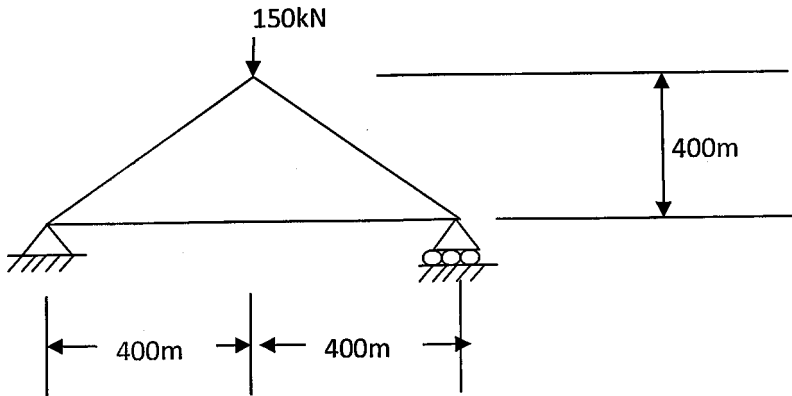2. a) Determine displacements and reactions in the plane truss shown below. Use Young's modulus as 200 GPa and area 2000 mm^2. **12**

150kN

400m

400m 400m

Fig. 2

   b) Find shape functions of a 3 noded bar element having nodes (–1, 0), (0, 0), (1, 0). Use polynomial function to arrive the shape functions. **6**

3. a) Determine shape functions of a four noded rectangular element using Lagrange polynomials. **7**

   b) Determine the displacement and rotation at midpoint of a fixed beam of 8 m span if a downward force of 10 kN and an anticlockwise moment of 20 kNm are acting at the midpoint of the beam. Discretize the beam into two elements of 4m each and analyze it using FEM. **10**

SECTION – II

4. a) Explain isoparametric concept with neat sketches. Explain about natural co-ordinate system and Cartesian co-ordinate systems. **6**

   b) Consider a four noded quadrilateral element having nodes (4, 2), (16, 3), (12, 8) and (6, 7). In this element at point (10, 6), 8 kN load is acting horizontally leftwards. Determine the nodal equivalent forces. **12**

5. Write short notes on below :
   i) Consistent mass matrices **4**
   ii) Lumped mass matrices **4**
   iii) Axis symmetric element **4**
   iv) Shell elements used in FEM. **5**

6. a) Explain the procedure to arrive Jacobian matrix. **5**

   b) Explain the procedure to arrive stiffness matrix of a rectangular plate bending element with 12 degrees of freedom. **12**

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Seat No.

M.E. (Civil Structure) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : EARTHQUAKE ENGINEERING

Day and Date : Monday, 22-5-2017   Max. Marks : 100
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. a) Write a note on prediction of an earthquake. Explain its classical approaches.   **15**

    b) Write in detail about "Tsunami".   **10**

2. What are the characteristics of response spectrum ? Explain the construction of combined response spectrum.   **25**

3. Derive the governing differential equation for two storied building subjected to ground acceleration ÿg and solve the derived equation if the amount of damping present is 5%. Assume the damping is stiffness proportional.   **25**

SECTION – II

4. a) What are the general principles and criteria to be followed to make a RCC building earthquake resistant.   **15**

    b) What are different types of irregularities which may present in buildings ? Suggest methods to minimize effect of these irregularities.   **10**

5. A four storey R.C.C. office building as shown in Fig. 1. This building with brick infill is located in very severe earthquake zone having medium soil. The building is supported on raft foundation. The lumped weight due to dead load 10 kN/m^2 on floors and 8 kN/m^2 on the roof. The live load is 3 kN/m^2 on floors and 1.5 kN/m^2 on the roof. Determine the lateral forces and storey shear. **25**

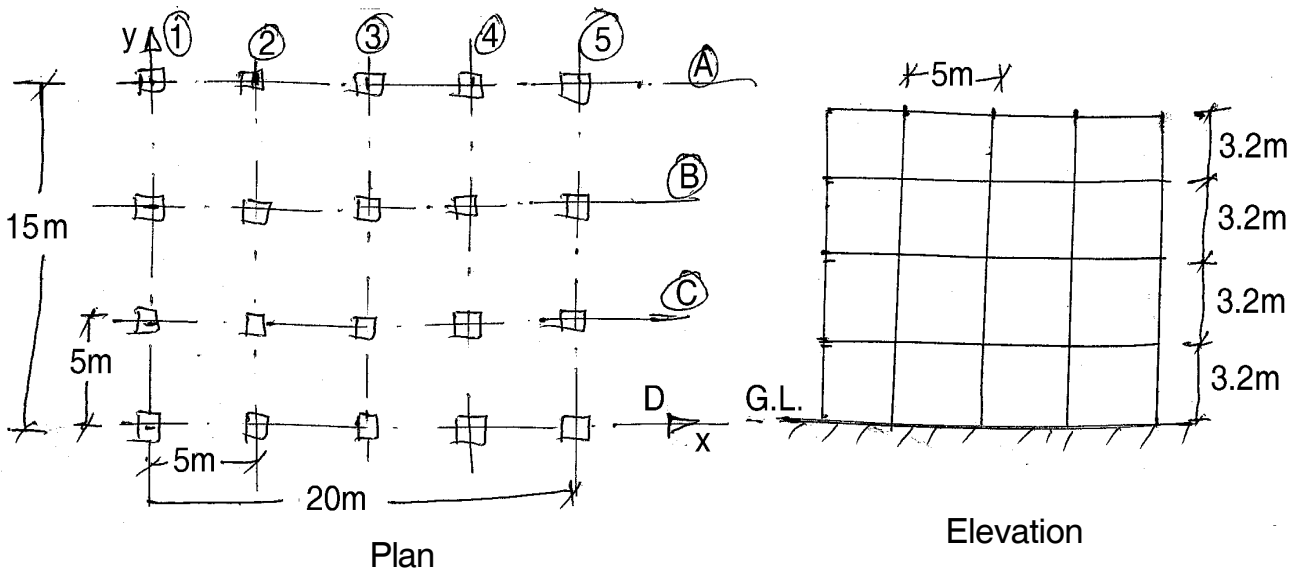Distribute forces in horizontal direction.

Figure 1. Q. 5)

6. a) What is meant by structural control and explain the systems available for structural control. **13**

   b) Compare the base isolation system and tuned mass dampers. **12**

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Seat
No.

M.E. (Civil-Structures) Semester – II Examination, 2017
(CBCS/CGPA)
Paper – IX : ADVANCED DESIGN OF STEEL STRUCTURES

Day and Date : Wednesday, 24-5-2017   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 are 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 2A and the area of top storey column as A. **17**
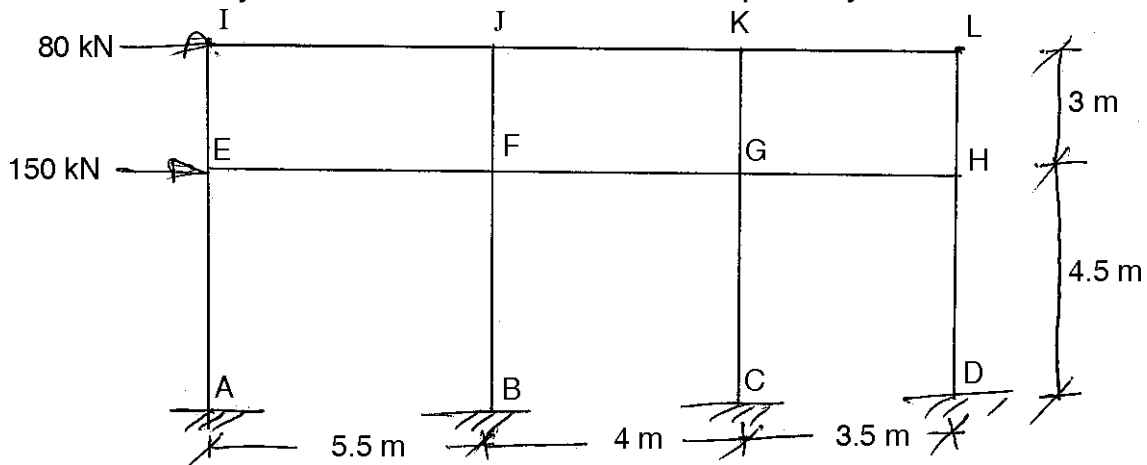
Figure No. 1

2. The effective span of a through type girder railway bridge is 55 m for a single lane B.G. track. The cross girders a spaced at 5.5 m apart. The stringers are spaced at 2.0 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 and the sleepers are of 2.5m × 0.25m × 0.35m. The main girders are provided at 6.2 m apart, determine the design forces in top, bottom, vertical and diagonal members of central panel. Design the bottom chord member and vertical member. The bridge is to carry a equivalent U.D.L. live load of 4500 kN for B.M. and 5100 for shear force. **18**

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

   b) A cold form section 100 mm × 50 mm × 4 mm with lip 20 mm is to be used as a concentrically loaded column of 3.2 m effective length. Determine the allowable load. **7**

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

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 upto portal collapse. The portal frame has vertical portion AB = 2.0m, CD = 4 m and horizontal portion BC = 5m. The end A is fixed and is also fixed. A horizontal load of 32 kN towards B is acting at B and a vertical load of 40 kN acting downwards is a 2m from B on BC portion. The plastic moment of the frame is uniform throughout. 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 kN/m on the right hand 3.5 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 1100 kN. The effective length of column is 4.0 m. **9**

   b) Design a composite foot bridge having clear width of 3 m and effective span of 10 m. The bridge is to be designed for live load of 4 kN/m². Assume kerb 45 cm × 35 cm and two steel girders at 1.8 m c/c are provided. **9**

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Seat
No.

M.E. (Civil Structures) (Semester – II) (CBCS/CGPA) Examination, 2017
(Elective – II) DESIGN OF RCC BRIDGES (Paper – X)

Day and Date : Friday, 26-5-2017
Time : 11.00 a.m. to 3.00 p.m.

Total Marks : 70

Instructions : 1) Solve **any three** questions **each** from Section – **I** and
Section – **II**.
2) Figures to the **right** indicates **full** marks.
3) **Assume** suitable data if **necessary** and mention **it**
clearly.

SECTION – I

1. Write a note on :   **12**

   a) Economic span length

   b) Selection of type of bridge

   c) Types of bridges

   d) Factors affecting location of piers and abutments.

2. Answer the following :

   A) What are the basic components of bridge structure ? Explain with the help
      of sketch.   **4**

   B) What is the importance of subsoil exploration in the design of major bridges ?
      List the data to be obtained from such explorations.   **4**

   C) Give a critical review of IRC loading for bridges.   **3**

3. Find the design bending moment of two lane bridge solid deck slab for following
   data :

   a) Effective span – 6.8 m

   b) Carriage way width – 9 m

c) Kerb – 600 × 275 on both side

d) Live load-IRC class A (Two lane)

e) Wearing coat – 100 mm thick

f) Use M-30 concrete and Fe-415 steel

g) Use $\alpha = 2.77$

Find the percentage change in the design bending moment if the live load of IRC class AA tacked is used. **12**

4. A RCC T beam type bridge having deck slab of 220 mm thick, wearing coat of 80 mm thick, three longitudinal girders and five cross girders. Determine the design bending moment for all the longitudinal girders. Use following additional data,

a) Carriage way width – 9 m

b) Span of bridge – 17 m

c) Live load – IRC class AA tracked

d) Kerb – 600 mm wide, 400 mm deep

e) Web thickness for longitudinal and cross girder – 300 mm

f) Longitudinal Girder spacing – 3.0m

g) Use M-30 concrete and Fe-415 steel. **12**

SECTION – II

5. Verify the adequacy of pier for the following data :

Top width of pier-1.8 m, Height of pier upto springing level-12 m, C/C distance of bearing-1.2 m, Side batter 1 : 14, HFL – 1.5 m below the bearing level, span of bridge-16 m, self weight of the superstructure = 250 kN/m, Live load-IRC class AA tracked, Material of pier = M 20 concrete. **11**

6. A) Write in detail about various types of bearings with neat sketch. **6**

B) Write a detail note on expansion joints. **6**

7. Verify the suitability of abutment as shown in the fig 1. Use following data :

   Density of soil – 17.8 kN/m^3, Friction angle of soil (Ø) = 33°.

   Coefficient of friction – 0.6, Live load IRC class AA tracked.   **12**
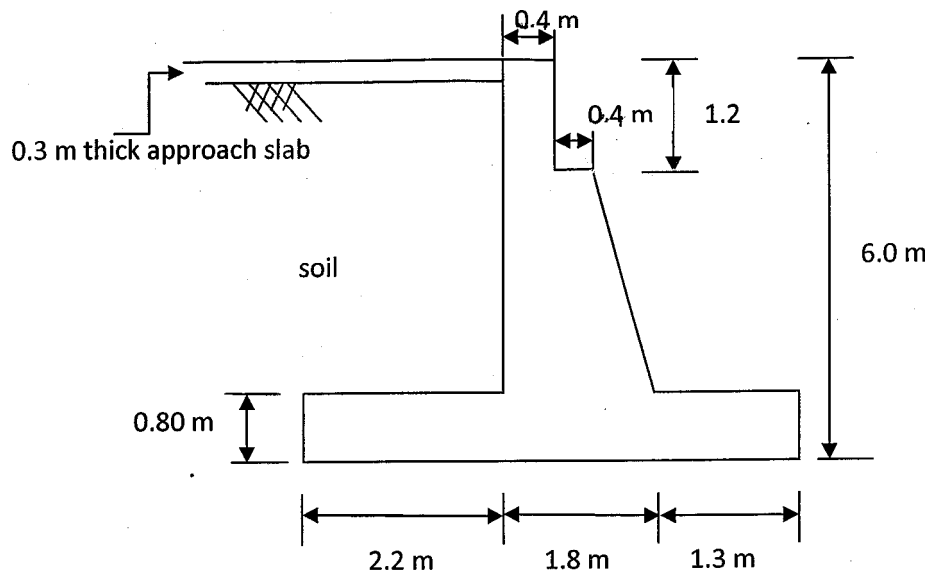

Fig. no.1

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

   a) Types of bridge pier with their suitability

   b) Functions of bearing

   c) Approach slab

   d) Inspection of bridges

   e) Importance of bridge inspection.

Seat
No.

**M.E. (Mech.) Design Engineering (Semester – I) (CBCS/CGPA)
Examination, 2017**
COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING (Paper – I)

Day and Date : Friday, 12-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What are errors ? Explain about different types of errors with examples.   **8**

   b) Write a note on normal equations.

   The curve $y = ab^x$ is fitted to the data

x :	1	2	3	4	5	6	7	8
y :	1	1.2	1.8	2.5	3.6	4.7	6.6	9.1

   10

2. a) Explain the Jacobi's method for finding eigen values and eigen vectors of a

   matrix. Also use it to find the same for $A = \begin{pmatrix} 5 & 0 & 1 \\ 0 & -2 & 0 \\ 1 & 0 & 5 \end{pmatrix}$.   **8**

   b) Using central differences derive the Stirling's formula. Hence use it to compute y at 12.2 from the following table using Stirlings formula.

x :	10	11	12	13	14
y :	23967	280960	31788	35209	38368

   9

3. a) Write a note on Gaussian quadrature. Also derive Gaussian quadrature integration formulae for n = 2 and n = 3. Further, evaluate the integration

$$\int_0^2 \frac{x^2 + 2x + 1}{1 + (x+1)^4} dx$$ by Gaussian 3 point formula. **8**

   b) Explain the LU decomposition method for solving simultaneous linear equations. Hence solve the following equation with it. **9**

   10x − 7y + 3z + 5u = 6, − 6x + 8y − z − 4u = 5, 3x + y + 4z + 11u = 2,
   5x − 9y − 2z + 4u = 7

SECTION – II

4. a) Suggest some methods of estimating the heights of mountain peaks and depths of ocean beds. **8**

   b) Write a note on Predictor corrector method.

   Given $y'' + xy' + y = 0$, y(0) = 1, $y'(0) = 0$, obtain y for 0 < x < 0.3 with subinterval of 0.1 by any other method. Hence solve the following differential equation using Milne Simpson's Method at x = 0.4. **10**

5. a) Write a note on boundary value problems. Explain Finite difference method to solve boundary value problems. Hence find y(0.25), y(0.5), y(0.75) satisfying the equation $y'' + y = x$ with the boundary conditions y(0) = 0, y(1) = 2 by finite difference method. **8**

   b) Solve $\dfrac{\partial u}{\partial t} = \dfrac{\partial^2 u}{\partial x^2}$ under the conditions u(0, t) = u(1, t) = 0, u(x, 0) = sin πx,

   $0 \leq x \leq 1$ by Schmidt method. (Take h = 0.2, $\alpha 0.5$) **9**

6. a) Write a note on Numerical solution of Partial differential equations. Given the values of u(x, y) on the boundary of the square in the Figure given below satisfying $\nabla^2 u = 0$.
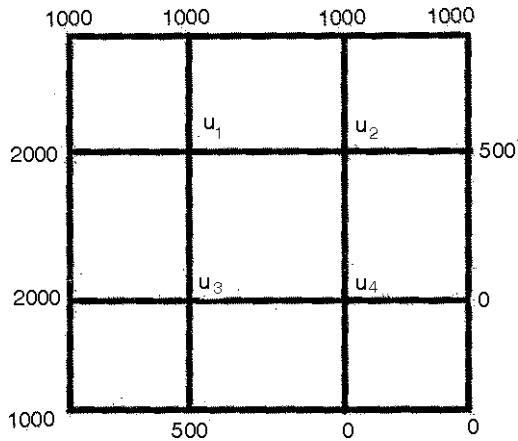
   9

   b) Write a note on Mathematical Modelling of a body falling from some height with parachute. **4**

   c) Write a note power method to solve eigen value problem. **4**

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Seat No.

M.E. (Mechanical Design Engg.) (Semester – I) Examination, 2017
(CBCS/CGPA)
MACHINE DYNAMICS (Paper – II)

Day and Date : Saturday, 13-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. : 1) Solve **any five** questions.
     2) Figures to the **right** indicate **full** marks.
     3) Assume suitable data if **necessary**.

1. a) Explain response of a single degree of freedom system with step input.   **7**
   b) Explain free vibrations with viscous damping.   **7**

2. a) Determine natural frequency of oscillation of double pendulum shown below.
     Assume $l_1 = l_2$ and $m_1 = m_2$ **7**
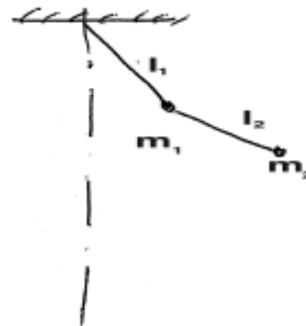
   b) Explain principle of working of dynamic vibration absorber.   **7**

3. a) Write down the equations of motion of multidegree freedom system. Put these
     equations in matrix form.   **7**
   b) Write note on Lagrange's equation to derive equation of motion.   **7**

4. a) Write a note on Holzer method.   **7**
   b) Derive equation of motion for torsional vibrations of circular uniform shaft.   **7**

5. a) Explain perturbation method.   **7**
   b) Explain forced vibrations with nonlinear spring (Duffings equation).   **7**

6. a) Explain random vibrations.   **7**
   b) Write a note on FFT analyzer.   **7**

7. a) Explain machine conditioning and monitoring.   **7**
   b) Write a note on rotating unbalance.   **7**

Seat No.

M.E. (Mechanical Design Engineering) (Semester – I) Examination, 2017 (CBCS/CGPA)
SOLID MECHANICS (Paper – III)

Day and Date : Monday, 15-5-2017   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. Validate the given function as Airy's stress function $\phi = B\left[y^3 + \frac{3}{4} yh^2 \right] + Fy^2$. Determine the stress distribution at $0 \leq x \leq l$ and for $y \pm h$ where l is span, 2h is depth of beam and F is the load. **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) Torsion of rolled profiles.

   ii) Relation between the elastic constants E, μ and G.

   iii) Stresses in rotating solid disc.

P.T.O.

SECTION – II

5. Locate the shear centre for the following section having uniform thickness of 2 mm.

11
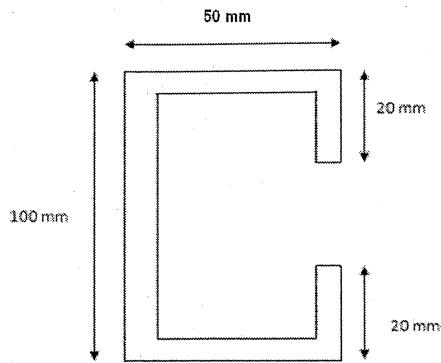
6. a) What are the assumptions made in theory of contact stresses ?   **3**

   b) Derive the expression for area of contact and pressure distribution in case of contact stresses between two spheres 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 0.05 and 0.025 meter respectively, is subjected to a twisting moment of 3500 Nm. Determine the maximum shearing stress and the angle of twist per unit length. Assume G = 80 Gpa.   **5**

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

   i) Pure bending of prismatic bar

   ii) Membrane analogy

   iii) Contact stresses in involute teeth gears.

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| Seat No. | |

M.E. (Mechanical Design Engineering) (Semester – I) Examination, 2017 (CBCS/CGPA)
DESIGN OF EXPERIMENTS & RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Tuesday, 16-5-2017　　　　　　　　　　　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. Explain the objectives of research. **6**

   b) Comment on the contents of research proposal. **5**

2. a) Explain literature review and its purpose. **6**

   b) Explain modeling with ordinary differential equations and graph. **6**

3. a) What do you mean by simulation ? Explain various types of simulation. **6**

   b) Explain the important parametric tests in hypothesis testing. **5**

4. Write short notes on **any 3** of the following : **12**

   a) Primary data and secondary data

   b) Delphi method

   c) Types of research

   d) Controllable and Uncontrollable variables

   e) Classification of mathematical models.

SECTION – II

5. a) What is the significance of design of experiments ? **6**

   b) What is creativity ? Explain. **5**

6. a) Explain the need of writing abstract in report. **6**

   b) Explain the procedure of writing the paper. **6**

7. a) Explain the significance of Taguchi method. **6**

   b) Comment on readability of report. **5**

8. Write short notes on **any 3** of the following : **12**

   a) Fractional factorial experiment

   b) Types of reports

   c) Importance and parameters of review paper

   d) Parametric and nonparametric data

   e) Regression analysis.

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Seat
No.

**M.E. (Mechanical-Design Engineering) (Semester – I) (CBCS/CGPA)
Examination, 2017
SYNTHESIS AND ANALYSIS OF MECHANISM AND MACHINES
(Elective – I) (Paper – V)**

Day and Date : Wednesday, 17-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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) Discuss kinematic pairs with neat diagrams. **4**

   b) Determine the Chebyshev spacing for a function $y = x \log e^x$, for a range $1 < x < 2$ with 4-accuracy points. Also find the corresponding angular position of input and output links of 4-bar function generation, if their total rotations are $45°$ and $90°$ respectively. The initial angular position of input and output link may be assumed. **8**

2. a) Discuss three position synthesis of four bar mechanism. **6**

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

   $W_1 = 10$ rad/sec $\alpha_1 = 0$
   $W_2 = 5$ rad/sec $\alpha_2 = 0$
   $W_3 = -0$ rad/sec $\alpha_3 = 86.6$ rad/sec^2
   Comment on the resulting mechanism. **6**

3. a) Explain cubic of stationary curvature. **6**

   b) Explain in brief branch and order defects. **6**

4. Write notes on the following : **11**
   a) Cups and crunodes
   b) Relative poles of the four bar linkages.

P.T.O.

SECTION – II

5. a) Derive the equation of coupler curves for a four bar linkage by Samuel Robert method. **6**

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

6. a) Explain crank follower synthesis of five accuracy point. **5**

   b) Explain Eulerian rotation transformation and Eulerian angle for spatial mechanism. **6**

7. a) Explain the application of spatial mechanism to robotics with suitable examples. **6**

   b) Explain branch and order detects. **5**

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

   a) Eulerian angles.

   b) Denavit-Harternberg Parameter.

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Seat
No.

**M.E. Mech. (Design Engineering) (Semester – I) (CBCS – CGPA)
Examination, 2017**
Elective – I : INDUSTRIAL INSTRUMENTATION (Paper – V)

Day and Date : Wednesday, 17-5-2017   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) Describe elements of generalized measurement system with block diagram.   **8**
   b) Distinguish between primary and secondary standards.   **4**

2. a) Explain the terms threshold, accuracy and drift of instrument.   **6**
   b) Explain the various dynamic characteristics of instruments.   **6**

3. a) Explain pneumatic amplifying element with neat sketch.   **5**
   b) Explain with neat sketch working of linear motion and rotary motion type LVDT.   **6**

4. a) Explain ring type and cantilever type load cell.   **6**
   b) Write a note on Torsion meter.   **5**

SECTION – II

5. a) Describe with neat sketch, the Mcleod Gauge.   **5**
   b) Describe 'Pitot tube' with its advantages and disadvantages.   **7**

6. a) State laws of thermocouples. Explain its basic principle.   **6**
   b) Describe a seismic instrument.   **5**

7. a) Explain system analysis by transient testing.   **6**
   b) Explain Ferrographic analyser.   **5**

8. Write a note on (**any four**) :   **12**
   1) Data acquisition system.
   2) Applications of instrument system.
   3) Atomic absorption spectrometer.
   4) Radiation pyrometer.
   5) Electrodynamic transducer.
   6) Particle counters.

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SLR-VC – 24

Seat No.

M.E. Mechanical (Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VI : ADVANCED DESIGN ENGINEERING

Day and Date : Thursday, 18-5-2017   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** indicates **full** marks.
3) Assume necessary data if required and state it **clearly**.

SECTION – I

1. a) Derive an expression for the response "x" of the follower in case of analysis of an elastic cam system.   **6**

   b) Explain standard motion cams and standard contour cams.   **6**

2. a) The following data refers to a short hydrodynamic journal bearing :   **7**

   Radial Load = 1000 N

   Journal speed = 2100 rpm

   (l/d) ratio = 0.5

   Eccentricity ratio = 0.65

   Radial clearance = 0.002 × Journal radius

   Flow rate of lubricant = 3.45 litre per hour

   Calculate :

    i) Diameter of journal

    ii) Radial Clearance

    iii) Dimensions of Bearings

    iv) Minimum oil-film thickness

    v) Absolute viscosity of lubricant.

   b) Explain dynamic viscosity and kinematic viscosity with their S.I. units.   **4**

3. a) Define lubrication and explain different types of lubrication. **6**

   b) Explain CEP and CPM cams. **5**

4. Write short notes on : **12**

   a) Types of cam with neat sketches

   b) Pressure development mechanism in hydrodynamic journal bearing.

SECTION – II

5. a) Derive the expression : $Z(t)\ R(t) = f(t)$. **6**

   b) A hard plastic box designed to house a multimeter is tested for its impact strength by dropping it from a fixed height and observing for any damage. A total of 500 boxes were tested and the results are tabulated as follows : **6**

No. of Drops	10	12	13	15	17	20	21	23	25
No. of boxes damaged	30	50	30	110	90	130	17	35	8

   Determine :

   i) Failure density

   ii) Hazard rate

   iii) Reliability.

6. a) Explain the significance of Bath tub curve in reliability analysis. **4**

   b) Calculate the reliability of the system as shown in the fig. **7**
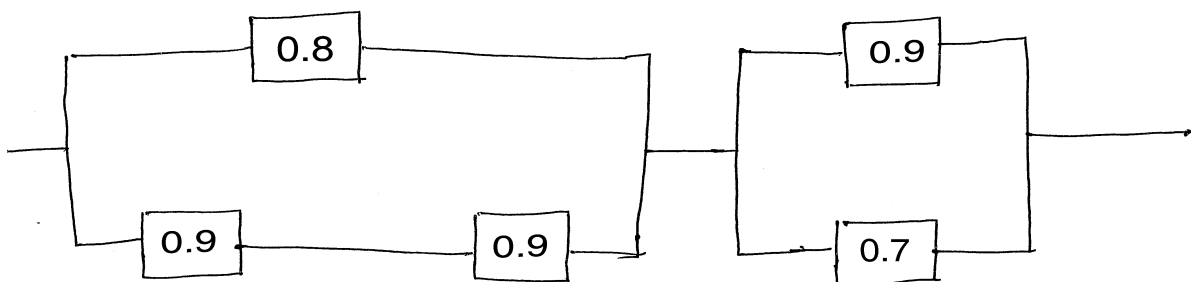
7. a) Derive the expression for thermal stresses for long hollow cylinder. **6**

   b) Explain design for manufacturing. **5**

8. Write short notes on : **12**

   a) Form and Contiguity constraint

   b) Reliability Improvement and Testing.

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Seat No.	

M.E. (Mech : Design Engg.) (Semester – II)
(CBCS/CGPA) Examination, 2017
Paper – VII : FINITE ELEMENT ANALYSIS

Day and Date : Saturday, 20-5-2017   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.

SECTION – I

1. a) Write a short note on finite element formulation. **6**

    b) Describe the procedure involved in finite element analysis. **6**

2. Develop weak form of weighted residual method and find the approximate

    solution for cantilever beam governing differential equation. $AE \dfrac{d2y}{dx2} + ax = 0$;

    with boundary condition $y(0) = 0$, $AE \dfrac{dy}{dx}$ at $x = 0$; $L = 0$. **12**

3. a) Solve the complete analysis. **8**
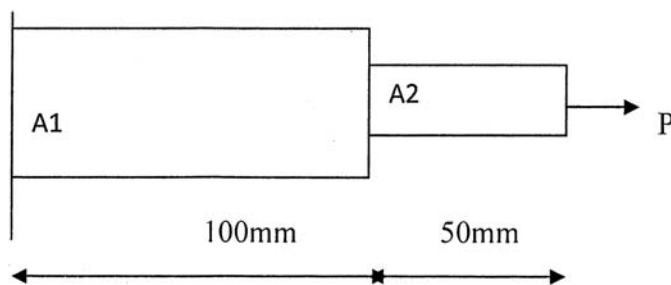
    A1 = 100 mm^2; A2 = 50 mm^2; P = 10 kN E = 200 Gpa

    b) Explain Rayleigh Ritz Method. **4**

4. Write short note on (Attempt **any two**) :   **12**

   a) FEM and BEM

   b) Weighted Residual Method

   c) Gauss Elimination Method.

SECTION – II

5. a) Write a short note fatigue analysis.   **6**

   b) Explain concept of mapping.   **4**

6. a) Explain sub-structuring and sub-modeling in brief.   **4**

   b) A square 5 cm × 5 cm fin is attached to a base temp. of 150°C as shown
      assume thermal conductivity as 37 W/m°k and convection heat transfer
      coefficient is 10 W/m^2 k. Find the temperature distribution of fin at 10 cm,
      20 cm and 30 cm, if it is exposed to air at 30°C.   **8**
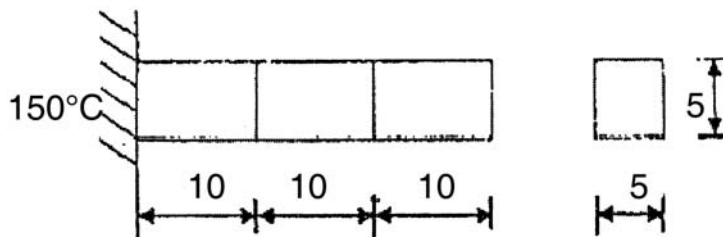
7. Explain modeling procedure of linear static analysis using software based FEM
   along with its application.   **10**

8. Write short note on (attempt **any two**) :   **12**

   a) Simplex, complex and multiplex elements.

   b) Modal Analysis

   c) Descritization of finite element problem.

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M.E. Mechanical (Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Monday, 22-5-2017   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 white 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 8 mm. It is subjected to equal and opposite compressive loads of 400 N along the vertical diameter. The observed fringe order at the disc centre and two other points 6 mm and 10 mm along the horizontal diameter is 0.3, 0.25 and 0.2 respectively. Calculate the average value of the material fringe constant. **6**

   b) Discuss Stress freezing techniques in three dimensional Photo elasticity. **6**

3. a) Explain how to determine exact fringe order(N) and the principal stress difference at a given point of interest. **6**

   b) Explain in brief : **6**

       i) Isoclinics

       ii) Birefringence

       iii) Isochromatics

       iv) Polarizations of light.

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 ϵ_a = 470 micro-strain, ϵ_b = 360 micro-strain, ϵ_c = 210 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. **7**

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

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

   b) Discuss use of strain gauge for measurement of torque. **5**

8. Write short notes : **11**

   a) Cross sensitivity of strain gauge.

   b) Commercial strain gauge Indicators.

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Seat No.

M.E. (Mechanical-Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – IX : INDUSTRIAL PRODUCT DESIGN

Day and Date : Wednesday, 24-5-2017　　　　　　　　　　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 the design and development process of industrial product. **7**

　b) What are the quality and maintainability considerations in product design. **7**

2. a) Explain impact of marketing on product design. **7**

　b) Give the detailed classification of products. How the product design criteria vary for each class ? Illustrate with an example for each. **7**

3. a) Explain the methodology for adopting anthropometric data for various product design. **7**

　b) Discuss the aspect of ergonomic design of radial drilling machine. **7**

4. a) What are the specification requirements and rating ? Give their importance in design of a consumer product. **7**

　b) With the help of suitable example explain the different methods for the interpretation of information on consumer product. Why it is necessary ? **7**

5. a) Why it is necessary to incorporate the legal and standard requirements in the design of a product ? **7**

　b) Discuss the effect of colour on product appearance. **7**

6. a) What are economic considerations of consumer product design ? **7**

　b) Explain the selection criteria of materials for an industrial product. **7**

7. a) Explain maintenance aspects of product patents. **7**

　b) Explain ergonomic aspects in design of tractors. **7**

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Seat
No.

M.E. (Mechanical – Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : INDUSTRIAL TRIBOLOGY (Paper – X)

Day and Date : Friday, 26-5-2017   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. Derive Reynolds equation with usual notations. What are assumptions made while deriving this equation ? Explain how this can be used to obtain pressure distribution in short bearings. **13**

2. a) Explain Kingsburry thrust bearing with neat sketch. **4**

   b) Derive pressure distribution in hydrostatic step bearing. **7**

3. a) From two dimensional Reynolds equation derive an expression for pressure distribution in narrow width Tapered pad bearings. **8**

   b) What is Sommerfeld number ? State its significance in bearing design. **3**

4. Explain the following :

   1) Modified adhesion theory of friction. **4**

   2) Tomlinson' Theory of molecular attraction. **4**

   3) Stick slip motion. **3**

SECTION – II

5. a) Explain practical applications of hydrostatic squeeze film lubrication. **6**

   b) A plate of 25 mm length and infinite width is separated from the plane by an oil film of 25 μm thickness and having an viscosity of 0.05 N-s/m^2. If the normal load per unit width of 20 kN/m is applied on the plate. Determine **7**
   1) The time required to reduce the film thickness to 2.5 μm.
   2) The maximum pressure.

6. a) Compare gas lubricated bearings with oil lubricated bearings based on
      following parameters. **6**
   1) Load carrying capacity
   2) Film thickness
   3) Surface finish
   4) Bearing material
   5) Overall coefficient of friction
   6) Effect of temperature on viscosity of lubricant.

   b) Discuss different experimental wear measurement techniques. **5**

7. Using Ertel Grubin theory derive relation **11**

$$\frac{h_o}{R} = 1.19 \left[\frac{\mu_o U_\alpha}{R}\right]^{\frac{8}{11}} \left[\frac{ELR}{W}\right]^{\frac{1}{11}}.$$

8. Briefly discuss :

   1) Lubrication in wire drawing and extrusion. **4**

   2) Tribological aspects of wheel on rail contact. **4**

   3) Desirable properties of bearing material. **3**

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Seat
No.

M.E. (Mechanical Design Engineering) (Semester – II) Examination, 2017
Paper – X : ENGINEERING FRACTURE MECHANICS (Elective – II)

Day and Date : Friday, 26-5-2017 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 Scientific calculator is **allowed**.
4) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. a) Explain Resistance curves for brittle and ductile materials. **5**

   b) Explain stress intensity factor with respect to fracture mechanics. **5**

   c) Explain with suitable figures opening mode, shearing mode and tearing mode. **8**

2. a) What are the mechanisms of fracture ? Explain any two with neat sketches. **7**

   b) An aluminum plate of 1.5 m width and 3 m length is required to support a force of 2 MN in the 3 m direction. Inspection procedures cab detect a through thickness edge cracks longer than 2.7 mm. Al-2024 and Al-7178 are the materials under consideration. Al-2024 has a value of stress intensity factor of 25 MPa√m, and yield stress S_y = 455 MPa. For Al-7178, K_{IC} = 35 MPa√m and yield stress S_y = 500 MPa. Weight is major consideration. Using factor of safety as 1.5, select the proper sheet and its thickness. **10**

3. Write short note on following **(any three)** : **17**

   i) Numerical methods for evaluating fracture toughness

   ii) Modified Griffith Energy criteria

   iii) Stress intensity factor for different problem geometries

   iv) Brittle and ductile fracture.

P.T.O.

SECTION – II

4. a) Estimate the failure load under the uni-axial tension for a centre cracked panel of aluminum alloy of width W = 400 mm and thickness B = 6 mm for the following values of crack length 2a = 20 mm and 2a = 10 mm. Yield stress

   σ_y = 300 MPa and fracture toughness K_{IC} = 70 MPa $\sqrt{m}$.   **10**

   b) Explain fatigue life calculations methods.   **8**

5. a) Discuss the crack growth rate for various ranges of stress intensity factor variation. Explain the significance of Paris equation.   **9**

   b) Explain S-N diagram related with fatigue mechanics.   **8**

6. a) An edge crack detected on a large plate is of 3.1 mm under a constant amplitude cyclic load having σ_{max} = 300 MPa and σ_{min} = 1500 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 a is not allowed to exceed 20 mm.   **10**

   b) Explain types of creeps with suitable figure.   **7**

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Seat No.

M.E. (Mechanical Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Elective – II) (Paper – X)

Day and Date : Friday, 26-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Attempt **any two** questions from **each** Sections.
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 rule of mixture. **8**

   B) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites. **9**

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) Find the transverse Young's modulus of a glass/epoxy lamina with a fiber volume fraction of 70 %. Young's modulus of the fiber is $E_f = 90$ GPa Young's modulus of the matrix is $E_m = 3.4$ GPa. **10**

   B) Explain Wu tensor theory. **8**

SECTION – II

4. A) Explain Bag moulding and filament winding related with manufacturing of composites. **10**

   B) Explain vibration equations for laminate plates. **7**

5. A) Explain lower bound and upper bound on apparent Young's modulus related with elasticity approach to stiffness. **11**

   B) What are steps in the structural design processes ? **6**

6. Write short note on following : **18**
   a) Buckling of laminate plates
   b) Inter-laminar stresses
   c) Pultrusion and pulforming.

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Seat No.

M.E. (Mechanical – Design Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : ENGINEERING DESIGN OPTIMIZATION (Paper – X)

Day and Date : Friday, 26-5-2017   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.
                 3) Assume suitable data if **necessary** and state it **clearly**.
                 4) Use of non-programmable calculator is **allowed**.

1. a) Give engineering applications of optimization.   **7**

   b) Explain relative and global maxima and minima in case of single variable optimization.   **7**

2. a) Explain standard form of linear programming problem.   **7**

   b) Write a note on unimodal function.   **7**

3. a) Explain grid search method for nonlinear programming of unconstrained optimization.   **7**

   b) Explain random search method with reference to nonlinear programming of constrained optimization.   **7**

4. a) Explain purpose and applications of optimum design of mechanical systems.   **7**

   b) Explain weight min-max method for multi-objective optimum design.   **7**

5. a) Explain geometry of linear programming.   **7**

   b) Write a note on golden section method.   **7**

6. a) Determine the maximum and minimum values of the function

     $f(x) = 12x^5 - 45x^4 + 40x^3 + 5.$ **7**

   b) Explain sequential linear programming method.   **7**

7. a) What is multi-objective optimization ? What are different methods of the same ?   **7**

   b) Write note on selection of optimum configuration in mechanical systems.   **7**

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Seat
No.

M.E. (Electronics) (Semester – I) (CBCS/CGPA) Examination, 2017
CMOS VLSI DESIGN (Paper – I)

Day and Date : Friday, 12-5-2017   Max. 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) Draw output characteristics of NMOS transistor and explain MOS transistor design equations for cut off, nonsaturation and saturation region.   **7**

   b) Explain any two second order effects for MOS transistor.   **4**

2. a) Draw circuit of CMOS inverter. Draw VTC of CMOS inverter and explain various regions of VTC. What is effect of Bn/Bp on VTC of CMOS inverter ?   **8**

   b) Explain dynamic power dissipation for CMOS inverter.   **4**

3. a) Explain pass transistor logic.   **4**

   b) Design AND, OR, NAND and NOR gates using CMOS logic.   **8**

4. a) What is basic principle of dynamic CMOS logic ?   **4**

   b) Explain the problem of charge leakage and charge sharing for dynamic CMOS logic.   **8**

SECTION – II

5. a) Draw circuit of master slave edge triggered register and explain. **6**

   b) Draw and explain Ratioed CMOS and SR latch. **5**

6. a) What is Dual edge triggered register ? Draw and explain C^2MOS based dual edge triggered register. **6**

   b) What is timing classification of digital systems ? Explain any two of them. **6**

7. a) Explain synchronous timing basics. **6**

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

8. a) What is DRAM ? Explain DRAM cell including waveforms during read and write operation. **6**

   b) Explain design of fast multipliers. **6**

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Seat
No.

M.E. (Electronics Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – II : ADVANCED DIGITAL SIGNAL PROCESSING

Day and Date : Saturday, 13-5-2017   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. 1) Draw the block diagram of Forward linear prediction. Derive the equation for coefficient of the linear Predictor by using 'P' stage lattice filter. **6**

    2) Derive the equation of reflection coefficient from the sequence of function by using Schur Algorithm. **6**

2. 1) For AR model parameter, explain in detail Burg Method. **6**

    2) Explain the Auto regressive (AR) process. Derive the equation MA(q). **6**

3. 1) Explain the design of Linear phase FIR filters by using Frequency sampling method with Type II Design. **6**

    2) Explain the design of Hilbert Transformer. **5**

SECTION – II

4. 1) Explain the method of sampling rate conversion by factor I/D. Explain the design of interpolater and decimator filter. **6**

    2) Explain with timing diagram technique for sampling rate conversion. **6**

5. 1) Explain with equation Frequency transformation in designing IIR filters. **6**

    2) 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 – 3 db and – 10 db respectively. The sampling frequency is 5000 Hz. Design a digital low pass Butterworth filter using bilinear transformation. **6**

6. 1) Discuss Scaling function and Wavelet Vector spaces. **6**

    2) Explain Parseval's theorem in expansion system. **5**

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Seat
No.

M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : ADVANCED NETWORK ENGINEERING

Day and Date : Monday, 15-5-2017   Max. 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) What is 3 way handshake in the case of TCP connection establishment and connection release ? List various timers used TCP communication.

   2) How ARP is used to obtain physical address of a PC ? Draw and explain ARP message format.

   3) Draw UDP header format and explain. What is pseudo -header in UDP ? How checksum is calculated in UDP ?

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

   1) What is silly window syndrome in TCP ? How it can be overcome ?

      If present R_{TT} in TCP communication is 50 msec and subsequent R_{TT}'s are 48, 45 and 52 msec, find new R_{TT} if $\alpha = 0.8$ and $\beta = 5$.

   2) Draw and explain TCP finite state machine.

   3) What is SNMP ? Discuss SNMP message formats.

3. Answer following questions :

   1) What is firewall ? What are the components of firewall ? Explain each component in detail.   **5**

   2) Explain RSA algorithm in detail. How RSA is used to provide security during communication ?   **6**

                       OR

   2) Draw IPsec architecture and AH header format and explain use of each field.   **6**

P.T.O.

SECTION – II

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

   1) What are the different classes of MPEG-7 applications ? Discuss MPEG-7 tools and descriptors.

   2) Explain use of RSVP and COPS to improve the quality of IP communication.

   3) What are different multimedia applications ?

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

   1) Draw architecture used in video streaming and explain it. What are the requirements of streaming applications ?

   2) What is the concept of psychoacoustics ? What is frequency masking and threshold of hearing and temporal masking in audio ?

   3) What is the necessity of sequence numbers and time stamp in RTP ? Draw RTP header format and explain.

6. Answer following questions :

   1) List different layers involved in DVB over IP. Draw and explain home reference model for digital broadcasting. **5**

   2) What is DVMRP ? Explain physical and tunnel interfacing in DVMRP. **6**

OR

   2) What are different image encoding methods ? Explain JPEG- 2000 in detail. **6**

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SLR-VC – 35

M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – IV : RANDOM SIGNALS AND PROCESSES

Day and Date : Tuesday, 16-5-2017   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) Given a PDF of a random variable X as $f_X(x) = y_0 e^{-b(x-a)}$, $a \leq x \leq \infty$, b > 0, where y_0, a and b are constants, show that $y_0 = b$.   **3**

   b) If the p.d.f. of a continuous random variable X is

   $$f_X(x) = \begin{cases} c(3+2x) & \text{for } 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

   Find the value of c and the distribution function $F_X(x)$.   **4**

   c) If X has an exponential distribution with mean = 2, find P(X<1/ X<2).   **5**

            OR

   c) The time in hours required to repair a machine is exponentially distributed with parameter $\lambda = \frac{1}{2}$, what is the probability that the required time
      I) Exceeds 2 hours
      II) Exceeds five hours.   **5**

2. Attempt the following :

   a) State and explain Bays theorem on inverse probability.   **6**

   b) For a certain binary channel, the probability that a transmitted 0 is correctly received as 0 is 0.94 and the probability that a transmitted 1 was correctly received as 1 is 0.91. Further, the probability of transmitting 0 is 0.45. If a signal is sent, determine
      I) The probability that 0 was received
      II) The probability that a 0 was transmitted given that a 0 was received and
      III) The probability of error.   **6**

            OR

b) Consider two urns. The first contains two white and seven black balls, and second contains five white and six black balls. We flip a fair coin and draw a ball from the first urn or the second urn depending the outcome was head or tail. What is the probability that the outcome of the toss was head given that a white ball was selected ? **6**

3. Attempt following :

a) Define joint probability distribution of two random variables and state its properties. **4**

b) X is a continuous random variable uniformly distributed in the interval (0,2). Let Y = 4X + 3. Find $F_Y(y)$ and $f_Y(y)$. **3**

c) Two random variables X and Y are defined as Y = 4X + 9. Find the correlation coefficient between X and Y. **4**

SECTION – II

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

a) Define autocorrelation function of random processes ? Explain in detail with its properties.

b) If X(t) = A (sin $\omega_0 t + \theta$) where A and ω_0 are constants and θ is uniformly distributed random variable in (0, 2π), calculate the autocorrelation function of the process and see whether the process is a WSS process.

c) An ergodic process has an autocorrelation function of the form

$$R_x(\tau) = 5e^{-|\tau|} - 2^{-2|\tau|}.$$

Where A is a constant.
 i) Find the mean value of the process.
 ii) Find the variance of the constant.

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

a) Explain estimation of autocorrelation function using frequency domain.

b) An ergodic random process has an autocorrelation function of the form

$$R_x(\tau) = 50\delta(\tau) + 36$$

What is the value of spectral density of this process at ω = 100 ?

c) A random process has sample functions of the form X(t) = Y t Z where Y and Z are statistically independent random variables with the following parameters

$\mu_Y = 0$, Variance of Y = 9

$\mu_Z = 0$, Variance of Z = 16

i) Is the process discrete or continuous

ii) Is the process deterministic or nondeterministic

iii) Find E[X(t)].

6. Attempt following :

a) Write short note on : Matched filter.   **5**

b) A random process with the autocorrelation function

$R_X(\tau) = 18\delta(\tau) + 32$

is applied to the input of a system whose impulse response is

h(t) = $(5e^{-2t} - 2.5e^{-t})$ u(t), find meanvalue of output.   **6**

OR

b) Define a Gaussian process. When a random process is said to be a normal ? State the properties of a Gaussian Process.   **6**

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Seat
No.

M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : DESIGN OF WIRELESS SYSTEM (Paper – V)

Day and Date : Wednesday, 17-5-2017　　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Design a six pole lumped filter using image parameter design for a band of 475 to 525 MHz. **7**

   b) What are S parameters ? What is its significance ? **6**

2. Solve **any two** :

   a) What are PLL fractional N synthesizers ? **6**

   b) Design a discrete crystal BJT oscillator for 22 MHz. Assume suitable parameters. **6**

   c) Design a discrete LC BJT oscillator for 400 MHz. Assume suitable parameters. **6**

3. Solve **any two** :

   a) Design a passive loop PLL synthesizer with a center frequency 2.45 GHz. Assume other suitable parameters. **5**

   b) With suitable example explain third order intercept point. **5**

   c) Discuss behavior of a typical capacitor and inductor at high frequency. **5**

SECTION – II

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

   b) Explain how a passive frequency multiplier can be designed using diode. What are the different types of diodes used ? Comment on its selection. **6**

5. Solve **any two** :

   a) Discuss linear RF transmitter. **6**

   b) Explain RF link budget. **6**

   c) Design shunt PIN SPST RF switch and small RF signal series PIN SPST switch. **6**

6. Solve **any two** :

   a) Draw and explain $50\,\Omega$ LC power splitter/combiner with $0°$. Also design it for $f_r = 915$ MHz with $Z_{IN} = Z_{OUT} = 50\,\Omega$. **5**

   b) Draw a SNAP frequency multiplier and discuss design steps. **5**

   c) Draw and explain AGC circuit in a receiver's IF chain. **5**

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SLR-VC – 37

Seat No.	

M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : Wireless Sensor Networks (Paper – V)

Day and Date : Wednesday, 17-5-2017　　　　　　　　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 different objectives for WSN MAC design.　**6**

2. a) Explain S MAC.　**6**

　 b) Explain wise MAC.　**6**

OR

　 c) Explain traffic adaptive MAC.　**6**

3. a) Explain flooding and gossiping.　**5**

　 b) Explain SPIN PP protocol.　**5**

OR

　 c) Explain rumor routing.　**5**

P.T.O.

SECTION – II

4. a) Explain data transfer in Beacon enabled and non Beacon enabled networks. **7**

   b) Explain GPS based localization. **6**

5. a) Explain flooding time synchronization protocol. **6**

   b) Explain reference broadcast synchronization. **6**

   OR

   c) Explain clocks and synchronization problem. **6**

6. a) Explain SPI bus. **5**

   b) Explain super Harvard architecture. **5**

   OR

   c) What are the various factors affecting dynamic power management strategy ?

   5

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Seat
No.

M.E. (Electronics) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : IMAGE AND VIDEO PROCESSING (Paper – V)

Day and Date : Wednesday, 17-5-2017   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. Solve **any four** questions :   **(4×5=20)**

   1) Discuss the properties and applications of
      a) Hadamard transforms   b) Discrete Cosine Transforms

   2) What do you mean by basic gray level transformation ? Explain any two with neat sketch.

   3) Explain SVD transform in detail.

   4) What is quantization and explain uniform quantization.

   5) Explain image restoration/degradation model.

   6) Explain different types of noise model.

2. Solve the following questions :

   1) What is histogram ? Explain histogram equalization with suitable example. And if the entire pixels in an image are shuffled, will there be any change in the histogram ? Justify your answer with example.   **(1×8=8)**

   2) What need of smoothing and sharping in spatial domain image enhancement ? Explain details.   **(1×7=7)**

SECTION – II

3. Solve **any four** questions :   **(4×5=20)**

   1) Explain of Edge Detection using Sobel, Prewwits and Robert Cross Operator.

   2) Explain lossless DPCM technique and list three reasons why image compression is important.

P.T.O.

3) Write short note on :
   a) video signal   b) analog signal
   c) digital signal   d) color model in video

4) Explain details MPEG 2, MPEG 4.

5) Explain details of special feature extraction.

6) Explain video compression technique.

4. Solve the following questions :

1) Solve the shanon-fano code for given image show below in purpose of image compression and also find out efficiency. **(1×7=7)**

2	3	4
4	3	2
5	2	3

Fig. – Image 3 × 3

2) For the image shown below, compute the degree of compression that can be achieved using (a) Huffman coding of pixel value, (b) Run-length coding, assuming 2 bits to represent the pixel value and 2 bits to represent the run length. **(1×8=8)**

3	3	3	2
2	3	3	3
3	2	2	2
2	1	1	0

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Seat
No.

M.E. (Electronics Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VI : RESEARCH METHODOLOGY

Day and Date : Thursday, 18-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) With suitable engineering example explain static system model. **6**

   b) With suitable engineering example explain dynamic system model. **6**

2. a) With suitable engineering example discuss significance of research. **5**

   b) With suitable engineering example explain steps in identifying research problem. **5**

   OR

   c) For any engineering research problem example of your choice discuss 'Objectives'. **5**

3. a) With suitable engineering example, explain how a research problem can be modeled mathematically ? What are its advantages ? **7**

   b) For any engineering research problem example of your choice discuss 'Validation Criteria'. **6**

   OR

   c) With suitable examples explain applied Vs fundamental research. **6**

SECTION – II

4. a) With suitable example explain confidence interval. **6**

   b) With suitable example explain hypothesis testing. **6**

5. a) Write a short note on ethical issues in research. **5**

   b) Discuss with suitable example how a concept of virtual lab is useful for an engineering research. **5**

   OR

   c) Explain typical applications of design of experiments. **5**

6. a) Discuss in details various chapters/sections in a typical engineering research project report. **7**

   b) With suitable example explain strategy of experimentation. **6**

   OR

   c) Write a short note on 'patents and its significance'. **6**

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Seat
No.

M.E. (Electronics) (Semester – II) (CBCS/CGPA) Examination, 2017
EMBEDDED SYSTEM DESIGN (Paper – VII)

Day and Date : Saturday, 20-5-2017　　　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
　　　　　　　　　2) Assume suitable data **wherever** necessary.

SECTION – I

1. Describe the following with example (**any three**) : 　　　　　**(5×3=15)**
   a) Immediate offset addressing mode.
   b) Register offset addressing mode.
   c) Scaled register offset addressing mode.
   d) Indexing methods.

2. Compare ARM instructions and thumb instructions. 　　　　　**10**

3. Explain operating modes of ARM core. 　　　　　　　　　　**10**
   　　　　　　　　OR
3. Explain CAN bus in detail.

SECTION – II

4. Illustrate inter process communication in detail. 　　　　　**10**

5. Explain with schematic representation embedded software development process. 　**10**

6. Explain the case study of an embedded system for a smart card. 　**15**

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Seat No.

M.E. (Electronics Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : PERIPHERAL SYSTEM DESIGN AND INTERFACING

Day and Date : Monday, 22-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

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

   1) Distinguish between serial and parallel communication. What are the advantages of RS 232 interface ? List application those prefer serial communication.

   2) Draw timing diagram of I/O read operation in case of 8 bit ISA and explain neatly.

   3) Draw USB connection diagram in case of USB. What is enumeration in USB ?

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

   1) List features of PCI bus. Discuss PCI bus system and explain bus attributes and bus transactions related to PCI.

   2) What are the limitations of GPIB ? How more GPIB devices can be added ? Discuss GPIB bus expanders.

   3) Draw and explain token, data, handshake and start of frame packet formats related USB.

3. Answer the following questions :

   1) What is PCI bus master, PCI bus slave and PCI bus arbiter ? Draw timing diagram for PCI bus arbitration.   **6**

   2) What is RS-485 communication standard ? What is RS-485 termination ? Draw figure showing termination. What is its importance ?   **5**

                                     OR

   3) What are the types of USB transfers ? Draw USB cable connection diagram. What is enumeration in USB ?   **5**

P.T.O.

SECTION – II

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

   1) Explain at least five registers associated with communication controller PC 16550D UART.

   2) Explain proportional and PID control actions.

   3) What are the criteria for PLC selection ? Draw basic structure of PLC and ladder diagram symbols.

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

   1) What are the different types of computer control systems ? Explain distributed computer control system and its features.

   2) Name layers involved in controlNet protocol. Draw and explain ControlNet message format.

   3) How data is transferred in DMA operation ? What are various DMA channels available in PC ?

6. Answer the following questions :

   1) Draw diagram showing typical PROFIBUS network. Draw and describe PROFIBUS telegram format. **6**

   2) Draw message formats of ASCII mode and RTU mode MODBUS formats and explain them in detail. **5**

                    OR

   3) Draw a block diagram of PC based data acquisition system and describe it in detail. **5**

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Seat
No.

M.E. (Electronics) (Semester – II) (CBCS/CGPA) Examination, 2017
ADVANCED CONTROL SYSTEMS (Paper – IX)

Day and Date : Wednesday, 24-5-2017   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) Diagonalize the matrix $A = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix}$.

   b) Explain advantages of state variable method over conventional method.

   c) Determine poles and ROC of signal $F(k) = \cos(K\pi)$.

2. Attempt **any two** :   (6×2=12)

   a) The state space representation of system is

   $\dot{X} = A\, x(t) + B\, u(t)$ where $A = \begin{bmatrix} 0 & 6 \\ -1 & -5 \end{bmatrix}$ obtain the state transition matrix for
   above system.

   b) Explain sampling, quantization effect, zero order hold block.

   c) For the transfer function model and input given below, find the response Y(k)

   $\dfrac{G(z)}{y(z)} = \dfrac{0.05z}{z - 0.95}$ if

   i) $r(k) = \delta(k)$ and   ii) $r(k) = \mu(k)$.

3. Solve the following :   (11)

   a) Write state equation for R-L-C series circuit if v(i) is input, v(o) is taken
   across C and i(t) is current flowing through series circuit.   **5**

   b) $A = \begin{bmatrix} 0 & 0 & 1 \\ -10 & -3 & 0 \\ 0 & 2 & 3 \end{bmatrix}$ $C = [1\ 0\ 0]$

   Find the rank Q_0 of check the observability, of above system.   **6**

SECTION – II

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

   a) For following MIMO system find following transfer functions

      i) $Y_1(z)/R_1(z)$ ii) $Y_2(z)/R_1(z)$.
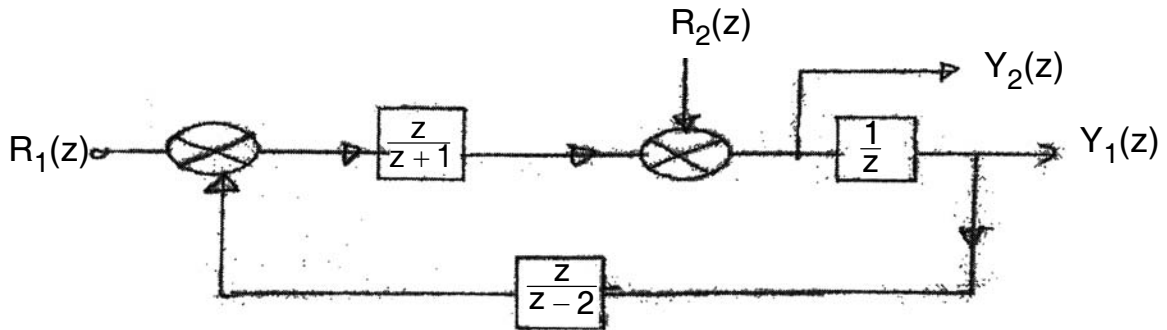
   b) What do you mean by pole placement problem ? Explain with example.

   c) Elaborate conversion of MIMO problem into SISO problem.

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

   a) The negative feedback control system has forward path transfer function.

      $G(s) = 10 / S(S + 1)$. While feedback path has transfer function $H(s) = 5$. Determine sensitivity of closed loop transfer function with respective to $H(s)$.

      $\omega = 1$ rad/sec.

   b) What are the different methods of evaluating state feedback gain matrix K ? Explain one in detail.

   c) Explain uncertainty and robustness.

6. Write short notes :   **(11)**

   a) Explain any one models of multivariable system in detail.   **5**

   b) Explain of one degree freedom control.   **6**

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Seat No.	

M.E. (Electronics Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
MOBILE TECHNOLOGY (Elective – II) (Paper – X)

Day and Date : Friday, 26-5-2017　　　　　　　　　　　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) List the steps involved in the MAP dialogue. **7**
   b) With diagram explain security techniques implemented in mobile station. **7**

2. Answer **any two** : **12**
   a) Explain the architecture of GSM, describe the functions of each component.
   b) Describe GPRS attach and detach procedures.
   c) Explain usefulness of WAP developer tool kits.

3. a) List the steps involved in international call setup procedure. **5**
   b) Describe GPRS network nodes. **4**
   　　　　　　　　OR
   b) Describe telecommunication management network. **4**

SECTION – II

4. a) With suitable sketch explain public key cryptography. **7**
   b) Explain different variants in configuring CDMA2000 network. **7**

5. Answer **any two** : **12**
   a) Explain basics of UMTS. Describe the UMTS migration path.
   b) Briefly explain different types of attacks observed in mobile computing.
   c) What different types of handover, UMTS supports ?

6. a) With diagram explain WCDMA air interface protocol architecture. **5**
   b) Describe various components of information security. **4**
   　　　　　　　　OR
   b) Explain the architecture of UTRAN. **4**

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Seat
No.

M.E. (Electronics) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : REAL TIME SYSTEMS (Paper – X)

Day and Date : Friday, 26-5-2017   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) Explain Fault tolerant scheduling in detail. **6**

　 2) Explain uniprocessor scheduling of IRIS tasks. **5**

2. 1) Describe desired language characteristic used for Real Time Systems. **6**

　 2) Explain the concept of package used in Real Time System. **6**

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

　 2) Explain timing specification and requirement used in good real time language. **6**

SECTION – II

4. 1) Discuss concurrency control issues during execution of database. **6**

　 2) Discuss one method of disk scheduling algorithms used in real time database. **6**

5. 1) Explain in detail continuous based protocol. **6**

　 2) Explain deadline based protocol with different constraints. **6**

6. 1) Discuss various obtaining parameter values in reliability evaluation techniques. **6**

　 2) Explain any one reliability model for Hardware Redundancy. **5**

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SLR-VC – 47

Seat No.	

M.E. (Electronics) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : VLSI in DSP (Paper – X)

Day and Date : Friday, 26-5-2017   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 and SFG for $y(n) = ax(n) + bx(n-1) + cx(n-2)$.

   b) Explain the concept of pipelining with the help of example.

   c) Compute the loop bounds for the following loops :
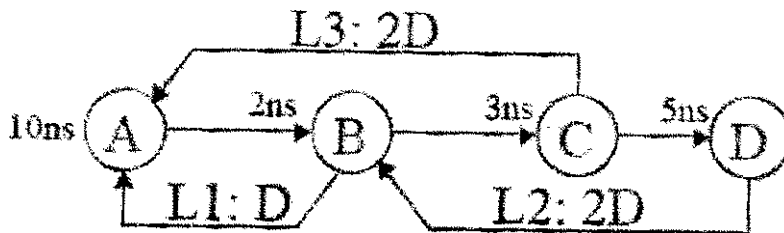
   d) Perform the retiming for the following DFG shown in fig.
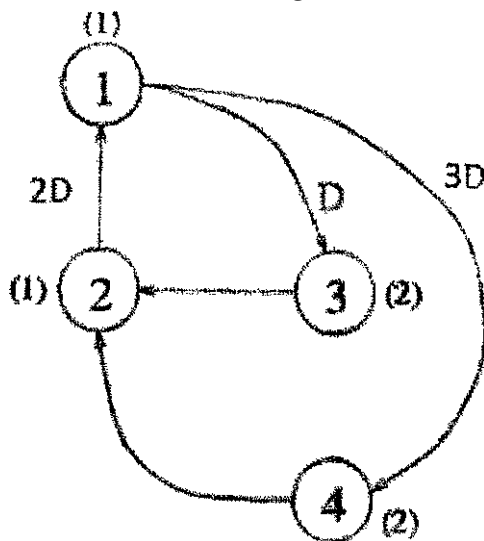
   e) What is retiming of DFG ? Explain properties of retiming.

2. Solve the following :

a) For DFG shown below find iteration bound using LPM algorithm. **8**
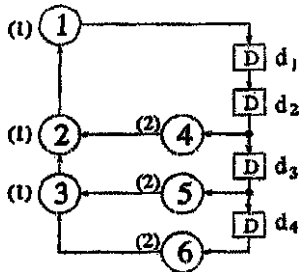
b) What is retiming of DFG ? Explain applications of retiming in DSP system. **7**

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 folding transformations.

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

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

d) Unfold the DFG for program as shown in fig. with unfolding factor 2.
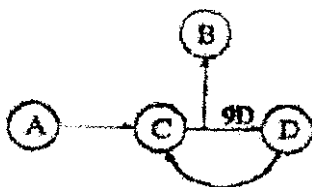
e) Design F filter for FIR systolic array.

4. Solve the following :

   a) Design B1 filter for FIR systolic array. **8**

   b) Explain any two applications of unfolding. **7**

   OR

   b) Draw the circular life time chart for following with period N = 8 : **7**

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

   _____

Seat
No.

**M.E. (CSE) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – I : THEORY OF COMPUTATION**

Day and Date : Friday, 12-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

SECTION – I

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

   a) In a Graph Theory describe the following with example;

       Directed graph, Simple path, Simple cycle and Strongly connected graph.

   b) Prove that $\sqrt{2}$ is rational using a proper method of proof and name it.

   c) What are decidable languages ? Prove that EQ_{DFA} is decidable language.

   d) Define nondeterministic TM. Prove that every nondeterministic TM has an
       equivalent deterministic TM.

   e) Illustrate A_{CFG} and E_{CFG} in decidability and prove that they are decidable
       languages.

2. Answer the following :   **6**

   What is diagonalization ? Prove that R is uncountable where R is a set of real
   numbers.

3. Answer the following :   **5**

   Design a TM for a computation of mod 5. Give its formal definition with example
   input illustration.

SECTION – II

4. Answer **any four** :   **24**

   a) Elaborate recursion theorem and prove that MIN_{TM} is not turning recognizable.

   b) List and explain growth rate functions.

   c) What is time complexity ? Brief out the time complexity of a TM.

   d) Elaborate recursion theorem with its applications.

   e) Write a note on tractable and intractable problems.

5. Answer the following :   **6**

   State base functions and strategy sets of primitive recursive functions.

6. Answer the following :   **5**

   Define PCP problem and prove its undecidability.

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Seat No.

M.E. (Computer Science and Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – II : ADVANCED OPERATING SYSTEM

Day and Date : Saturday, 13-5-2017   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

I. Answer **any two** :   **10**

1) Give example of three applications for which distributed computing systems will be more suitable than parallel processing systems.

2) Explain the workstation server model of distributed computing system.

3) Illustrate with example how to keep track of lost and out of sequence packets in a multidatagram message transmission.

4) List and explain five types of transparencies required in distributed systems.

II. Answer **any two** :   **10**

1) How do you justify that different applications require different degrees of reliability in multicast communication ?

2) Explain the nonblocking send and nonblocking receive primitives in message passing.

3) With diagram explain the implementation of RPC.

III. a) Explain different call semantics used in RPC.   **10**

    b) What is an idempotent operation ? Which of the following operations are idempotent ?   **5**

       a) Read_next_record(filename)

       b) Read_record(filename, rec-num)

       c) Add(int1, int 2)

       d) Increment(var-name).

SECTION – II

IV. Answer **any two** :   **10**

  a) What are the commonly used approaches for structuring shared memory space of a DSM system.

  b) What are main causes of thrashing in DSM system ? What are the methods used for solving the thrashing problem ?

  c) Propose a suitable replacement algorithm for a DSM system whose shared memory space is structured as objects with the goal to minimize memory fragmentation.

V. Answer **any two** :   **10**

  a) What are the different address transfer space mechanisms ?

  b) Explain the state information exchange policies use in load-sharing algorithms.

  c) Suggest some policies used for load estimation in load-balancing algorithms. Discuss their advantages and disadvantages.

VI. a) Explain the different message forwarding mechanisms used in process migration.   **10**

  b) Explain the structure of RPC messages.   **5**

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Seat No.

M.E. (Semester – I) (Computer Science and Engineering) (CBCS/CGPA) Examination, 2017
Paper – III : ANALYSIS OF ALGORITHMS

Day and Date : Monday, 15-5-2017   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 of remaining questions from **each** Section.
3) Figure to **right** indicates marks.

SECTION – I

1. Given a recursive algorithm find out time complexity using recurrence relation. **7**

```
long power(long x, long n)
       if(n == 0)
            return 1;
       else
            return x * power (x, n – 1);
```

2. A) Explain the general Greedy method algorithm for subset paradigm. Give proper example. **7**

   B) Explain the all pair shortest path problem and discuss dynamic programming approach to solve this problem. **7**

3. A) Explain the general strategy for solving a problem using branch and bound. Use suitable example. **7**

B) Compute minimum cost spanning tree using Prim's algorithm for following Figure 4. **7**
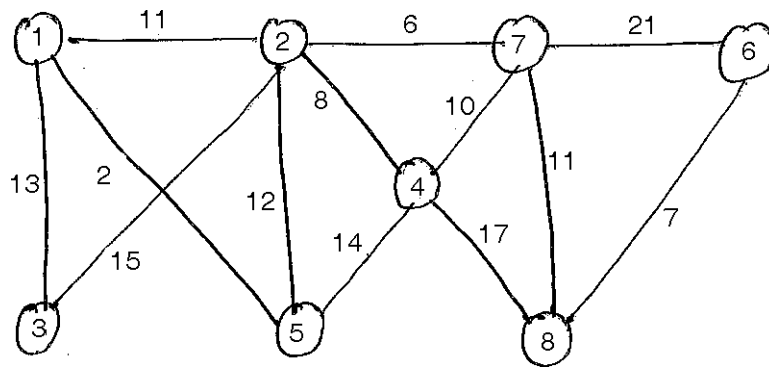
Figure. 4

4. A) Explain graph coloring problem and its solution using Backtracking. **7**

B) Consider the travelling sales person instance defined by following cost matrix

$$\begin{bmatrix} \infty & 07 & 03 & 12 & 08 \\ 03 & \infty & 06 & 14 & 09 \\ 05 & 08 & \infty & 06 & 18 \\ 09 & 03 & 05 & \infty & 11 \\ 18 & 14 & 09 & 08 & \infty \end{bmatrix}$$

Obtain the reduced cost matrix. **7**

SECTION – II

5. Explain the concept of NP-hard and NP-complete with suitable example. **7**

6. A) Explain Voronoi Diagrams. **7**

B) Explain Prefix Computation in PRAM. **7**

7. A) Write a short note on List Ranking. **7**

B) Explain flow shop scheduling with respect to NP-hard. **7**

8. A) Write short note on Computational Models in PRAM. **7**

B) State and explain Cook's Theorem. **7**

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Tuesday, 16-5-2017 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 for that question.*

3) *If* **required** *assume suitable data.*

SECTION – I

1. Write answer to **any four** questions (**7** marks for **each**) : **(7×4=28)**

A) Distinguish between research methods and research methodology.

B) Write short note on rephrasing the research problem.

C) Explain the meaning and significance of a research design.

D) Write a short notes on research design in case of descriptive and diagnostic research studies.

E) Why data collection through projective techniques is considered relatively more reliable ?

F) Examine the merits and limitations of the observation method in collecting material.

2. Draw the flow chart and briefly describe the different steps involved in a research process. **7**

SECTION – II

3. Write answer to **any four** questions (**7** marks for **each**) : **(7×4=28)**

   A) Write a short note on time series analysis.

   B) Find the geometric mean of the numbers, 4, 6, 9 and the harmonic mean of the numbers 4, 5, 10.

   C) What is plagiarism ? How to detect it ?

   D) When to go for what type of technical paper in the research process ?

   E) What is bibliography and why it is important in the context of research report ?

   F) Briefly introduce "LATEX" documentation and presentation tool.

4. What are the steps to be followed while writing a IEEE paper ? **7**

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Seat No.	

M.E. (Computer Science and Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : DATA MINING (Paper – V)

Day and Date : Wednesday, 17-5-2017　　　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Q. **(1)** and **(2)** are **compulsory**.
　　　　　　　　2) Answer **any three** questions from Q. **3** to Q. **7**.
　　　　　　　　3) **All** questions carry **equal** marks.

1. Choose the correct answer : 　　　　　　　　　　　　　　**(14×1=14)**

　1) The full form of OLAP is
　　A) Online Analytical Processing　　B) Online Advanced Processing
　　C) Online Advanced Preparation　　D) Online Analytical Performance

　2) _____ is a subject-oriented, integrated, time-variant, nonvolatile collection or data in support of management decisions.
　　A) Data Mining　　　　　　　　B) Data Warehousing
　　C) Document Mining　　　　　　D) Text Mining

　3) The data is stored, retrieved and updated in
　　A) OLAP　　　B) OLTP　　　C) SMTP　　　D) FTP

　4) An _____ system is market-oriented and is used for data analysis by knowledge workers, including managers, executives and analysts.
　　A) OLAP　　　　　　　　　　　B) OLTP
　　C) Both of the above　　　　　　D) None of the above

　5) _____ is a good alternative to the star schema.
　　A) Star schema　　　　　　　　B) Snowflake schema
　　C) Fact constellation　　　　　　D) Star-snowflake schema

　6) The _____ exposes the information being captured, stored and managed by operational systems.
　　A) top-down view　　　　　　　B) data warehouse view
　　C) data source view　　　　　　D) business query view

　7) The type of relationship in star schema is
　　A) many to many　　　　　　　B) one to one
　　C) one to many　　　　　　　　D) many to one

　8) The _____ allows the selection of the relevant information necessary for the data warehouse.
　　A) top-down view　　　　　　　B) data warehouse view
　　C) data source view　　　　　　D) business query view

P.T.O.

9) Which of the following is not a component of a data warehouse ?
   A) Metadata
   B) Current detail data
   C) Lightly summarized data
   D) Component Key

10) Which of the following is not a kind of data warehouse application ?
   A) Information processing
   B) Analytical processing
   C) Data mining
   D) Transaction processing

11) A data warehouse includes which of the following ?
   A) Can be updated by end users
   B) Contains numerous naming conventions and formats
   C) Organized around important subject areas
   D) Contains only current data

12) An operational system includes which of the following ?
   A) A system that is used to run the business in real time and is based on historical data
   B) A system that is used to run the business in real time and is based on current data
   C) A system that is used to support decision making and is based on current data
   D) A system that is used to support decision making and is based on historical data

13) The generic two-level data warehouse architecture includes which of the following ?
   A) At least one data mart
   B) Data that can extracted from numerous internal and external sources
   C) Near real-time updates
   D) None of the above

14) The active data warehouse architecture includes which of the following ?
   A) At least one data mart
   B) Data that can extracted from numerous internal and external sources.
   C) Near real-time updates
   D) All of the above

2. Attempt **any three** : **14**

   a) What is a business model ?

   b) List the basic elements of Data Mining.

   c) What is Visualisation ?

   d) Compare between classification and clustering.

3. a) List the steps in KDD Process. **10**

   b) What is Association Rule Mining ? How is it carried out ? **4**

4. a) How is tree based classification carried out ? **10**

   b) How is extraction done using Neural Networks ? **4**

5. a) What are types of Web Mining ? **10**

   b) What is a Query language ? How is its GUI developed ? **4**

6. a) List the applications of Data Mining. Illustrate one. **8**

   b) What is Spatial Mining ? **6**

7. a) How is knowledge extracted from the web ? **8**

   b) List and explain the Data Mining primitives. **6**

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Seat No.	

M.E. (Computer Science and Engg.) (Semester – I) Examination, 2017
(CBCS/CGPA Pattern)
Elective – I : MOBILE COMPUTING (Paper – V)

Day and Date : Wednesday, 17-5-2017   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) Explain basic spread spectrum technique.

   b) What are advantages and disadvantages of cellular systems with small cells ?

   c) Draw functional architecture of GSM system and explain radio subsystem.

2. Solve **any two** :   **12**

   a) Explain DAMA scheme in wireless medium access.

   b) Explain GSM handover in detail.

   c) Draw and explain GPRS architecture reference model.

3. How exposed terminals problem can be avoided using MACA ?   **6**

   #### OR

   Why there is a need for specialized MAC in wireless networks ?

4. Explain MACA with polling and ISMA.   **5**

SECTION – II

5. Solve **any two** :   **12**

   a) Explain 802.11b architecture with respect to networking of Bluetooth devices.

   b) Write a note on power management in IEEE 802.11 using adhoc networks.

   c) Draw frame format of an IEEE 802.11 PHY frame using FHSS and explain each field.

6. Solve **any two** :   **12**

    a) Explain agent discovery phase in detail.

    b) What is HIPERLAN ? How EYNPMA is implemented ?

    c) Explain Mobile TCP.

7. Describe architecture of Android OS.   **6**

<div align="center">OR</div>

Draw and explain Symbian OS architecture.

8. Explain unicast data transfer in WLAN IEEE 802.11.   **5**

<div align="center">_____</div>

Seat
No.

M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VI : INTERNET ROUTING ALGORITHM

Day and Date : Thursday, 18-5-2017   Max. Marks : 70
Time : 11.00 a.m. 2.00 p.m.

Instructions : 1) Figures to the **right** indicate **full** marks.
         2) **All** questions are **compulsory**.
         3) **Wherever** required draw diagrams and assume data.

SECTION – I

I. Write answer to **any two** questions :   **(2×5=10)**

   A) Write a short note on different optical fiber transmission modes.

   B) What is subnetting ? Give the IP address of a host and the net mask, explain how network address is determined ?

   C) What are the similarities and differences between IS-IS and OSPF ?

II. Write answer to **any two** questions :   **(2×5=10)**

   A) Draw the diagram depicting protocol layering in IP architecture.

   B) Using mathematical notations and equations write widest path algorithm, computed at node i (Bellman-Ford-based).

   C) What are the main differences between RIPv1 and RIPv2 ?

III. A) For the following network topology compute the widest path between node 1 and node 5.   **10**
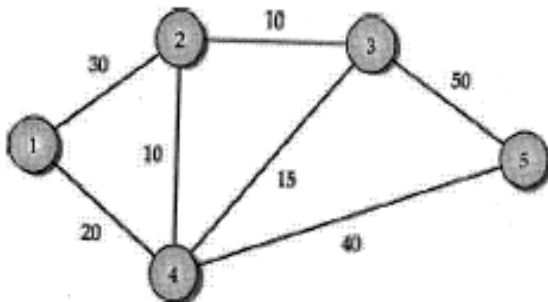
   B) What are the different BGP message types ?   **5**

SECTION – II

IV. Write answer to **any two** questions : **(2×5=10)**

A) What is Policy Based Routing ? State its three phases.

B) What are the sub-protocols of a link state protocol ?

C) Explain Naive's solution for Packet Classification.

V. Write answer to **any two** questions : **(2×5=10)**

A) What is packet processing ? Explain fast path versus slow path.

B) Explain path vector routing with example.

C) Illustrate search and update operations in a binary trie with example.

VI. A) Describe basic framework of distance vector protocol (node i's view). **10**

B) With diagram, explain shared nothing architecture of routers. **5**

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Seat No.

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2017 (CBCS/CGPA)
ADVANCED DATABASE CONCEPTS (Paper – VII)

Day and Date : Saturday, 20-5-2017   Total 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 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.
5) **Assume** suitable data **wherever** necessary.

SECTION – I

1. a) Apply criteria 1 and 2 to simplify global query. Show stepwise result. **8**

   $PJ_{NAME, TAX}$ (EMP JN $_{DEPTNUM = DEPTNUM}$ SL AREA $=$ $_{"NORTH"}$DEPT)

   DF (EMP JN $_{DEPTNUM = DEPTNUM}$ SL $_{DEPTNUM <10}$ DEPT)

   b) Compare data partitioning techniques in parallel database. How the skew in distribution of tuples is handled ? **7**

2. a) Explain Fragment and Replicate join. When it is advantageous to use ? **5**

   b) Explain 3 phase commitment protocol. **5**

3. a) Explain reference model of distributed transaction recovery. **5**

   b) Explain basic timestamp mechanism for concurrency control. **5**

4. a) Explain cold checkpoints and cold restart in distributed database. **5**

   b) How the catalogs are allocated in distributed database ? **5**

P.T.O.

SECTION – II

5. a) What are complex data types ? How they are defined in SQL ? **5**

   b) Explain space filling curve. **5**

   c) How multimedia data is stored and retrieved ? **5**

6. a) Explain Nesting and unnesting of relations with example. **5**

   b) What are the structured types ? Explain the operations on structured data with example. **5**

7. a) How multimedia data is indexed ? Discuss any one indexing structure. **5**

   b) Explain how data is searched in R-Tree. **5**

8. Write a short note on : **10**

   a) Temporal database

   b) Difference in RDBM, OODBMS, ORDBMS.

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Seat No.

M.E. (Computer Sci. and Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
PARALLEL COMPUTER ARCHITECTURE (Paper – VIII)

Day and Date : Monday, 22-5-2017   Total Marks : 70

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

Instructions : 1) *Q. No. **1** is **compulsory**.*
              2) ***All** questions from Section – **I** and **II** are **compulsory**.*
              3) *Figures to the **right** indicate **full** marks.*
              4) ***Assume** data **if necessary**.*

SECTION – I

1. Attempt **any three** of the following :   **(5×3=15)**

   a) Explain two basic approaches to instruction scheduling.

   b) Explain an example of Control Dependency Graph (CDG).

   c) Explain Define-use dependency and Load-use dependency.

   d) Describe Application scenario of pipelined processor.

2. Draw design space of instruction issue of superscalar processor. Discuss issue policy in detail.   **10**

3. With the help of diagram, compare the decode and issue tasks of a scalar and a superscalar processor. What is predecoding ? Explain the principle of predecoding.   **10**

SECTION – II

4. Attempt **any three** of the following : **(5×3=15)**

   a) What are the ISA concepts to implement checking for specified conditions ?

   b) What are the three aspects which give to the basic approaches in branch handling ?

   c) What are the four different kinds of annulment can be introduced for conditional branches.

   d) Explain features of IBM Power4.

5. Explain the main features of R10000. Draw a diagram of core part of the micro architecture of the R10000. **10**

6. A) Describe implementation of superscalar CISC processors using a superscalar RISC core [10]. **10**

   OR

   B) Draw the layout of the pipelines of the PowerPC 620. Explain it in detail. **10**

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
GRID COMPUTING (Elective – II) (Paper – IX)

Day and Date : Wednesday, 24-5-2017   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.
            3) ***Wherever*** required draw appropriate and ***neat*** diagrams.
            4) Figures to the ***right*** indicate ***full*** marks for that question.

SECTION – I

1. Write answer to **any four** questions (**5** marks for **each**) :   **(4×5=20)**

    A) Write a short note on key risk factors and vulnerabilities of Grid Computing deployments.

    B) What is the Worldwide LHC Computing Grid ?

    C) Compare Grid Computing and Cloud Computing environments.

    D) Draw the diagram of Grid protocol architecture and briefly describe it's relationship with to the Internet protocol architecture.

    E) Briefly describe abstractions and services that can be used as building blocks to implement a variety of higher-level Grid services.

2. Write answer to **any one** question :   **10**

    A) What is Semantic Grid ? What are the functionalities and issues addressed at the knowledge layer of Semantic Grid ?

    B) Write a note on Open Grid Services Architecture (OGSA).

3. Why there is a need for intergrid protocols ?   **5**

SECTION – II

4. Write answer to **any four** questions (**5** marks for **each**) : **(4×5=20)**

   A) Write a short note on semantic web of astronomical data.

   B) What are the challenges of the grid from the perspective of bioinformatics researchers ?

   C) What is Strasbourg Ontology ?

   D) What is MONTAGE architecture ?

   E) How security in GARUDA Grid is facilitated ?

5. Write answer to **any one** question : **10**

   A) What is a GARUDA Grid computing system ? Describe its architecture with core components.

   B) What is combinatorial chemistry ? Explain SPLIT and MIX approach.

6. Write a short note on usage of GARUDA Grid for Open Source Drug Discovery (OSDD) application. **5**

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Seat No.	

**M.E. (Computer Sci. & Engg.) (Semester – II) (CBCS/CGPA)
Examination, 2017
Elective – II – REAL TIME OPERATING SYSTEM (Paper – IX)**

Day and Date : Wednesday, 24-5-2017   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. List and explain phases of the Software Life Cycle.   **7**

2. A) Describe Non temporal Transitions in the Software Life Cycle with diagram.   **7**

   B) Describe Petri Nets with the help of example and diagram.   **7**

3. A) Explain State Charts in details.   **7**

   B) Describe in detail – Interrupt Driven Systems.   **7**

4. A) Describe the concept of Mailboxes in detail.   **7**

   B) Describe Process Stack Management in detail.   **7**

SECTION – II

5. Write a note on – Analysis of memory requirements.   **7**

6. A) Explain Little's Law and Erlang's Formula.   **7**

   B) Describe Faults, Failures, Bugs and Defects.   **7**

7. A) What is Testing ? Describe Unit Level Testing and System-level Testing.   **7**

   B) Describe Goals of Real-time System Integration.   **7**

8. A) What is software Heisenberg uncertainty principle ? Explain.   **7**

   B) Write a note on – Real Time Image Processing.   **7**

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SLR-VC – 64

Seat No.

**M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA)
Examination, 2017
Paper – IX : NATURAL LANGUAGE PROCESSING (Elective – II)**

Day and Date : Wednesday, 24-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) *Q. No.* ***1*** *and* ***5*** *are* ***compulsory***.
　　　　　　　2) *From the remaining solve* ***any two*** *questions in* ***each*** *Section.*

SECTION – I

1. Answer briefly :   **15**

   a) Describe the case frame used in Machine Translation system with Agent, Object, Dative, Instrument, Source and Location case.

   b) How to generate a word form table ? Illustrate with example.

   c) Illustrate use of Kriya Rupa Chart.

   d) Discuss different conflicts between verb forms like-sotaa, khaata, diyaa etc.

   e) Illustrate semantic model for the Paninian framework.

2. a) Illustrate the following :
      i) chart parser
      ii) link parser
      iii) definite clause grammar.   **5**

   b) Explain morphological analysis using paradigms.   **5**

3. a) List different kinds of modifier – modified structure and explain verbal . structures. Identify and draw the structure for the following sentences.   **5**
      i) raama paani piikara ghara gayaa.
      ii) raama ka ghara jaana mohan ko acchaa lagaa.

   b) Illustrate six karaka relations with example.   **5**

4. a) Describe karaka sharing with different rules.   **5**

   b) Construct the constraint parser using Matching and assignment in bipartite graph.   **5**

P.T.O.

SECTION – II

5. Answer briefly : **15**

   a) Discuss problems of Machine Translation. Give the domains where MT is applicable.

   b) Illustrate LFG formalism.

   c) Compare between CFG and Indian languages.

   d) How can GB help in parsing ?

   e) PG perform better than TAG for Indian languages. Justify.

6. a) Discuss Lexicalized Tree Adjoining Grammar in detail. **5**

   b) What is LFG ? Discuss overview of LFG and well-formedness condition in detail. **5**

7. a) Give Similarities and differences between TAG and PG. **5**

   b) Compare GB with PG. **5**

8. a) Draw structure of Anusaaraka system. How are language barriers overcome using Anusaaraka ? **5**

   b) With an illustration explain GB model. **5**

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : INFRASTRUCTURE MANAGEMENT (Paper – IX)

Day and Date : Wednesday, 24-5-2017 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Q. **(1)** and **(2)** are **compulsory**.
2) Answer **any three** questions from Q. **3** to Q. **7**.
3) **All** questions carry **equal** marks.

1. Objective Questions. Choose the correct alternatives : **14**

   1) Which of these items is a major component of today's IT infrastructure ?
      a) computer software
      b) data management technology
      c) networking
      d) technology services
      e) all of the above

   2) What software organizes, manages, and processes business dates concerned with inventory, customers and vendors ?
      a) application software
      b) customer-oriented software
      c) data management software
      d) Storage area network
      e) grid computing software

   3) What type of computer(s) is specially designed and/or used for tasks that require extremely rapid and complex calculations ?
      a) PC
      b) supercomputer
      c) midrange computer
      d) mainframe
      e) personal digital assistant

P.T.O.

4) A multitier, load-balancing scheme for web-based applications in which the web site content, logic and processing are performed by smaller and less expensive servers located nearby the user is known as

   a) transactions, such as payroll time cards, which are accumulated and stored in a group or batch until the time when it is efficient or necessary to process them

   b) industry-wide effort to develop systems that can configure themselves, optimize and tune themselves, heal and protects themselves

   c) the process of presenting a set of computing resources so that they can all be accessed in ways that are not restricted by physical configuration or geographic location

   d) a way to reduce power requirements and hardware sprawl

   e) the process of edge computing

5) The storage and input and output devices are called peripheral devices because

   a) they are outside the main computer system unit

   b) they are not as important as other computer devices

   c) their main purpose is to fix computer errors

   d) none of the above

   e) all of the above

6) What is the most widely used secondary storage medium ?

   a) magnetic tape

   b) magnetic sensor

   c) network

   d) optical disc

   e) magnetic disk

7) Which device is NOT considered an input device ?

   a) printer

   b) sensor

   c) touch screen

   d) keyboard

   e) computer mouse

8) Which one of these operating systems are used powerful PCs, workstations and network servers ?
   a) Windows XP
   b) Mac OS X
   c) Linux
   d) UNIX
   e) Windows Vista

9) Which of the following is NOT a category of Fourth-Generation Languages ?
   a) Query language
   b) Application generator
   c) Graphics language
   d) Report generator
   e) COBOL

10) _____ are small software programs that can be added to Web pages or placed on the desktop to provide additional functionality.
   a) Mashups
   b) Widgets
   c) Clouds
   d) Ajax
   e) Java

11) When firms outsource software outside their national borders, the practice is called
   a) Outsourcing
   b) Localization
   c) Web supporting
   d) Off-shore outsourcing
   e) Web hosting

12) What software application allows individuals or companies to create their own customized application and share information with others ?
   a) Mash-ups
   b) Widgets
   c) Cloud computing
   d) Web service
   e) None of the above

13) What is the software tool that provide immediate online answers to requests for information that are not predefined ?

a) Fourth-generation language

b) Query languages

c) HTML

d) Tcp/ip

e) Visual programming language

14) Which of the following is NOT an input device ?

a) Keyboard

b) Sensors

c) Printers

d) Character recognition

e) Digital scanner

2. Attempt **any three** : **14**

a) What is a IM ? State it's components.

b) List the basic elements of a service delivery process.

c) What are the patterns for IT systems management ?

d) Compare between the different models for IS.

3. a) What is cost estimation ? How is it carried out ? **10**

b) How is growth of internet carried out ? **4**

4. a) How the design for is IS carried out ? **10**

b) State and compare the technologies used for service delivery. **4**

5. a) What are the types of securities provided to IS ? **10**

b) List and compare the various techniques used for storage management. **4**

6. a) How is Rural IT sector management carried out ? **8**

b) List the applications of IM. **6**

7. a) What is Change Management ? How does it work ? **8**

b) Elaborate on the architectures of security management. **6**

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : Elective – III : WEB TECHNOLOGY

Day and Date : Friday, 26-5-2017   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 **right** indicate **full** marks.
                  3) **Assume** suitable data if necessary.

SECTION – I

1. Explain e-commerce business model with suitable example. **7**

2. Explain structure of HTTP request and response web page. **7**

3. Explain the frames and table tags of HTML with suitable example. **7**

4. How is XML defined ? Write down the XML syntax and structure rules. What is DTD, XPATH and schema ? Discuss its application. **7**

5. Explain client side and server side scripting. **7**

6. How session and cookies handle in asp page ? Explain with suitable example. **7**

SECTION – II

7. Write notes on :
   a) Widgets. **3**
   b) Web 2.0 and Web 3.0. **4**

8. Explain various components of JSP. **7**

9. Write a short note on RSS and Blog. **7**

10. What are the most important steps you would recommend for securing a new web server and web application. Explain. **7**

11. Explain servlet operation in detail with sample servlet program. **7**

12. Create JSP web application with database for Login and Logout module. **7**

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Seat
No.

M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : BUSINESS INTELLIGENT SYSTEM (Elective – III)

Day and Date : Friday, 26-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. Write answer to **any four** questions : **(4×5=20)**
   1) List and describe the components of BI.
   2) What are the four perspectives in balanced scorecard ?
   3) What are basic task in strategic planning process ?
   4) Describe the major categories of BPM applications.
   5) What are some of popular application areas of text mining ?

2. Write answer to **any one** question : **10**
   1) Compare BSC with six sigma.
   2) What are some of benefits and challenges of NLP ?

3. What are some of the major factors in today's business environment ? **5**

SECTION – II

4. Write answer to **any four** questions : **(4×5=20)**
   1) What are the major types of BI implementation influencing factors ?
   2) What are some of the critical success factors in BI projects ?
   3) List some legal issues of BI.
   4) What are the limitations of on demand systems ?
   5) What is a virtual world ?

5. Write answer to **any one** question : **10**
   1) What is RFID ?
   2) Define reality mining.

6. Define social network. **5**

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M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2017
OBJECT ORIENTED SOFTWARE ENGINEERING AND DESIGN PATTERNS
(Paper – X)   (Elective – III)

Day and Date : Friday, 26-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Answer briefly :   **(5×3=15)**

   a) Explain about crunching knowledge.

   b) Explain the life cycle of domain object.

   c) Write short note on – Architectural styles.

2. a) Explain use case realization design in detail.   **5**

   b) Explain about inheritance and polymorphism.   **5**

                              OR

2. Explain software architecture in the context of the overall software life cycle.   **10**

3. Write note on (**any two**).   **(5×2=10)**

   a) Model expressed in software.

   b) Interfaces and components in design driven workflow.

   c) Software Architecture.

SECTION – II

4. Answer briefly.   **15**

   a) What is global analysis in software architecture design ?

   b) Compare between product and quantity archetype patterns.

   c) Explain about communication patterns along with example.

5. a) Explain ISO2000 : The advanced imaging solution. **5**

   b) Explain about Code Architectural View. **5**

   OR

5. What is Customer Relationship Management (CRM) Archetype Pattern along with example ? **10**

6. Write note on (**any two**). **(5×2=10)**

   a) Documenting software interfaces.

   b) Literate Modelling.

   c) Frameworks and patterns.

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : WIRELESS AD-HOC NETWORK (Elective – III)

Day and Date : Friday, 26-5-2017   Total 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) What is Table-Driven Routing Protocol ? Explain DSR protocol.   **6**

   B) Draw schematic diagram of ad-hoc wireless internet and discuss its major issues.   **6**

2. A) Explain in details IEEE 802.11 DCF and RTS-CTS (medium access) mechanism.   **6**

   B) Explain heterogeneity in mobile devices.   **6**

3. A) Explain in detail the security and energy management challenges in Adhoc-wireless network.   **6**

   B) Explain in details the difference between Cellular and Ad-hoc wireless network.   **6**

4. A) What is Wireless Communication ? Explain Radio Propagation Mechanism.   **5**

   B) List the criteria for classification of Routing Protocols in Ad-hoc WANs. Explain with diagram the DSDV protocol.   **6**

SECTION – II

5. A) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP.   **6**

   B) Explain ad-hoc TCP and split TCP in details.   **6**

P.T.O.

6. A) Explain the design goals of a TCP for ad-hoc wireless networks. **6**

   B) Draw and explain Architecture Reference Model for Multicast Routing Protocols. **6**

7. A) Write a short note on Key management in WAN security. **6**

   B) What it is difficult to design a multicast routing protocol ? Explain with diagram receiver-initiated multicast protocols. **6**

8. A) What are Issues and challenges in Security Provisioning for ad-hoc wireless networks ? **5**

   B) Give the comparison of various TCP solutions for Ad-hoc wireless networks. **6**

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Seat
No.

**M.E. (Electronics and Telecommunication Engineering) (Semester – I)
Examination, 2017
(CBCS)
RESEARCH METHODOLOGY (Paper – I)**

Day and Date : Friday, 12-5-2017　　　　　　　　　　　　Total 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) What is qualitative research approach ? Explain.
   b) State any five types of sampling.
   c) State the criteria for scientific research.

2. Solve **any one** :　　　　　　　　　　　　　　　　　　　**(7×1=7)**
   a) Explain Monte Carlo method with example.
   b) Explain simple factorial design with example.

3. Solve **any three** :　　　　　　　　　　　　　　　　　　　**(6×3=18)**
   a) State difference between :
      i) Descriptive and Analytical Research
      ii) Conceptual and Empirical Research
   b) With the help of Block diagram explain Research process.
   c) What are the step involved in identifying a problem ?
   d) Explain static physical model and dynamic physical model with example.

SECTION – II

4. Solve **any two** :　　　　　　　　　　　　　　　　　　　**(2×5=10)**
   1) Explain in detail statistical output analysis.
   2) Explain in detail need of report writing.
   3) Give comment on role of probability and statistics in simulation.

5. Attempt **any one** : **(1×7=7)**

   1) Explain in detail types of errors and need of precision.

   2) Write the difference between a technical report and a popular report and also comment on report structure and formulation.

6. Write a short note on **any three** : **(3×6=18)**

   1) Evaluation of report.

   2) E-research

   3) Virtual lab

   4) Statistical distributions

   5) Writing abstract.

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M.E. (Electronics & Telecommunication Engg.) (Semester – I) (CBCS) Examination, 2017
Paper – II : ANTENNA THEORY AND DESIGN

Day and Date : Saturday, 13-5-2017   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) Explain cavity model for the analysis 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 Non-isotropic sources which has equal Amplitude and out of phase to each other.

   b) Explain in brief following parameters of antenna array :
      a) Directivity
      b) Beamwidth
      c) Array factor.

3. Attempt **any three** questions.   **(6×3=18)**

   a) Explain transmission line model for the analysis of microstrip antenna.

   b) Explain about the aperture coupled microstrip antenna for broad band antennas.

   c) Derive an equation for Array factor for array of two isotropic point source of equal amplitude and spacing.

   d) Explain in brief design consideration of Rectangular microstrip antenna.

SECTION – II

4. Solve **any two** questions. **(5×2=10)**

   a) Write a note on semiconductor substrate.

   b) Explain transmission line modeling for aperture coupled microstrip antenna.

   c) Explain series feed excitation method for microstrip antenna.

5. Solve **any one** question. **(7×1=7)**

   a) State different techniques used for bandwidth enhancement. Explain any one technique in brief.

   b) Explain Linear array design with Microstrip patches using series feed arrays.

6. Attempt **any three** questions. **(6×3=18)**

   a) Explain the effects of substrate parameters on Bandwidth.

   b) Explain desirable substrate characteristics for antenna fabrication.

   c) Write a note on composite material and ferrimagnetic substrate.

   d) Justify selection of shape of patch affects on bandwidth of microstrip antenna.

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Seat No.

M.E. (Electronics and Telecommunication Engg.) (Semester – I) Examination, 2017 (CBCS)
Paper – III : PROBABILITY AND STOCHASTIC PROCESSES

Day and Date : Monday, 15-5-2017   Total 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) State and prove the Baye's theorem.

   b) State properties of CDF of random variables.

   c) Explain in detail marginal PMF and joint probability density function.

2. Attempt **any one** :   (7×1=7)

   a) Explain maximum likelihood estimation of nonrandom parameters.

   b) Suppose you toss a fair coin three times :
       i) What is the probability of three heads, HHHHHH ?
       ii) Given that you have observed at least one heads, what is the probability that you observe at least two heads ?

3. Attempt **any two** :   (8×2=16)

   a) Prove the central limit theorem.

   b) Find the expectation and variance of the random variable X, whose PDF is given by $F(x) = \begin{cases} 2e^{-2x} & \text{if } x > 0 \\ 0 & \text{otherwise} \end{cases}$.

   c) Explain linear estimation of X given Y of random variables.

P.T.O.

SECTION – II

4. Attempt **any two** :   (6×2=12)

   a) State types of Stochastic process.

   b) Explain different classification states of Markov Chain.

   c) What is the effect arrival rate for M/M/1/N queuing system ?

5. Attempt **any one** :   (7×1=7)

   a) Discuss estimation of Spectral density.

   b) Let $X(t) = A\cos(\omega t) + B\sin(\omega t)$, where ω is constant, A and B are uncorrelated random variables with zero mean (they may have different distributions). Is X(t) Wide Sense Stationary (WSS) ? If the process is not WSS, what additional contributions should be imposed on A and B to make it WSS ?

6. Attempt **any two** :   (8×2=16)

   a) Consider the Markov chain with three states, $S = \{1, 2, 3\}$ that has the following

   transition matrix $P = \begin{bmatrix} 1/2 & 1/4 & 1/4 \\ 1/3 & 0 & 2/3 \\ 1/4 & 1/2 & 0 \end{bmatrix}$.

      i) Draw the state transition diagram for this chain.
      ii) If $P(X_1 = 1) = P(X_1 = 2) = 1/4$, find $P(X_1 = 3, X_2 = 2, X_3 = 1)$.

   b) A dental surgery has two operation rooms. The service times are assumed to be independent, exponentially distributed with mean 15 minutes. Andrew arrives when both operation rooms are empty. Bob arrives 10 minutes later while Andrew is still under medical treatment. Another 20 minutes later Caroline arrives and both Andrew and Bob are still under treatment. No other patient arrives during this 30-minutes interval.
      i) What is the probability that Andrew will be ready before Bob ?
      ii) What is the probability that Caroline will be ready before Andrew ?
      iii) What is the probability that Caroline will be ready before Bob ?

   c) State the properties of power spectral density.

Seat
No.

M.E. (E&TC) (Semester – I) (CBCS) Examination, 2017
Paper – IV : ADVANCED NETWORK SYSTEMS

Day and Date : Tuesday, 16-5-2017　　　　　　　　　　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.

SECTION – I

1. Attempt **any three** : **(5×3=15)**
   a) Explain DHCP client transition diagram.
   b) Write short note on Hierarchical name space.
   c) Explain different types of records in DNS message format.
   d) What is a firewall ? Explain packet filter firewall.

2. Answer the following : **(5×2=10)**
   a) What is RARP ? How it resolves the logical address ? Explain.
   b) Explain the architecture of a firewall.

3. Explain the steps involved in storing a binary file to the server in FTP. **10**

SECTION – II

4. Attempt **any three** : **(5×3=15)**
   a) Explain the TISPAN-NGN overall architecture.
   b) Explain the ReSerVation Protocol (RSVP) architecture.
   c) Explain the label distribution protocol used in MPLS.
   d) Explain the Gigabit Ethernet Architecture.

5. Answer the following : **(5×2=10)**
   a) Explain any five quality of service parameters specified in ATM.
   b) Explain the multiprotocol over ATM architecture.

6. Explain Private Network Node Interface (PNNI) signaling with help of a neat
   timing diagram. **10**

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Seat No.

M.E. (Electronics and Telecommunication) (Semester – I) (CBCS) Examination, 2017
Elective – I : OPTICAL NETWORKS (Paper – V)

Day and Date : Wednesday, 17-5-2017   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. Attempt **any two** :   (5×2=10)

   a) Describe major characteristics of three generation of transport network. Discuss key nodes in a high capacity optical network.

   b) List and explain the different topologies used in optical networks.

   c) Discuss how "loop diversity" can be achieved in SONET/SDH rings.

2. Solve **any one**.   (7×1=7)

   a) Discuss in detail SONET and SDH multiplexing hierarchy. Also explain different transmission formats and speeds of SONET and SDH.

   b) Explain the OTN layered model.

3. Write short note **(any three)** :   (6×3=18)

   a) In-band and Out-band control signaling.

   b) Explain DWDM Tunable laser light source.

   c) Optical Add/Drop multiplexer.

   d) Control plane and data plane.

SECTION – II

4. Solve **any two**.   **(5×2=10)**

   a) Explain the key terms used in optical routers.

   b) Explain the migration to IP optical networking.

   c) What is domain service model and unified service model ?

5. Solve **any one**.   **(7×1=7)**

   a) What are optical switching technologies ?

   b) Explain internet transport network protocol stack.

6. Solve **any three** :   **(6×3=18)**

   a) What is recovery and use of protection path ?

   b) Explain the mapping of MPLS labels to WDM channels.

   c) What are the issues in MPLS/optical interworking ?

   d) Explain the process of IP and lambda forwarding.

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Seat
No.

M.E. (E&TC Engineering) (Semester – I) (CBCS) Examination, 2017
Elective – I : SPEECH AND VIDEO PROCESSING (Paper – V)

Day and Date : Wednesday, 17-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note *:* i) ***All*** *questions* ***compulsory****.*
 ii) ***Neat*** *diagrams must be drawn* ***wherever*** *necessary.*
 iii) *Figures to the* ***right*** *indicate* ***full*** *marks.*
 iv) *Use of electronic pocket calculator is* ***allowed****.*

SECTION – I

1. Attempt **two** questions.

   a) Explain in detail speech production system.   **7**

   b) Explain in detail pitch estimation.   **8**

               OR

   b) Explain the Speech Enhancement Techniques.

2. Attempt **two** questions.

   a) Explain in detail Adaptive Noise Cancellation.   **7**

   b) Explain in detail pitch estimation.   **8**

               OR

   b) Explain speech filtering using Least Mean Square filter.

3. Attempt **one** question.

   a) Explain Baye's rule ?   **5**

               OR

   a) Explain production and classification of speech sounds.

P.T.O.

SECTION – II

4. Attempt **two** questions.

    a) Explain filtering operations on video.   **7**

    b) Explain the multi resolution motion estimation.   **8**

                        OR

    b) Explain block based transform coding.

5. Attempt **two** questions.

    a) Explain in detail global motion estimation.   **7**

    b) Write short note on Linear Predictive Coding (LPC).   **8**

                        OR

    b) Write short note on Applications of Video Coding.

6. Attempt **one** question.   **5**

    a) Write short note on digital video.

                        OR

    b) Explain general methodologies for motion estimation.

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SLR-VC – 78

M.E. (E and TC) (Semester – I) (CBCS) Examination, 2017
(Elective – I)
ADVANCED VLSI DESIGN (Paper – V)

Day and Date : Wednesday, 17-5-2017　　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : I) Q. **1** is **compulsory**.
　　　　　　　　II) Attempt **any four** questions from Q. **2** to Q. **7**.

1. a) Explain DSP application for motion estimation. **5**

   b) Explain the parallel FIR system. **5**

   c) Explain algorithm of computing input co-variance matrix K and output co-variance matrix W. **4**

2. a) Explain correlation algorithm for two discrete sequences. **8**

   b) Explain pipelining for low power consumption. **6**

3. a) For a unscaled second order filter, state variable matrices are

$$A = \begin{bmatrix} 0 & 1 \\ \dfrac{1}{16} & 0 \end{bmatrix} \quad b = \begin{bmatrix} 0 \\ 1 \end{bmatrix} \quad c = \begin{bmatrix} \dfrac{1}{16} \\ \dfrac{1}{2} \end{bmatrix} \quad d = 0$$

   Find state co-variance matrix for scaled and unscaled filter. **8**

   b) Explain round off noise computation in filter. **6**

4. a) Construct a 2×3 convolution algorithm using modified Cook-Toom algorithm with $\beta = 0$, ± 1. **8**

   b) Explain parallel carry save array multiplier for 4×4 bit multiplication. **6**

P.T.O.

5. a) Construct an efficient realization using Winograd algorithm for 2×3 linear convolution. **8**

   b) Draw signal flow graph representation and data broadcast structure of FIR filter given by $y(n) = a\, x(n) + b\, x(n-1) + c\, x(n-2)$. **6**

6. a) Explain architecture of tspc n latch and tspc p latch. **8**

   b) What is signal transition graph ? Explain different terminologies associated with it. **6**

7. a) Give the FPGA implementation of carry completion adder module. **8**

   b) Draw state transition diagram for a static CMOS NAND gate. **6**

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Seat
No.

M.E. (E & TC) (Semester – I) (Old – CGPA) Examination, 2017
ADVANCED LIGHT WAVE COMMUNICATION (Paper – I)

Day and Date : Friday, 12-5-2017　　　　　　　　　　Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

1. Attempt **any two** :　　　　　　　　　　　　　　　　　**(2×5=10)**
   1) Differentiate between single mode and multimode fibers on the basis of normalized frequency V of the fiber.
   2) Explain working principle of LASER. Mention different types of LASERs.
   3) What are the different types of sources of noise in photo detector ?

2. Attempt **any one** :　　　　　　　　　　　　　　　　　**(1×7=7)**
   1) Explain Erbium Doped Filter Amplifier in detail.
   2) How multipath time dispersion is minimized in GRIN fiber ?

3. Write short notes (**any three**) :　　　　　　　　　　　**(3×6=18)**
   1) Intrinsic and extrinsic absorption.
   2) Avalanche Multiplication Noise.
   3) Quantum Efficiency.
   4) Spontaneous Emission and Stimulated emission.

SECTION – II

4. Attempt **any two** :　　　　　　　　　　　　　　　　　**(2×5=10)**
   1) What are Active WDM Devices ? Explain different WDM Devices.
   2) Explain physical principle of PIN photo detector with the help of suitable schematic.
   3) What is cut off wavelength ?

5. Attempt **any one** :　　　　　　　　　　　　　　　　　**(1×7=7)**
   1) Give an estimate of link power budget for point to point optical link.
   2) What are different passive components required in WDM system ? Explain any one in detail.

6. Write short notes (**any three**) :　　　　　　　　　　　**(3×6=18)**
   1) Design considerations for long haul high bandwidth system.
   2) DWDM optical communication system.
   3) Soliton system.
   4) Hybrid and planar waveguide devices.

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Seat
No.

M.E. (E&TC Engineering) (Semester – I) (Old – CGPA) Examination, 2017
Paper – II : LINEAR ALGEBRA & ERROR CONTROL TECHNIQUES

Day and Date : Saturday, 13-5-2017   Max. Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : i) *All questions **compulsory**.*

ii) ***Neat*** *diagrams must be drawn **wherever** necessary.*

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

iv) *Use of electronic pocket calculator is **allowed**.*

SECTION – I

1. Attempt **any two** questions :   **15**

   a) Describe briefly with suitable example linear independent spaces.

   b) Show that S = {(1, 2, 4), (1, 0, 0), (0, 1, 0), (0, 0, 1)} is linear dependent Vector space $V_3(R)$. Where R is the field of real numbers ?

   c) Explain the vector space with suitable example.

2. Attempt **any two** questions :   **15**

   a) Describe briefly matrix algebra and its properties.

   b) Compute AB where $A = \begin{bmatrix} 2 & 1 \\ 1 & -5 \end{bmatrix}$ and $B = \begin{bmatrix} 4 & 3 & 6 \\ 1 & -2 & 3 \end{bmatrix}$.

   c) Explain the inner product spaces with suitable example.

3. Attempt **any one** question :   **5**

   a) Compute u.v and v.u for $u = \begin{bmatrix} 2 \\ -5 \\ -1 \end{bmatrix}$ and $v = \begin{bmatrix} 3 \\ 2 \\ -3 \end{bmatrix}$.

   b) Write short note on orthogonality.

P.T.O.

SECTION – II

4. Attempt **any two** questions : **15**

   a) Explain Linear Block Code.

   b) Explain hamming code with suitable example.

   c) Draw and explain cyclic encoder.

5. Attempt **any two** questions : **15**

   a) Describe briefly BCH Code with suitable example.

   b) Devise a syndrome computation circuit for the single error correcting Reed-Solomon code of length 15 with symbol from GF (2^4).

   c) Explain Binary Convolutional encoder.

6. Attempt **any one** question : **5**

   a) If $u^{(1)} = (1, 0, 1)$ and $u^{(2)} = (1, 1, 0)$ then u = (1, 1, 0, 1, 1, 0) Find v.

   b) Write short note on Reed-Solomon code.

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M.E. (Electronics & Telecommunication Engg.) (Semester – II) (CBCS) Examination, 2017
RF & MICROWAVE CIRCUIT DESIGN (Paper – VI)

Day and Date : Thursday, 18-5-2017   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) Define S-parameters. Explain S-parameters from SPICE analysis.

   b) Derive the expression for current gain and Voltage gain in terms of S parameters for two port network.

   c) Explain stability analysis and limitations of amplifier.

2. Solve **any one** question.   **(7×1=7)**

   a) Explain three different procedures used for the design of unilateral amplifier.

   b) The S parameters for the HP HFET-102 GaAs FET at 2 GHz with a bias voltage of Vgs = 0 are given as follow (Z0 = 50 Ohm) :

   $S_{11} = 0.894 < -60.6, S_{21} = 3.122 < 123.6, S_{12} = 0.020 < 62.4, S22 = 0.781 < -27.6$
   Determine the stability of this transistor using the K – Δ test and the μ test.

3. Attempt **any three** questions.   **(6×3=18)**

   a) Explain a balanced amplifier using 90° hybrid couplers.

   b) Explain single ended diode mixer with neat circuit diagram.

   c) State two design approaches for single balanced mixer. Explain any one in detail.

   d) Derive expression for transducer power gain.

SECTION – II

4. Solve **any two** questions. **(5×2=10)**

   a) Draw oscillator design flowchart and explain in brief.

   b) Explain K – β diagram and wave velocities.

   c) Explain the process of filter design by image parameter method.

5. Solve **any one** questions. **(7×1=7)**

   a) Explain nonlinear active model for oscillator.

   b) List MMIC fabrication Techniques and explain.

6. Attempt **any three** questions. **(6×3=18)**

   a) Write a note on Richards's transformation for filter implementation.

   b) Explain the characteristics of ideal substrate material and ideal conductor material used for the manufacturing of monolithic microwave integrated circuits.

   c) State the image parameters for T and π network of filter design.

   d) Explain kuroda's identity.

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Seat No.

M.E. (Electronics and Telecommunication) (Sem. – II) Examination, 2017
Paper – VII : ADVANCED SIGNAL PROCESSING (CBCS)

Day and Date : Saturday, 20-5-2017   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.

SECTION – I

1. Attempt **any two** :   **15**

    a) Explain in detail steepest descent method and its stability.

    b) Describe briefly least-mean-square adaptive filters.

    c) Write short note on least absolute deviation.

2. Attempt **any two** :   **12**

    a) Explain in detail adaptive system with suitable example.

    b) Explain the features of adaptive filters.

    c) Compare the SDA and LMS algorithms.

3. Attempt **any one** :   **8**

    a) Describe briefly Levinson algorithm.

    b) Write short note on Wiener filter.

SECTION – II

4. Attempt **any two** :   15

   a) Explain in detail adaptive blind equalizer.

   b) Write short note on constant modulus algorithm.

   c) Explain in detail decimation and interpolation with suitable example.

5. Attempt **any two** :   12

   a) Describe as a application linear predictive coding in adaptive filter.

   b) Explain in detail noise cancelation as a application.

   c) Draw and explain multistage and poly phase realization.

6. Attempt **any one** :   8

   a) Describe briefly linear predictive coding as a application in adaptive filter.

   b) Write short note on applications sub band coding.

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Seat No.

M.E. (Electronics and Telecommunication Engg.) (Semester – II) (CBCS) Examination, 2017
WIRELESS COMMUNICATION (Paper – VIII)

Day and Date : Monday, 22-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

Instructions : 1) **All** questions are **compulsory**.
2) *Figures to* **right** *indicate* **full** *marks*.

SECTION – I

1. Solve **any four** : (4×4=16)

   1) Explain basic propagation mechanism in mobile radio propagation.

   2) What are the types of small scale fading ?

   3) Explain indoor propagation model.

   4) Discuss the basic concept of cellular phone in brief.

   5) Write down the significance of CDMA in wireless communication.

2. A) Solve **any two** : (2×6=12)

   1) Explain WSSUS channel modeling in detail.

   2) Discuss the concept of frequency reuse in cellular communication.

   3) State the effects of multipath propagation on CDMA.

   B) Explain impulse response model of a multipath fading channel. **7**

SECTION – II

3. Solve **any four** :   **(4×4=16)**

   1) Describe the cyclic prefix in OFDM.

   2) Explain the MIMO Spatial Multiplexing.

   3) Discuss uniform pulse train of UWB.

   4) Explain Global system for mobile phones.

   5) What is MIMO ? Write down the applications of MIMO.

4. A) Solve **any two** :   **(2×6=12)**

   1) Explain with necessary diagram, operation of OFDM transreceiver.

   2) List the features and applications of UWB.

   3) Write a note on WCDMA and WIMAX.

   B) Explain Bit-Error rate performance of UWB.   **7**

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Seat
No.

M.E. (E and TC) (Semester – II) (CBCS) Examination, 2017
Paper – IX : CRYPTOGRAPHY AND NETWORK SECURITY

Day and Date : Wednesday, 24-5-2017　　　　　　　　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) Explain different security services and mechanisms.

   b) Explain on Rotor machine.

   c) Discuss with example substitution cipher.

2. Attempt **any one** :　　　　　　　　　　　　　　　　**(7×1=7)**

   a) Explain with block diagram public key cryptosystems.

   b) Explain with figure single round of DES algorithm.

3. Attempt **any three** :　　　　　　　　　　　　　　　**(6×3=18)**

   a) Explain D-H key exchange algorithm.

   b) Explain RSA algorithm in detail.

   c) Explain in detail transposition cipher.

   d) Explain public key distribution techniques.

SECTION – II

4. Attempt **any two** :   **(5×2=10)**

   a) Write a note on S/MIME.

   b) Explain digital signature.

   c) Write a note on intrusion.

5. Attempt **any one** :   **(7×1=7)**

   a) Explain architecture of IPSec.

   b) Explain Elgamal digital signature technique.

6. Attempt **any three** :   **(6×3=18)**

   a) Describe working of message authentication code.

   b) Write a note on viruses and related threats.

   c) Describe X.509 certificates.

   d) Describe elements of public-key infrastructure.

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SLR-VC – 85

M.E. (Electronics and Telecommunication) (Semester – II) (CBCS) Examination, 2017
Paper – X : WIRELESS SENSOR NETWORK AND OPTIMIZATION
(Elective – II)

Day and Date : Friday, 26-5-2017   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 generic protocol stack for sensor network.

   b) Draw and explain typical sensor network arrangement.

   c) What is Category 1 and Category 2 WSNs ? Explain with the help of figure.

   d) Draw and explain hardware and software components of the wireless node.

2. a) What is MANET ?   **3**

   b) Draw Bluetooth protocol stack and explain personal area network.   **8**

                        OR

   b) What are the advantages of and challenges in ad-hoc wireless sensor network ? **8**

SECTION – II

3. Solve **any three** :   **(8×3=24)**

   a) Explain Distributed Priority Scheduling (DPS).

   b) Explain Real-Time Medium Access Control (RTMAC) protocol.

   c) Explain Core Extraction Distributed Ad-hoc Routing (CEDAR) protocol.

   d) Explain ZigBee and ZigBee protocol stack.

4. a) State classification of energy management schemes.   **3**

   b) Provide classification of routing protocol.   **8**

                        OR

   b) What is need for energy management in ad-hoc wireless networks ?   **8**

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Seat
No.

M.E. (Electronics and Telecommunication Engg.) (Semester – II) (CBCS) Examination, 2017
Paper – X : WAVELET TRANSFORM AND APPLICATIONS (Elective – II)

Day and Date : Friday, 26-5-2017　　　　　　　　　　　　　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. Attempt **any one** of the following questions :　　　　　　　**(7×1=7)**

   a) Explain construction of MRA with equations of the dilation equation and the wavelet equation.

   b) Discuss about necessary and sufficient condition for orthonormality.

2. Attempt **any two** of the following questions :　　　　　　　**(5×2=10)**

   a) Explain frequency resolution and time resolution in wavelet transform.

   b) Explain the criteria for wavelet selection.

   c) Define CWT. State the necessary conditions.

3. Write a short note on (**any three**) :　　　　　　　　　　　**(6×3=18)**

   a) Admissibility condition wavelet basis functions

   b) Multi resolution analysis

   c) Wavelet basis functions

   d) Biorthogonality and biorthogonal basis for construction of wavelets.

P.T.O.

SECTION – II

4. Attempt **any one** of the following questions :   **(7×1=7)**

   a) Explain image fusion using wavelet transform.

   b) Wireless digital communication system based on DWT.

5. Attempt **any two** of the following questions :   **(5×2=10)**

   a) Write about edge detection using wavelet transform.

   b) Explain video compression using multi resolution technique.

   c) Explain wavelet denoising.

6. Write a short note on (**any three**) :   **(6×3=18)**

   a) Discrete wavelet sub band in face recognition

   b) Audio compression using DWT

   c) Image compression using wavelet transform

   d) Object isolation.

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Seat No.

M.E. (Electronics and Telecomm. Engg.) (Semester – II) (CBCS) Examination, 2017
(Paper – X) (Elective – II) : ADVANCED EMBEDDED SYSTEMS

Day and Date : Friday, 26-5-2017   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 two** :   **(6×2=12)**
   a) Explain ARM 11 architecture in detail.
   b) Explain the ARM state register set of MP11.
   c) Explain the concept of Pipeline stages.

2. Attempt **any two** :   **(6×2=12)**
   a) Explain with block diagram HW/SW design process for embedded system.
   b) Explain operating modes in MP11.
   c) Give the details of exceptions in MP11.

3. Attempt **any two** :   **(6×2=12)**
   a) Explain Register organization in ARM.
   b) Explain the instruction bit pattern of MRC and MCR instructions of CP15 registers.
   c) Explain the virtual memory system.

SECTION – II

4. Attempt **any two** :   **(6×2=12)**
   a) Explain software development process life cycle and its model in detail.
   b) Explain in detail semaphore management in linux.
   c) Explain task states in RTOS. Explain inter task communication and synchronization in μ cos II RTOS.

5. Attempt **any two** :   **(6×2=12)**
   a) Explain Kernel structure in μ cos II RTOS.
   b) Explain memory management and porting in μ Cos-II RTOS.
   c) Explain Linux commands and file manipulations in Linux.

6. Attempt **any two** :   **(5×2=10)**
   a) Draw and explain Raspberry Pi architecture.
   b) Write a program to toggle single LED using Raspberry Pi.
   c) Draw keyboard interfacing with Raspberry Pi.

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Seat No.

M.E. (Electronics and Telecommunication Engg.)
(Semester – II) Examination, 2017
(Old – CGPA)
Elective – II : CRYPTOGRAPHY AND NETWORK SECURITY (Paper – IX)

Day and Date : Thursday, 18-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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** : (5×2=10)

   a) Explain network security model.

   b) Explain confusion and diffusion.

   c) Explain D-H key exchange algorithm and its implementation.

2. Attempt **any one** : (7×1=7)

   a) Illustrate diagrammatically Feistel encryption and decryption algorithm.

   b) Discuss with diagram the principle elements of public key cryptography.

3. Attempt **any three** : (6×3=18)

   a) Explain steganography with example.

   b) Explain principles of Block ciphers.

   c) Explain RSA algorithm.

   d) Discuss Triple DES with example.

SECTION – II

4. Attempt **any two** : (5×2=10)

   a) List the characteristics needed in a secure hash function.

   b) List few approaches to produce message authentication.

   c) Explain three classes of intruders.

P.T.O.

5. Attempt **any one** :   **(7×1=7)**

   a) What are different Web security threads ?

   b) Explain IP security architecture and services.

6. Attempt **any three** :   **(6×3=18)**

   a) Write a note on S/MIME.

   b) Explain birthday attack.

   c) Explain digital signature standard.

   d) Write on malicious software.

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Seat No.

**M.E. (Mech. – CAD/CAM Engg.) (CBCS/CGPA) (Semester – I)
Examination, 2017
Paper – I : ADVANCED MACHINE DESIGN**

Day and Date : Friday, 12-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. For the given stress matrix, determine principal strain and direction of the max. unit strain (ε max)   **13**

$$[\varepsilon \, ij] = P \begin{bmatrix} 1 & 0 & 0 \\ 0 & 0 & -4 \\ 0 & -4 & 3 \end{bmatrix} \text{ where } P = 10^{-4}.$$

2. If the displacement field is given by ux = kxy, uy = kxy, uz = 2k (x + y)z where k is a constant small enough to ensure applicability of the small defamation theory.

   a) Write down the strain matrix.

   b) What is strain in the direction nx = ny = nz = $\frac{1}{\sqrt{3}}$?   **11**

3. a) Explain principal stress and stresses invariants, also derive formula for the same.   **6**

   b) Explain stress-strain relation for isotropic material.   **5**

4. a) Derive the displacement equation of equilibrium. **6**

   b) Compute the Lame's coefficient for the material of elasticity $E = 28 \times 10^6$ kPa and Poissons ratio is 0.3. **5**

SECTION – II

5. A thick cylinder of inner radius 'a' and outer radius 'b' is subjected to an internal P_a and external pressure P_b. Considering plane stress state, derive the relations for radial and tangential stress. **13**

6. a) Explain soderberg and modify good man diagram. **6**

   b) Explain the significance of notch sensitivity in the design. **5**

7. A force F = 45,000 N is necessary to rotate the shaft shown in Fig. at uniform speed. The crank shaft is made of ductile steel whose elastic limit is 207,000 kPa, both in tension and compression. With $E = 207 \times 10^6$ kPa, u = 0.25, determine the diameter of shaft, using octahedral shear stress theory and mass shear stress theory. Use factor of safety is 2. Consider a Pt. on the periphery at section A for analysis. **11**
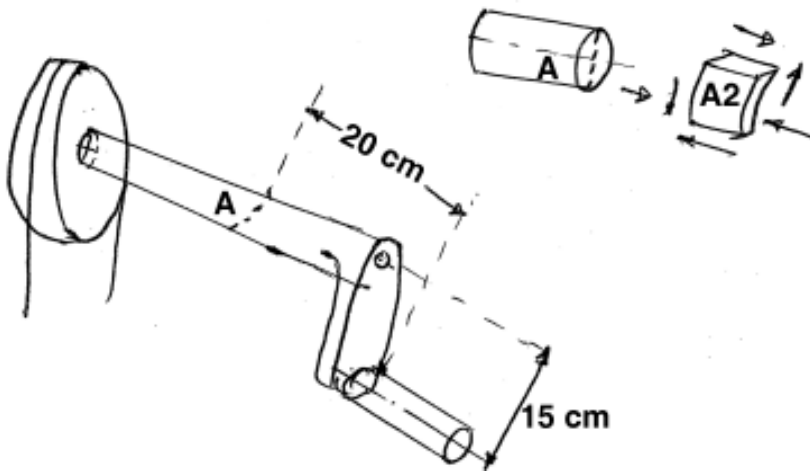
8. A composite is made by inserting material 'B' between two plate of material 'm'. Neglecting friction, if material 'B' is subjected to compressive stresses in X and Y direction, determine the stress in 2 direction and strain in all direction in terms of Poisson ratio u. **11**

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SLR-VC – 98

Seat
No.

M.E. (Mechanical – CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – II : Computer Aided Manufacturing

Day and Date : Saturday, 13-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Q. No. **1** and Q. No. **5** are **compulsory**. Solve **any two** from remaining questions from **each** Section.
　　　　　　　 2) Figures to **right** indicate **full** marks.
　　　　　　　 3) Assume suitable data if required and state **clearly**.

SECTION – I

1. a) Explain drive system of CNC machine tool.   **9**

   b) Explain tool and work holding features of CNC machining center.   **8**

2. a) Explain role of cutting fluid.   **9**

   b) What are the features of software used in coordinate measuring machine ?   **8**

3. a) Which machining parameters are responsible for economics of machining ?   **9**

   b) Explain cutter compensation and tool length compensation.   **8**

4. Write short note on :   **(6×3=18)**

   a) ISO nomenclature of tools.

   b) Cutting tool material.

   c) Effect of heat treatment on machining operations.

P.T.O.

SECTION – II

5. a) Explain working principle of wire cut EDM. **9**

   b) Discuss different types of chip in metal cutting. **8**

6. a) Explain, how will you measure perpendicularity using CMM. **9**

   b) Explain the term 'Design for assembly'. **8**

7. a) Explain process planning with suitable example. **9**

   b) Explain the use of pallets in CNC machining. **8**

8. Write short note on : **(6×3=18)**

   a) Tolerance stacking.

   b) Abrasive water jet machining.

   c) Tool path generation.

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SLR-VC – 99

Seat No.	

M.E. (Mechanical) (CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : FINITE ELEMENT ANALYSIS

Day and Date : Monday, 15-5-2017　　　　　　　　　　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) Write a short note on principal of virtual work.　　　　　　**5**

　b) Explain weighted residual approach applied to finite element analysis.　　**6**

2. a) Explain factors affecting accuracy of finite element analysis.　　**5**

　b) Derive an expression for stiffness matrix for beam element.　　**6**

3. a) Explain HRZ Lumping scheme.　　　　　　　　　　　　**6**

　b) Explain general procedure for finite element analysis.　　　　**6**

4. Write short note on :　　　　　　　　　　　　　　　　　**12**

　a) Hermite polynomials.

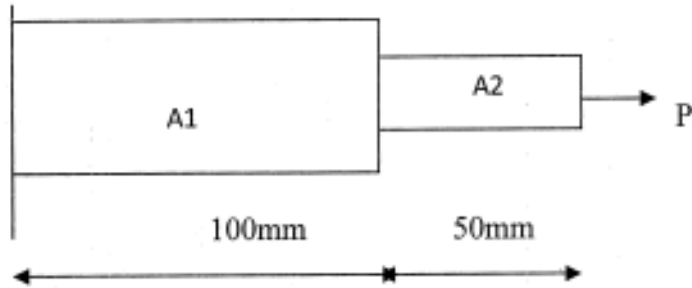　b) Size and number of elements.

SECTION – II

5. a) Write a short note on software used in finite element analysis.　　**5**

　b) Explain Lagrangian shape function.　　　　　　　　　　**6**

6. a) Describe 1-D, 2-D and 3-D elements.　　　　　　　　　　**5**

　b) Explain Local, Global and natural coordinate system.　　　　**6**

7. Solve the complete analysis. **12**

A1 = 100 mm^2, A2 = 50 mm^2, P = 10 KN, E = 200 Gpa

8. Write short note on : **12**

   a) Spectrum analysis.

   b) Formulation of isoparametric elements.

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Seat
No.

M.E. Mechanical (CAD-CAM) (Semester – I) Examination, 2017
(CBCS/CGPA)
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Tuesday, 16-5-2017   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) Explain sponsoring agent's requirements for a research proposal.   **8**

2. a) What is literature review in research ? Explain its importance and methods. **8**

   b) Explain research problem formulation with suitable example.   **9**

3. Write short notes on (**any three**) :   **(3×6=18)**
   1) Field study for research
   2) Selection of samples
   3) Creativity
   4) Process of simulation.

SECTION – II

4. a) Explain concept of robust design with suitable examples.   **9**

   b) What is modelling ? Explain principles of modelling.   **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 note on (**any three**) :   **(3×6=18)**
   1) Formats of report writing.
   2) Parametric and non-parametric tests.
   3) Use of computational tools and software.
   4) Concept of design of experiments.

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SLR-VC – 106

M.E. (Mech. – CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : ADVANCED MATERIALS AND PROCESSING (Paper – V)

Day and Date : Wednesday, 17-5-2017　　　　　　　　　　Max. Marks : 70

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

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

　　　　　　　2) Draw **neat** sketches **whereve**r necessary.

SECTION – I

1. A) Explain the types of plastics with its properties and applications. **6**

　B) Explain the significance of Hardening Process. What are different types of Hardening ? **6**

2. A) What are the structures, properties and applications of engineering polymers ? **6**

　B) Explain in detail any one case study of selection of material with respect to Marine application. **5**

3. A) What is Heat treatment ? Explain the objectives of annealing in detail. **6**

　B) Give the detail classification of engineering materials. **5**

4. Attempt the following questions **(any 3)** : **12**

　a) Explain the different types of stainless steels in brief.

　b) What is precipitation hardening ? Enlist such alloys.

　c) Write a note on advanced structural ceramics.

　d) Explain the applications of Metal Matrix Composites.

　e) Explain the process of squeeze casting.

P.T.O.

SECTION – II

5. A) Explain the principle, process, advantages and disadvantages and surface preparation of Physical Vapor deposition. **6**

   B) Explain the principle, salient features, advantages and disadvantages of Magnetic Abrasive Finishing. **6**

6. Explain **any three** of the following : **12**

   a) Principle of theory of MRR

   b) Wire drawing

   c) Thermal metal spraying

   d) Sheet Metal Processing

   e) Wire EDM.

7. A) What are the different types of data formats used in Rapid Prototyping ? How does digital prototyping differ from virtual prototyping ? **6**

   B) Explain the principle and process of fused deposition modeling. **5**

8. A) Explain the significance of MEMS in detail. **5**

   B) What are the advantages, limitations and applications of non conventional machining processes. **6**

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M.E. Mechanical (CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VII : MANUFACTURING SYSTEM DESIGN

Day and Date : Thursday, 18-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Q. No. **3** and Q. No. **6** is **compulsory**.
  2) Solve **any two** questions from **each** Section.
  3) Figures to **right** indicate **full** marks.
  4) **Assume** suitable data if necessary and mention it **clearly**.

SECTION – I

1. a) Discuss the types of systems in manufacturing environment with suitable examples. **9**

   b) Discuss the decision making criteria for system design and basic approaches for it. **8**

2. a) What is relational decision making process ? Discuss the types of decision making. **9**

   b) Explain the concept of product life cycle and system for planning a new product. **8**

3. Write short notes on (**any three**). **(3×6=18)**

   1) Cost reduction in product design stage

   2) Process planning, process and operation design

   3) Techniques for system optimization

   4) Economic scope in diversification.

SECTION – II

4. a) Explain the various data structures in data base system. Discuss how relational data base can be useful for monitoring the production status on the shop floor. **9**

   b) Discuss the automatic data collection system with its applicability. **8**

5. a) Discuss the following phases of general manufacturing system design.

i) Conceptual modeling of desired manufacturing system.

ii) Analysis of control system

iii) Detailed design. **9**

b) Discuss the various types of simulation models. What is the role of probability in simulation experimentation ? **8**

6. Write short note on (**any three**) **(3×6=18)**

1) Lean Manufacturing

2) Just in time technique

3) Flexible manufacturing system

4) Group technology.

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Seat No.

M.E. Mech. (CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VII : PRODUCT LIFE CYCLE MANAGEMENT

Day and Date: Saturday, 20-5-2017 — Max. Marks: 70
Time: 11.00 a.m. to 2.00 p.m.

Instructions : 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) Define PLM. With the help of a block diagram explain the PLM model.	**7**
	b) Discuss with the help of a block diagram the comparison of PLM with SCM.	**7**
2.	a) Explain the processes of estimation of product manufacturing cost.	**7**
	b) Explain in details the collaborative product development.	**7**
3.	a) Define digital manufacturing. What are its benefits ?	**7**
	b) Enumerate the Taguchi method for design experiments.	**7**
4.	a) What is concurrent engineering and how it is suitable for PLM ?	**7**
	b) What are the noise factors with reference to the Robust design ?	**7**
5.	a) Elaborate upon the advanced data base design for integrated manufacturing.	**7**
	b) What is FMECA ? Discuss its application with suitable example.	**7**
6.	a) What is product model explain the various types of product models ?	**7**
	b) Discuss the barriers to successful implementation of PDM.	**7**
7.	a) Enumerate on the process model and evolution model.	**7**
	b) Discuss the step involved in QFD process.	**7**

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Seat No.

M.E. (Mech.) CAD/CAM Engg. (Sem. – II) Examination, 2017
(CBCS/CGPA)
INDUSTRIAL AUTOMATION AND ROBOTICS (Paper – VIII)

Day and Date : Monday, 22-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Question **4** and question **8** are **compulsory**.
2) Answer **two** questions from **each** Section.
3) Answer to **both** the Sections are to be written in a single answer books.
4) Figures to the **right** indicates **full** marks.
5) Assuming missing data **if** any, suitable and state if **clearly**.
6) Draw and sketches **wherever** necessary.

SECTION – I

1. a) What are reasons for automation ? Explain fixed, flexible and programmable automation. **6**

   b) What is discrete control ? Explain event driven and time driven discrete control with example. State the application area of discrete control in manufacturing and in process industries. **6**

2. a) Derive the expression for line efficiency of a two stage transfer line with storage buffers. **6**

   b) Explain four common application of robots. **6**

3. a) With the help of schematic, sketches, explain the various robot configurations and the types of joints used in each of them. **6**

   b) Explain basic components of an industrial robots. **6**

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

   a) Storage buffers in transfer lines

   b) Criteria for selection of robots

   c) Automated manufacturing system.

P.T.O.

SECTION – II

5. a) With the help of a block diagram, explain the general robot controller structure. Explain briefly the types of robots

   I) Non-servo

   II) Servo

   III) Servo-controlled. **6**

  b) Explain the following dynamic properties of robots stability, control and spatial resolution, accuracy and repeatability. **6**

6. a) Explain the type of motion and path control of robots. **6**

  b) Explain the controlling action of the following type of controllers in robotic control. State their input/output expressions and transfer function. **6**

   i) Proportional

   ii) Integral

   iii) Proportional and integral

   iv) Proportional and derivative

7. a) Explain motion interpolation and its types in robots. **6**

  b) Explain various drives used in robots. **6**

8. Write short notes on : **11**

  a) Tactile sensor

  b) Robotic actuators

  c) Lead through method.

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SLR-VC – 110

M.E. (Mechanical-CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
OPTIMIZATION TECHNIQUES (Paper – IX)

Day and Date : Wednesday, 24-5-2017

Total Marks : 70

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

SECTION – I

1. Solve **any two** : (6×2=12)

   a) Exhaustive Search Method

   b) Dichotomous method

   c) Secant Method.

2. Solve **any two** : (6×2=12)

   a) Pattern Search Method

   b) Conjugate Gradient Method

   c) Davidon-Fletcher-Powell Method.

3. Solve **any two** : 11

   a) Multi-variable optimization techniques

   b) Necessary and Sufficient Conditions

   c) Lagrange Multipliers Method.

SECTION – II

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

   a) Exterior Penalty Method

   b) Interior Penalty Method

5. Write note on Genetic Algorithm and Simulated Annealing. **12**

6. Solve **any two** : **(6×2=12)**

   a) None principles of OPT

   b) Detailed comparison of TOC and Local Optimization Techniques

   c) Five focusing steps of TOC.

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Seat
No.

M.E. (Mechanical) (CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : AUTOMATIC CONTROL ENGINEERING (Elective – II)

Day and Date : Friday, 26-05-2017   Max. Marks : 70
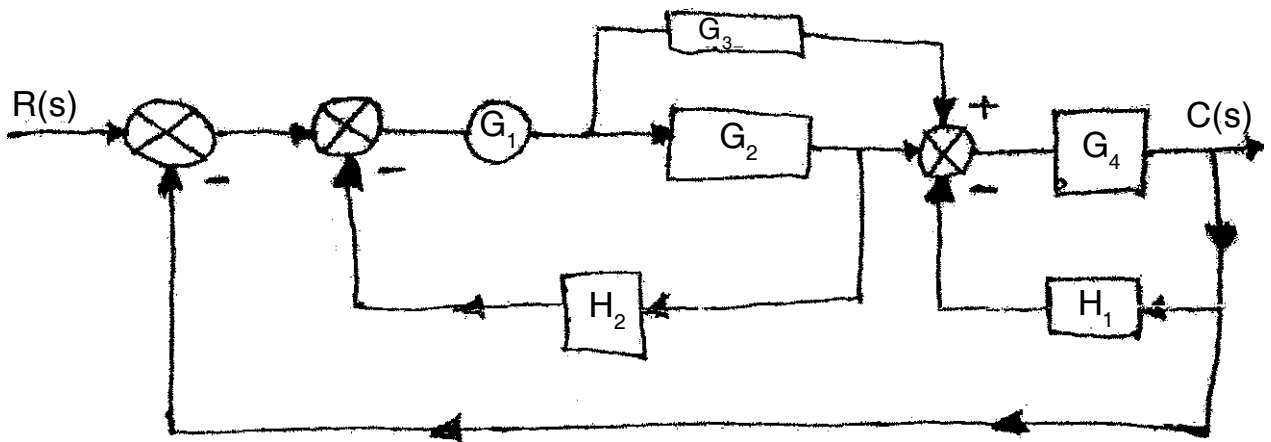
Time : 11.00 a.m. to 2.00 p.m.

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

                2) *Make suitable assumptions if **required**.*

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

SECTION – I

1. a) Reduce the following block diagram to its simple form and hence obtain C(s)/R(s). **7**

    b) Explain the advantages and disadvantages of pnuematic system. **6**

2. a) Explain hydraulic integral controller. **6**

    b) Explain hydraulic servo-motor and draw the block diagram for the same. **6**

P.T.O.

3. Write short note on (**any two**) : **12**

   a) Disturbance in the feedback path.

   b) Thermal system.

   c) Effect of feedback on stability.

   d) Laplace transform properties.

SECTION – II

4. a) What are the advantages of root locus and body plots ? State practical application for the both systems. **6**

   b) Draw the root locus for $G(s) \times H(s) = \dfrac{k(s+4)}{(s+2)(s-1)}$, comment on system stability. **6**

5. a) Explain lag compensation techniques based on frequency response approach. **6**

   b) Comparison between lead, lag and lead lag compensation. **7**

6. Write short notes on (**any two**) : **12**

   a) Adpfire control system.

   b) Bode plot.

   c) Microprocessor based digital control.

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Seat No.

M.E. Mechanical (CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – II : CAD/CAM/CAE PRACTICES IN METAL FORMING
(Paper – X)

Day and Date : Friday, 26-5-2017   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 the **right** indicate **full** marks.*
3) *Assume additional suitable data, if necessary and mention it **clearly**.*

SECTION – I

1. a) What is metal forming ? Explain the significance of friction in metal forming. **9**
   b) Explain effect of temperature and composition in metal casting of ferrous alloys. **8**

2. a) Define plasticity and visco-plasticity. Explain the virtual work rate principle. **9**
   b) What are the different methods of analysis ? Explain the upper bound method. **8**

3. Write short notes on (**any three**) : **(3×6=18)**
   1) Process modelling.
   2) Metal forming operations as a system.
   3) Cold forging and extrusion.
   4) Effective stresses and effective strain.

SECTION – II

4. a) Explain boundary condition and mesh system for steady state asymmetric extrusion analysis. **9**
   b) What is FEM ? Explain assemblage and linear matrix solver. **8**

5. a) Explain the Axi-symmetric punch stretching and deep drawing process. **8**
   b) Discuss the significance of simulation of gating design in metal casting. **9**

6. Write short notes on (**any three**) : **(3×6=18)**
   1) Plate Bending   3) Plastic anisotropy
   2) Shell nosing at room temperature   4) Rezoning

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Seat
No.

M.E. (Mech. Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING (Paper – I)

Day and Date : Friday, 12-5-2017   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 them **clearly**.
4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

1. a) Apply L-O decomposition method to solve

   $3x + 2y + 7z = 4$,
   $2x + 3y + z = 5$,
   $3x + 4y + z = 7$ **10**

   b) A curve passes through the points (0, 18), (1, 10), (3, – 18) and (6, 90). Find
   the slope at x = 2 for the curve.   **8**

2. a) An experiment gave the following values

v (ft/min.) :	350	400	500	600
t (min.) :	61	26	7	2.6

   It is known that v and t are connected by the relation $v = at^b$. Find best
   possible values of a & b.   **7**

   b) The elevation above a datum line of seven points of a road are given below.
   Find the gradient of road at the middle point.   **10**

x :	0	300	600	900	1200	1500	1800
y :	135	149	157	183	201	205	193

3. a) Obtain cubic splines and evaluate y (1.5) and y' (3) for the following values
   of x & y.   **9**

x :	1	2	3	4
y :	1	2	5	11

   b) Explain weighted least square methods.   **8**

P.T.O.

SECTION – II

4. a) Explain types of shape functions. **6**

   b) Explain Gatekin least square method. **6**

   c) Explain modelling of linear differential equation of second order. **5**

5. a) Solve the initial value problem, $\dfrac{dy}{dx} = x - y^2$, $y(0) = 1$ to find $y(0.4)$ by Adam's method. Starting solutions required to obtain using Runge-Kutta 4th order method using step value $n = 0.1$. **10**

   b) Solve $u_t = u_{xn}$ subject to $u(0, t) = 0$, $4(1, t) = 0$ and $u(x, 0) = \sin \pi x$, $0 < x < 1$. **8**

6. a) Solve the elliptical equation, $U_{xx} + U_{yy} = 0$ for the following square mesh. **12**
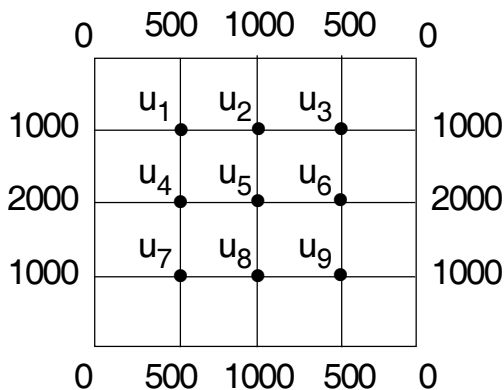

Fig. [Q = 6 (a)]

   b) Given $\dfrac{dy}{dx} = \dfrac{y - x}{y + x}$ with initial condition, $y = 1$ at $x = 0$ find y for $x = 0.1$ by Euler's method. **5**

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Seat
No.

**M.E. (Mechanical Engineering) (Semester – I) (CBCS/CGPA)
Examination, 2017
Paper – II : INDUSTRIAL INSTRUMENTATION**

Day and Date : Saturday, 13-5-2017   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 the **right** indicate **full** marks.
                3) Draw **neat** sketches **wherever** necessary.

SECTION – I

1. a) Explain functional elements of a measurement system.   **6**

   b) What are the different criteria for selection of the instrument ?   **6**

2. a) Explain what is meant by zero order, first order and second order instruments
and derive an expression for output response for second order system for
periodic input harmonic type.   **6**

   b) Explain typical applications of instrument systems.   **5**

3. a) Explain Ionisation and Mechano-Electronic transducer.   **6**

   b) Explain Mechanical and Hydraulic amplifying element.   **5**

4. Write short notes on (**any three**) :   **(3×4=12)**

   i) Filters

   ii) Elastic Force Devices

   iii) Gear Dynamometer

   iv) Strain gauge torque transducer.

SECTION – II

5. a) What are the different types of elastic transducers used for pressure measurement ? Explain LVDT-type pressure transducer. **6**

   b) Explain Ultrasonic flow meters. **6**

6. a) Explain Resistance temperature detectors. **5**

   b) Explain Sound pressure level and Sound power level. **6**

7. a) Explain Wear behavior monitoring. **6**

   b) Explain Dead Weight tester. **5**

8. Write short notes on (**any three**) : **(4×3=12)**

   i) Data acquisition system

   ii) Sound Level meter

   iii) Total radiation pyrometer

   iv) Electret Microphone.

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Seat No.

M.E. (Mechanical) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : SOLID MECHANICS

Day and Date : Monday, 15-5-2017   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 suitable data, **if required**.

SECTION – I

1. a) Explain body forces and surface forces.   **4**

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

2. Investigate what problem of plane stress is solved by the stress function $\phi = \dfrac{a}{6}xy^3 + bxy$ applied to the region included by $y = \pm c$ and $0 \leq x \leq l$ where a and b are constants.   **11**

3. Derive the stresses in rotating disc of uniform thickness having a hole at centre.   **11**

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

    i) Relation between E, μ and G.

    ii) Saint Venant's principle.

    iii) Plane stress and plane strain.

SECTION – II

5. a) Explain in brief importance of shear centre. **4**

   b) Locate the shear centre for outward lipped channel as shown in Fig. 1. The thickness is 5 mm throughout. **7**
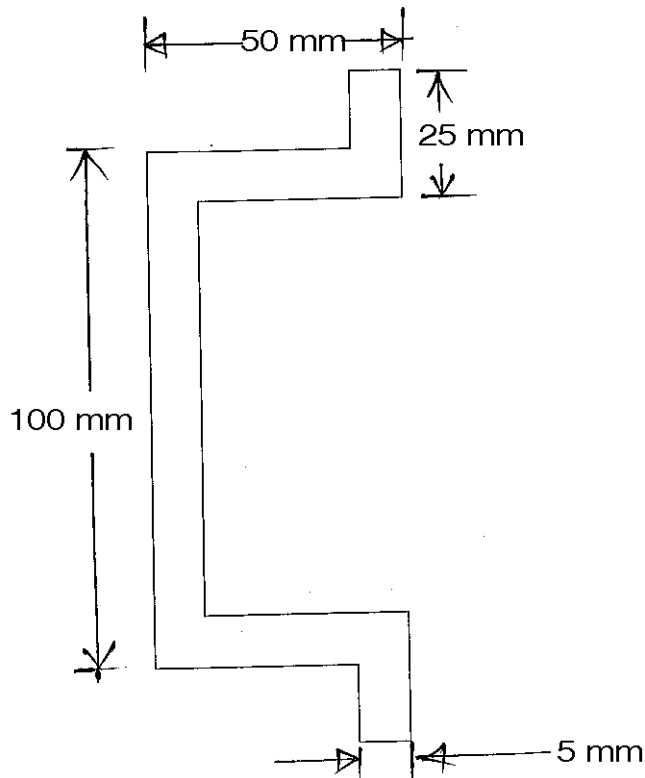

Fig. 1

6. a) Explain membrane stresses with suitable examples. **4**

   b) Derive equation of torsion and angle of twist for elliptical cross section. **7**

7. a) State and explain basic assumptions made in theory of contact stresses. **4**

   b) Derive expression for area of contact and pressure distribution over the contact surface of two spherical rollers subjected to compressive load. **8**

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

   i) Torsion of hollow shafts

   ii) Shell of uniform strength

   iii) Soap film analogy.

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Seat No.

M.E. (Mechanical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Tuesday, 16-5-2017   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) Give various definitions of Research. Enlist the steps in research plan. **6**

   b) What are the different types of research ? **6**

2. a) Explain simulation concept and its types. **6**

   b) What is literature review ? Give its importance. **5**

3. a) What are different guidelines for designing experiments ? **5**

   b) What is a mathematical model ? How such models are classified ? **6**

4. Write a short note on following **(any 3)** : **(3×4=12)**

   a) Field study

   b) Classification of Mathematical modeling.

   c) Nuisance factors for Experimental Modeling.

   d) Taguchi method of parameter design.

   e) Statistical process control.

SECTION – II

5. a) What are various data collection sources ? **5**

   b) What are different types of report ? **6**

6. a) Explain the procedure of writing a research paper. **6**

   b) What factors should be considered while writing synopsis for proposed research work ? **5**

7. a) What do you mean by Appendices ? Explain it with examples. **6**

   b) Give the importance of citation. **6**

8. Write a short note on **any 3** of the following : **(3×4=12)**

   a) Parametric and nonparametric data.

   b) Testing adequacy of model.

   c) Error analysis of result.

   d) Style of writing a report.

   e) Increasing creativity.

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SLR-VC – 124

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

2) Assume suitable data if necessary.

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

SECTION – I

1. A) Discuss Taguchi's loss function concept. **5**

   B) For a system having Weibull failure distribution with a shape parameter of 1.4 and a scale parameter of 550 days, find the following :

   1) R (100 days)

   2) MTTF

   3) The standard deviation

   4) t_{med}

   5) t_{mode}

   6) The design life for a reliability of 0.90. **6**

2. A) Using the existing design, the lives of three AA batteries are 20, 22 and 21 hr an experimental design produces batteries with values of 17, 21 and 25 hr. Which is the better design and how much ? **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 – 0.02t   0 ≤ t ≤ 10 years

Find :

1) Show that the hazard rate function is increasing, indicating continuous wear out over time.

2) Find the MTTF.

3) The median time to failure.

4) Find the mode of the failure distribution.

5) The standard deviation. **6**

3. Write short note (**any three**) : **(4×3=12)**

   1) Exponential Distribution.

   2) Taguchi's approach to parameter design.

   3) Hazard rate function.

   4) Lognormal distribution.

SECTION – II

4. A) What are the main steps used for performing 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 25 hours. A system reliability of 0.95 is required. Find the reliability requirement for the subsystems. **6**

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 per hour.

   Calculate : 1) Reliability of the system for a 50-hour mission.

   2) The system Mean Time To Failure (MTTF). **6**

   B) Explain reliability life testing. **6**

6. Write short note (**any three**) : **(4×3=12)**

   1) Identification as one maintainability design factor.

   2) Decomposition method.

   3) Reliability evaluation methods.

   4) Ideal reliability growth curve.

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Seat No.

M.E. (Mechanical – Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : FINITE ELEMENT METHOD (Paper – V)

Day and Date : Wednesday, 17-5-2017   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**.

SECTION – I

1. a) Explain Lagrangian and Hermite shape function of beam elements.   **6**

   b) Explain in brief consistence and lumped mass formulation.   **6**

2. a) Explain principal of minimum potential energy approach.   **6**

   b) Explain general procedure of finite element method.   **5**

3. a) Find the approximate solution of differential equation and displacement of cantilever beam subjected to uniform axial load using weighted residual method.   **6**

   b) Write a short note on principal of virtual work.   **5**

4. Write short note on :   **12**

   a) Static analysis by direct stiffness method.

   b) Node, element and shape function.

SECTION – II

5. a) Explain plane stress, plan strain and axis symmetric elements.   **6**

   b) Explain finite element analysis of composite material with suitable example.   **5**

6. Explain in detail iterative methods in static and dynamic analysis for finite element solution along with examples. **12**

7. a) Write a short note on software used in finite element analysis. **6**

   b) Explain element conductivity matrix for one dimensional heat flow problem. **5**

8. Write short notes on : **12**

   a) Eigen value analysis.

   b) Transient analysis.

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Seat No.

M.E. (Mechanical-Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
SYNTHESIS AND ANALYSIS OF MECHANISM AND MACHINES
(Elective – I) (Paper – V)

Day and Date : Wednesday, 17-5-2017   Total 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) Discuss kinematic pairs with neat diagrams.   **4**
   b) Determine the Chebyshev spacing for a function $y = x \log_e^x$, for a range $1 < x < 2$ with 4-accuracy points. Also find the corresponding angular position of input and output links of 4-bar function generation, if their total rotations are $45°$ and $90°$ respectively. The initial angular position of input and output link may be assumed.   **8**

2. a) Discuss three position synthesis of four bar mechanism.   **6**
   b) To determine link of four bar mechanism that will one of its position satisfy the following specifications :

   $W_1 = 10$ rad/sec $\alpha_1 = 0$
   $W_2 = 5$ rad/sec $\alpha_2 = 0$
   $W_3 = -0$ rad/sec $\alpha_3 = 86.6$ rad/sec^2

   Comment on the resulting mechanism.   **6**

3. a) Explain cubic of stationary curvature.   **6**
   b) Explain in brief branch and order defects.   **6**

4. Write notes on the following :   **11**
   a) Cups and crunodes
   b) Relative poles of the four bar linkages.

P.T.O.

SECTION – II

5. a) Derive the equation of coupler curves for a four bar linkage by Samuel Robert method. **6**

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

6. a) Explain crank follower synthesis of five accuracy point. **5**

   b) Explain Eulerian rotation transformation and Eulerian angle for spatial mechanism. **6**

7. a) Explain the application of spatial mechanism to robotics with suitable examples. **6**

   b) Explain branch and order detects. **5**

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

   a) Eulerian angles.

   b) Denavit-Harternberg Parameter.

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Seat No.

M.E. (Mechanical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
DESIGN ENGINEERING (Paper – VI)

Day and Date : Thursday, 18-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

1. a) Explain cycloid motion cam with the help of SVAJ diagram. **5**

   b) Synthesize the double dwell 4-5-6-7 polynomial cam for the following data.

   Dwell at zero displacement for 90°

   Rise of 25 mm in 90°

   Dwell at 25 mm for 90°

   Fall of 25 mm for 90°

   Cam velocity is 3π rad/sec

   Plot SVAJ diagrams with peak values. **7**

2. a) Derive the expression for thermal stresses in long hollow cylinder. **6**

   b) Explain fracture mechanics approach in design. **5**

3. a) What are the types of electric motors used as drives ? Discuss factors affecting the selection of electric motors. **6**

   b) What is form design ? Discuss important factors considered in form design. **5**

4. Write short notes on **any three** of the following : **(3×4)**

    i) CEP and CPM cam

    ii) Plastic bending of beams

    iii) Methods of reducing thermal stresses

    iv) Variable speed drives.

P.T.O.

SECTION – II

5. a) Define and explain the following terms used in reliability analysis. **6**

    i) Reliability

    ii) Hazard rate

    iii) MTTF

    iv) MTBF.

  b) According to a constant hazard model, the mean time to failure of certain electronic component is 1200 hours. What is the reliability for similar component to survive for

    i) 300 hours

    ii) 800 hours

    iii) 1500 hours. **6**

6. a) State an equation for beam on elastic foundation and find the solution of this equation for an infinite beam subjected to concentrated load. **6**

  b) What is creep ? Explain the exponential creep law. **5**

7. a) Derive an expression for R(t), f(t) and z(t), with usual notations, in case of Rayleigh distribution. **6**

  b) Explain the discontinuity stresses in cylindrical pressure vessel with flat head. **5**

8. Write short notes on **any three** of the following : **(3×4)**

    i) Reliability of systems

    ii) Form constraint and contiguity constraint

    iii) Cumulative damage in fatigue

    iv) Bath Tub Curve.

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Seat No.

M.E. (Mechanical) (Semester – II) (CBCS/CGPA) Examination, 2017
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Paper – VII)

Day and Date : Saturday, 20-5-2017   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 the **right** indicate **full** marks.
              3) **Assume** suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. a) Explain basic terminology of fiber-reinforced composite material.   **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) Classification and characteristics of composite materials.

   2) Stress-strain relations for anisotropic materials.

   3) Comparison of approaches to stiffness.

   4) Maximum stress theory.

SECTION – II

4. a) Explain classical lamination theory.   **9**

   b) Discuss mechanics of materials approach to strength.   **8**

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) Inter-laminar stresses.

   2) Bending of laminated plates.

   3) Effect of discontinuity in laminates.

   4) Design of composite structures.

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Seat No.

M.E. Mechanical Engineering (Semester – II) (CBCS/CGPA) Examination, 2017
MECHATRONICS SYSTEM DESIGN (Paper – VIII)

Day and Date : Monday, 22-5-2017   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. Write notes on the following :   **14**
   i) Mechatronic system modeling
   ii) Temperature sensors
   iii) Timers in PLC.

3. a) Comment on mechatronic design approach and Traditional design approach using appropriate examples.   **7**

   b) Describe the performance terminology of measurement systems.   **7**

4. a) Describe Signal Conditioning Process and explain Operational Amplifiers. **7**

   b) Write a brief note on Piezo-electric sensors.   **7**

5. Describe, in details, how real time interfacing can be done for stepper motor control system.   **14**

6. Write notes on the following :   **14**
   i) Artificial Intelligence in mechatronics
   ii) Mechatronic on-line quality monitoring system
   iii) Fuzzy control.

7. a) Describe counters in PLC.   **7**
   b) Describe Pin configurations of 8051.   **7**

8. Describe, in details, any one automation application of PLC.   **14**

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Seat
No.

M.E. (Mechanical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
INDUSTRIAL PRODUCT DESIGN (Paper – IX)

Day and Date : Wednesday, 24-5-2017 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 **wherever** necessary.

1. a) Explain innovativeness with reference to products development. **7**

   b) Explain the design and development process of industrial products. **7**

2. a) Discuss the ergonomic aspect of design of instruments. **7**

   b) Explain the process of setting specifications of a product. **7**

3. a) Discuss effect of colour with reference to ergonomics of consumer products. **7**

   b) Explain interpretation of information in product design. **7**

4. a) Explain the aesthetic expressions of contrast and proportion. **7**

   b) Explain mechanics of seeing. **7**

5. a) Explain the concept of design for production. **7**

   b) Explain use of standardization with reference to economic considerations. **7**

6. a) Discuss conceptual (conceptional) design. **7**

   b) Write a note on selection of material with reference to economic
   consideration. **7**

7. a) Write a note on symmetry and balance with reference to aesthetics of a
   product. **7**

   b) Write a note on influence of line and form. **7**

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Seat No.	

M.E. (Mechanical Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II)

Day and Date : Friday, 26-5-2017   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) Explain the principles in the design of material handling system. **6**

   b) Discuss the way to minimise the material handling in a plant. **5**

2. Discuss types, design considerations of various types of industrial trucks used in material handling. **12**

3. Discuss construction, working and below mentioned parameters for

   a) Flat belt conveyors

   b) Gravity type conveyor.

   parameters to be covered – sizes, power requirement, speed, capacity, advantages and limitations. **12**

4. a) Describe advantages and limitations of electric drive and pneumatic drive for hoisting machinery. **6**

   b) Explain the relationship of storage of material with material handling. **5**

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 necessary data :

   a) Hook design

   b) Wire rope

   c) Pulley

   d) Trolley

   e) Wheels and rails.   **12**

6. a) Discuss the concept of system design and economics in material handling.   **6**

   b) Explain bulk material handling design considerations.   **5**

7. a) Describe the relationship between material handling and plant layout.   **6**

   b) Explain the importance of safety in material handling.   **5**

8. Write note on (**any 3**) :   **12**

   a) Stability and structural analysis

   b) Material handling and productivity.

   c) Escalators

   d) Jib crane.

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Seat No.

**M.E. (Mechanical Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
ROBOTICS
(Elective – II) (Paper – X)**

Day and Date : Friday, 26-5-2017   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. Explain inverse kinematics problem. Describe the solution to the inverse kinematics problem with an example.   **14**

2. a) Explain various motion control methods used in robot programming. Which is the best method ? Why ? Explain.   **7**

   b) Give classification of the robot end-effector from the view point of control. Describe cam actuated gripper used for robots.   **7**

3. Describe the pneumatic drives used in the robots. Describe various types of pneumatic drives used in the robots.   **14**

4. a) Describe in details, the textual robot language structure.   **7**

   b) Describe various generations of robots. Elaborate on the work envelope of a cylindrical robot.   **7**

5. Write short notes on the following :   **14**

   a) Inspection robot   b) Spray painting robot

6. a) Explain various types of actuators used for robots. Describe the working of a hydraulic actuator system.   **7**

   b) With the help of sketch explain pitch, yaw and roll motions of a robot wrist.   **7**

7. Explain working principle and applications of :   **14**

   i) Tactile sensors   ii) Range sensors

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M.E. (Mechanical – Manufacturing Process Engg.) (Semester – I) Examination, 2017
(CBCS/CGPA)
Paper – I : ADVANCED MANUFACTURING TECHNIQUES – I

Day and Date : Friday, 12-5-2017   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 the **right** indicate **full** marks.
              3) **Assume** additional suitable data, **if necessary** and mention it **clearly**.

SECTION – I

1. a) What are the applications and special features of ECG ? Explain with neat sketch. **10**
   b) Discuss the MAF in detail. **7**

2. a) Explain in detail Residual stress analysis in Welding. **10**
   b) Explain the Solid Phase welding. **7**

3. Write short notes on **(any three)** : **(3×6=18)**
   1) Under water welding
   2) WJM
   3) Die penetrant non destructive weld testing
   4) Automation of NCMP's.

SECTION – II

4. a) Explain SLS in detail. **10**
   b) Explain importance of Rapid prototyping. **7**

5. a) Explain Plasma Spraying. **9**
   b) Discuss coating of ceramic powders. **8**

6. Write short notes on **(any three)** : **(3×6=18)**
   1) CVD
   2) Fine Blanking
   3) Prevention of erosive wear
   4) Coating tribology.

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Seat No.

M.E. (Mech.-Manufacturing Process Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – II : ELECTRO PHYSICAL PROCESSES

Day and Date : Saturday, 13-5-2017　　　　　　　　　　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 the **right** indicate **full** marks.
　　　　　4) Make suitable assumptions, **if required** and state them **clearly**.

1. Answer the following :
   a) Comparison of modern machining processes as per their process capabilities. **6**
   b) Calculate the machining rate and electrode feed rate when iron is electrochemically machined using Cu electrode and NaCl solution. (r = 7 Ω cm). The power supply data of the ECM machine supplied are :
      Supply Voltage = 20 Volt DC, Tool Work gap = 0.6 mm
      Atomic Weight = 56 gm, Valency = 2, Density = 7.86×10^6 g/m^3. **8**

2. Derive the MRR relation in USM as suggested by COOK. **14**

3. Answer the following :
   a) What are the limitations in non-traditional machining process ? Explain with appropriate example. **6**
   b) Derive theoretical relationship for determination of MRR of an alloy in ECM. **8**

4. Explain EDM process with neat sketch and discuss the effect of :
   a) Charging Resistance
   b) Gap setting
   c) Capacitance on MRR.
   Employing R-C Realization circuit. **14**

5. Write short notes on : **14**
   a) Micro welding by laser application.
   b) Chemistry involved in ECM process.
   c) Effect of voltage on MRR in EDM process.

6. Answer the following :
   a) Describe lasing process and Photon cascade in LASER. **6**
   b) ECDM. **4**
   c) Process capabilities of EBM. **4**

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Seat
No.

M.E. Mechanical (Manufacturing Process Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : COMPUTER AIDED MANUFACTURING

Day and Date : Monday, 15-5-2017   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. a) Explain QFD with suitable example.   **7**

   b) Explain with suitable example, Similarity Coefficient Method.   **7**

2. a) What is process optimization ? Explain.   **7**

   b) Explain various Group Technology layouts.   **7**

3. a) What is process monitoring ? Discuss contact and non-contact inspection techniques used in process monitoring.   **7**

   b) With suitable example explain MRP.   **7**

4. a) Explain Retrieval CAPP system.   **7**

   b) Describe working of re-circulating ball screw and preloading of ball screw.   **7**

5. a) Discuss implementation issues in Concurrent Engineering.   **7**

   b) What are the various elements of FMS ? Explain.   **7**

6. a) What is Group Technology ? Explain parts classification and coding for GT.   **7**

   b) Write a note on Product Data Management System.   **7**

7. a) What are the various flexibilities associated with Flexible Manufacturing Systems ? Explain.   **7**

   b) What is DNC ? What are the advantages of using DNC on the shop floor ?   **7**

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Seat No.

M.E. Mechanical (Mfg. Process Engg.) (Semester – I) Examination, 2017
(CBCS/CGPA)
RELIABILITY AND TEROTECHNOLOGY (Paper – IV)

Day and Date : Tuesday, 16-5-2017   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. a) What is meant by reliability ? And explain how it is different from quality ? 'Availability is more practical and appropriate measure of equipment performance.' Discuss.   **6**

   b) The following data refer to predicted reliability of six components in series. In case the desired reliability of the system is not fall below 75%, find the reliability goal for individual components.   **8**

Components	1	2	3	4	5	6
Predicted Reliability	0.994	0.998	0.990	0.996	0.990	0.980

2. The network shown in the figure 1 indicates the reliabilities of the component. Find out the reliability of the system by using star delta method.   **14**
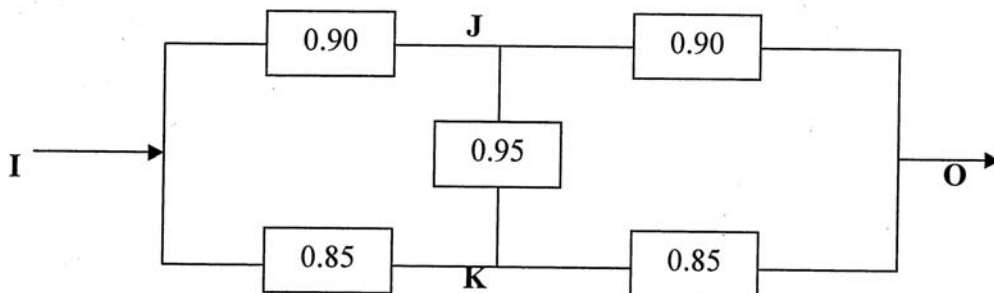
3. a) Discuss the method of allocations of reliabilities of various components of a system using AGREE method. State the assumptions used. **6**

   b) A system consists of three subsystems A, B and C having failure rates 0.005, 0.003 and 0.001 respectively per hour. If the mission time is 20 hours and the system reliability required is 0.95. Find the failure rates as well as reliability of subsystem for the entire mission period. **8**

4. a) Discuss different types of probability distribution curves. **6**

   b) A logical gate diagram for FMEA study has been shown in fig. 2. The basic failure modes of A, B, C and D have failure rates 0.002, 0.003, 0.004 and 0.005 per hour respectively. Find out the failure rate of T_0. Assume mission time of 100 hrs. **8**
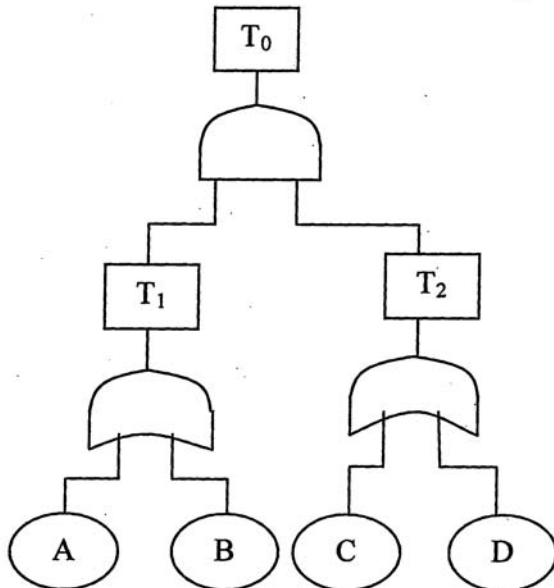
5. a) Explain MTTF MTBF and MTTR. **6**

   b) How Analytical Hierarchy Process (AHP) is used to make the decisions for organization ? **8**

6. Write short notes on the following (**any two**) : **(2×7=14)**

   a) Preventive maintenance Vs condition based maintenance.

   b) Reliability Centered Maintenance (RCM).

   c) What do you mean by Mean Median Mode deviation ?

Seat No.

M.E. (Mechanical) (Mfg. Process Engg.) (Semester – I) (CBCS/CGPA) Examination, 2017
DESIGN FOR MANUFACTURING (Paper – V)
(Elective – I)

Day and Date : Wednesday, 17-5-2017   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 non-programmable 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.

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Seat No.

M.E. Mechanical (Manufacturing Process Engg.) (Sem. – I) (CBCS/CGPA) Examination, 2017
Elective – I : MANAGEMENT OF TECHNOLOGY (Paper – V)

Day and Date : Wednesday, 17-5-2017   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 the process of Technology change.	**14**
2. Explain Technology Life Cycle.	**14**
3. Describe the eleven commandments related to Technology forecasting.	**14**
4. What is High, Low and Medium Technology ? Explain.	**14**
5. Write briefly about innovation management.	**14**
6. Describe the Actor-Network theory related to Technology Management.	**14**

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Seat No.

**M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2017
(CBCS/CGPA)
ADVANCED MANUFACTURING TECHNIQUES – II (Paper – VI)**

Day and Date : Thursday, 18-5-2017   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 the **right** indicate **full** marks.
3) **Assume** additional suitable data, **if necessary** and mention **it clearly**.

SECTION – I

1. a) What are the applications and special features of Shell molding ? Explain with neat sketch. **10**

   b) Discuss the burnishing process in detail. **7**

2. a) Explain super finishing process in detail. **10**

   b) With neat sketches explain Casting Defects, their causes and remedies. **7**

3. Write short notes on (**any three**) : **(3×6=18)**
   1) Continuous casting full mould casting
   2) Full mould casting
   3) Deburring process
   4) Solidification process in casting.

SECTION – II

4. a) Explain Explosive forming. **10**

   b) Explain Magnetic-Forming Process. **7**

5. a) Explain fiber metal process. **9**

   b) Discuss the Transfer moulding process. **8**

6. Write short notes on (**any three**) : **(3×6=18)**
   1) Injection Moulding
   2) Important characteristics and methods of powder production
   3) Solid Phase welding
   4) Hydro forming.

M.E. (Mechanical Manufacturing Process Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VII : ROBOTICS AND ROBOT APPLICATIONS

Day and Date : Saturday, 20-5-2017   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 the **right** indicate **full** marks.
4) Make suitable assumptions, if **required** and state them clearly.

1. What is inverse kinematics problem ? Explain the solution to the inverse kinematics problem with an example.   **14**

2. Write short notes on (**any 3**) :   **14**

   a) Magnetic grippers

   b) Tactile sensor

   c) Spray painting application of robot

   d) Robot application in medical field.

3. Answer the following :

   a) Explain trajectory planning and obstacle avoidance in robots.   **7**

   b) Discuss the textural robot language structure.   **7**

4. Answer the following :

   a) Discuss the origin and various generations of robots. Sketch and explain the work envelope of a cylindrical robot.   **7**

   b) What are the four main types of motion control used in robot programming ? Which provides the best control ? Explain briefly.   **7**

5. Answer the following :

   a) Explain direct kinematic analysis of articulated robot. **8**

   b) Explain Robot centered work cell and In-line robot work cell. **6**

6. Answer the following :

   a) Explain robot vision. Describe vision hardware. **7**

   b) Distinguish between first generation and second generation robot languages. Discuss general instructions used in robot programming. **7**

7. Answer the following :

   a) What are the considerations given by Engel Berger in gripper selection and design ? **7**

   b) Explain construction and working of wrist force-torque sensor used in robots. **7**

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Seat
No.

M.E. Mechanical (Mfg. Process Engineering) (Semester – II) Examination, 2017
(CBCS/CGPA)
Paper – VIII : MANUFACTURING PROCESS MODELLING

Day and Date : Monday, 22-5-2017   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. Discuss different types and principles of models in detail. **14**

2. What is graph theory ? Explain in detail application of graphs in manufacturing. **14**

3. Explain components of generic algorithm in detail. **14**

4. Calculate the Karl Pearson's correlation coefficient for the following data. **14**

X :	28	41	40	38	35	33	40	32	36	43
Y :	23	34	33	34	30	26	28	31	36	38

5. Explain recurrent network and multilayer network in detail. **14**

6. Carry out the closest insertion method for the travelling sales man problem for the complete weighted graph shown below from vertex "a". **14**
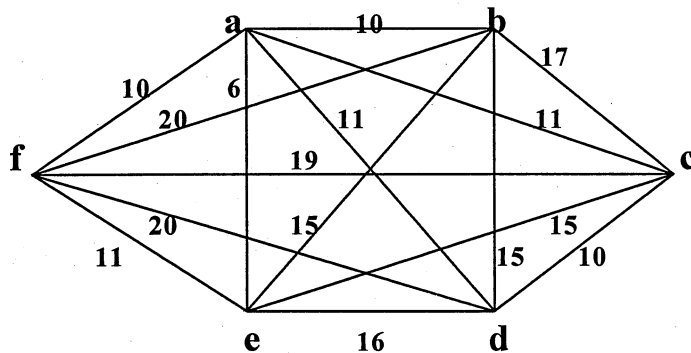
7. Discuss FMS in detail and compare this with other manufacturing systems. **14**

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Seat No.

M.E. Mechanical (Manufacturing Process Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
MACHINE TOOL ENGINEERING   (Paper – IX)

Day and Date : Wednesday, 24-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions :   1) Attempt **any five full** questions.
               2) Assume suitable data **wherever** necessary and state it **clearly**.

1. a) With neat sketch explain about thermodynamic drive of feed unit. **7**

   b) What is stick-slip vibration how to minimize of stick-slip vibration in machine tools ? **7**

2. a) Discuss briefly the economics of metal cutting processes and obtain optimum cutting speed corresponding to maximum tool life. **7**

   b) Explain with neat sketch atleast three different forms of slide and slide ways design in briefly. **7**

3. a) How stepped and stepless drive obtained explain in brief with one example ? **7**

   b) Describe the following : **7**
      a) Torodal ball variators
      b) Epi-Cyclic drive.

4. a) What are various types of guide shapes commonly used in machine tools with their characteristics and uses ? **7**

   b) Make a comprehensive evaluation of the various types of cross sections commonly used in machine tool on the basis of stress and deflection. **7**

5. a) Explain the method of evaluating the stiffness and nature frequency of vibration of a machine tool bed having two-tier cross-section with stiffeners. **7**

   b) Show the circuit diagram for effecting push button control system brief about working of it. **7**

P.T.O.

6. a) With neat sketch of circuit diagram show the functioning of a thermal relay and an electrical braking system. **7**

   b) Explain in brief about differences between structure and ray diagram. **7**

7. Write short notes on (**any two**) :

   a) Tribolugical behaving of various materials and their uses in machine tool design. **7**

   b) Acceptance test in machine tool. **7**

   c) Magne to strictive drive. **7**

   d) FMS. **7**

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SLR-VC – 148

M.E. Mechanical (Mfg. Process Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
TOTAL QUALITY CONTROL (Paper – X)
Elective – II

Day and Date : Friday, 26-5-2017 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 TQM Philosophy by Deming, Juran and Ishikawa. **14**

2. a) Discuss cost of poor quality. **8**

   b) Explain guidelines to establish and cut down quality cost. **6**

3. a) Discuss Quality Control Tools. **8**

   b) Explain quality Circle. **6**

4. a) Write a note on ISO 9000 and ISO 14000. **8**

   b) Discuss in brief six-sigma. **6**

5. Explain Quality function deployment in brief. **14**

6. a) Explain quality assurance. **8**

   b) Discuss Taguchi's recommended design technique. **6**

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SLR-VC – 151

M.E. (Mech. – Mfg. Process Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
COMPUTATIONAL TECHNIQUES (Elective – II) : Paper – X

Day and Date : Friday, 26-5-2017   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) Use of scientific calculator is **allowed**.
4) Assume suitable data if **necessary** and mention it **clearly**.

SECTION – I

1. a) Find the positive root of $x - \cos x = 0$ by bisection method. **9**

   b) Using Runge Kutta method of Fourth order solve $\dfrac{dy}{dx} = \dfrac{y^2 - x^2}{y^2 + x^2}$ given $y(0) = 1$ and at $x = 0.2, 0.4$. **9**

2. a) Using improved Euler method, find y at $x = 0.1$ and y at $x = 0.2$ given

   $\dfrac{dy}{dx} = y - \dfrac{2x}{y}$, $y(0) = 1$. **9**

   b) By dividing the range into ten equal parts, solve $\int_{0}^{\pi} \sin x \, dx$ by trapezoidal and Simpson's rule. **8**

3. a) Using gauss elimination method, solve
      $3.15\,x - 1.96\,y + 3.85\,z = 12.95$
      $2.13\,x + 5.12\,y - 2.89\,z = -8.61$
      $5.92\,x + 3.05\,y + 2.15\,z = 6.88$. **9**

   b) Explain multiple regression and its applications. **8**

P.T.O.

SECTION – II

4. a) Explain general reflection through arbitrary line by suitable diagram. **9**

   b) Explain orthographic projection. **8**

5. a) Explain β-splive curve. **8**

   b) Explain coong bi-cubic surface. **9**

6. Write short note on : **18**
   1) Parametric representation of ellipse.
   2) Bezier curve
   3) Sweep surface.

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Seat No.	

M.E. (Mech./Thermal Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – I : ADVANCED FLUID MECHANICS AND CFD

Day and Date : Friday, 12-5-2017 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 non-programmable calculator is **allowed**.

SECTION – I

1. a) What power is required per kilometre of a line to overcome the viscous resistance to the flow of glycerine through a horizontal pipe of diameter 100 mm at the rate of 10 liters/sec. ? Take μ = 8 poise and kinematic viscosity = 6 stokes. **8**

   b) Derive an expression for Von-Karman momentum integral equation. **9**

2. a) For the velocity profile in laminar boundary layer as, $\dfrac{u}{U} = \dfrac{3}{2}\left(\dfrac{y}{\delta}\right) - \left(\dfrac{1}{2}\right)\left(\dfrac{y}{\delta}\right)^3$

   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 1.4 m wide and is placed in water which is moving with a velocity of 200 mm per second. Find the total darg force on the plate if μ for water = 0.01 poise. **9**

   b) Determine the displacement thickness and momentum thickness in terms of boundary layer thickness for the given velocity profile. $u/U = 2(y/\delta) - (y/\delta)^2$, u is the velocity at a hight y above the surface and U is the free-stream velocity. **9**

P.T.O.

SLR-VC – 152

3. Write note on the following : **18**

   a) Turbulent flow through pipes.

   b) Hydrodynamic theory of lubrication.

   c) Prandtl's mixing length theory.

SECTION – II

4. a) What is computational fluid dynamics ? Explain how it can be used as a research tool ? **8**

   b) Air flows isentropically around a submerged object. At section 1 in the approaching stream the pressure $P_1 = 101.043$ KN/M^2, the density $\rho_1 = 1.226$ kg/m^3 and the velocity $V_1 = 135$ m/s. At point 2 near the object, the pressure P_2 is to be 39.24 KN/M^2. Calculate the temperature ratio between these two points and the Mach number at each point. Take $\gamma = 1.4$ and R = 287 J/Kg K. **9**

5. a) Explain the normal shock with the help of Fanno and Rayleigh curve. **9**

   b) Explain the Maccormackl's techniques with its advantages and disadvantages. **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**

Seat No.

M.E. (Mechanical) Thermal Engineering (Semester – I) (CBCS/CGPA) Examination, 2017
MEASUREMENT IN THERMAL SYSTEMS (Paper – II)

Day and Date : Saturday, 13-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. : 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) Following values were obtained from the measurements of the value of a resistor :

   147.2, 147.4, 147.9, 148.1, 147.1, 147.5, 147.6, 147.4, 147.6, 147.5. Calculate arithmetic mean, average deviation, treating the data as a finite.   **6**

   b) What is propagation of error ? Find the propagated error in heat transfer coefficient if small error in temp; area and heat transfer occurs.   **6**

   c) From the following data, obtain predicted cop as a function of experimental cop. Assume linear relation for least squares.

Predicted cop	1.2	2.0	2.4	3.5	3.5
Exp. cop	1	1.6	3.4	4.0	5.2

   6

2. a) How temperature measuring devices are calibrated ?   **7**
   b) Explain principle of working of radiation pyrometer.   **6**
   c) Explain with neat sketch Seeback and Peltier effect related to thermocouple.   **4**

3. a) A pitot tube is to be used to measure the speed of an aeroplane. The pressure differential is measured by a U tube manometer using water. The density of air is 1.22 kg/m^3. If the reading of the manometer is 80 mm of water and the velocity correction factor is 0.98. Calculate the velocity of the aeroplane. Assume air is incompressible.   **8**

   b) How flow rate is measured with the help of rotameter ? Explain with sketch and derive the relation required.   **10**

SECTION – II

4. a) A Mcleod guage is available with bulb and measuring capillary volume of 150×10^6 mm^3 and a capillary diameter of 0.3 mm. Calculate a guage reading for a pressure of 30 μm. **7**

   b) Thermal conductivity guage to measure low pressure. **5**

   c) Draw neat sketch to measure air velocity with the help of pitot tube and suggest a suitable manometric fluid. **5**

5. a) Draw a neat sketch to measure heat transfer coefficient of the working fluids. **10**

   b) Why calibration is essential before installing the measuring devices ? How newly purchased differential digital manometer is to be calibrated ? **7**

6. Write a short note on : **(6×3=18)**

   i) Shadow graph

   ii) Measurement of turbulence

   iii) Gas chromatography.

Seat No.

M.E. Mechanical (Thermal Engineering) (Semester – I) Examination, 2017
Paper – III : ADVANCED HEAT AND MASS TRANSFER (CBCS/CGPA)

Day and Date : Monday, 15-5-2017   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) A 2 mm wire with 0.8 mm thick layer of insulation (k = 0.15 W/m°C) is used in a certain electric heating application. The insulated surface is exposed to atmosphere with convective heat transfer co-efficient 40 W/m^2°C. What percentage change in heat transfer rate would occur if critical thickness of insulation is used ? It may be assumed that temperature difference between surface of the wire and surrounding air remains unchanged. **9**

   b) Explain Lumped heat capacity method in detail. **4**

   c) Write note on thermal contact resistance. **4**

2. a) A 10 cm diameter apple, approximately spherical in shape, is taken from a 20°C environment and placed in a refrigerator where temperature is 5°C and average convective heat transfer co-efficient over the surface of apple is 6 W/m^2°C. Calculate the temperature at the center of the apple after a period of 1 hour. Thermo-physical properties of apple are : ρ = 998 kg/m^3, c = 4180 J/kgK and k = 0.6 W/mK. **9**

   b) Derive differential equation of heat conduction in Cartesian. **9**

3. Write notes on :

   a) Reynolds analogy. **5**

   b) Navier stokes equation. **6**

   c) Physical significance of Reynold number and Grashof number. **6**

P.T.O.

SECTION – II

4. a) Explain :

   i) Solar radiation

   ii) Gas radiation. **6**

   b) Explain the theory of thermal radiation by using electromagnetic spectrum. **6**

   c) Explain the effect of radiation on temperature measurement. **6**

5. a) Explain the heat pipe in detail, also write principle application of heat pipe. **8**

   b) A steam condenser is transferring 250 kW of thermal energy at a condensing temperature of 65°C. The cooling water enters the condenser at 20°C with flow rate of 7500 kg/hr. Calculate the log mean temperature difference. If overall heat transfer coefficient for the condenser surface is 1250 W/m²°C, what surface area is required to handle this load ? **9**

6. Write short note on :

   a) Drop condensation promoters. **4**

   b) Pool boiling and forced boiling. **4**

   c) Analogy of heat transfer and mass transfer. **4**

   d) Flow pattern in natural convection. **5**

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Seat No.

M.E. (Mechanical) Thermal Engineering (Semester – I) (CBCS/CGPA) Examination, 2017
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Tuesday, 16-5-2017   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 **statistical table** and **scientific calculator** permitted.
3) **Assume** suitable data, if necessary.
4) **Draw** neat sketches, flow diagram **whenever** required.
5) **Use** of non-programmable calculator is **allowed**.
6) Figures to the **right** indicate **full** marks.

SECTION – I

1. a) Define research and describe general characteristics of research. **8**

   b) Discuss how data is processed and analysed. **9**

2. a) What are objectives and functions of modelling ? **8**

   b) List the different types of graphs used in research. **9**

3. a) What is hypothesis testing ? Explain how statements of hypothesis is made. **8**

   b) Two factories are considered for starting salary comparison. Factory 1 reported that the mean starting salary is Rs. 38,000 with a standard deviation of Rs. 6,000 for a sample of 40 employees. Factory 2 reported mean starting salary of a employee is Rs. 35,000 with a standard deviation of Rs. 7,000 for a sample of 35 employees. At the .01 significance level can you conclude the mean salary of factory 1 is more than 2 ? Draw distribution indicate significance and test statistics. **10**

P.T.O.

SECTION – II

4. a) What is surface response methodology ? Explain response surface with contour plot. **7**

   b) The parts were made on machine, 10 samples were measured result is listed in table below : **10**

   25.21 25.48 25.92 24.67 25.26 25 20 24.82 25.45 24.37 24.60

   Required specification for the part is 25 mm with lower limit 24 mm and upper is 26.5 mm find the defective %. (Consider $\pm$ 3 Std. dev.) Draw the distribution showing rejected area.

5. a) Table represents some experimental results conducted for different combinations of levels of A and B. A is having two levels Low (–) and High (+) (Low 15 units and 75 units) B is also having two levels Low and High (20 Units and 120 units). Determine main effects and interaction effect. Establish regression in coded value. Represent the effects in graphically. Comment on interaction effect. **10**

A	B	Y
L	L	40
H	L	80
L	H	60
H	H	104

   b) Explain the following for the DOE : **7**
   i) Randomization
   ii) Blocking
   iii) Replication.

6. Write short note on : **18**
   a) Types of report
   b) Creativity and madness
   c) Dependent and Independent variables.

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Seat No.

M.E. Mechanical (Thermal Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : ADVANCED THERMODYNAMICS (Paper – V)

Day and Date : Wednesday, 17-5-2017   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) What is isothermal and adiabatic compressibility ? With usual notation prove following relation $Cp - Cv = \dfrac{Tv.\beta^2}{Kt}$.   **6**

    b) Write note on Joule Thomson co-efficient.   **6**

    c) Write note on Clapeyron equation.   **6**

2. a) Prove that whenever a system executes a complete cyclic process, the $\oint \dfrac{\delta Q}{T}$ is less than zero or in the limit is equal to zero. Hence prove that entropy is property of system.   **6**

    b) An electric current of 10 A is maintained for 1 second in a resistor of $25\,\Omega$, while the temperature of resistor is maintained at 27°C, surrounding temperature is 27°C and change in internal energy of resistor is given by $\Delta u = C_v \Delta T$ for this
      a) what is $(\Delta S)_{resistor}$?
      b) what is $(\Delta S)u_{niverse}$?   **6**

    c) With the help of entropy concept, prove that heat transfer through finite temperature difference is irreversible process.   **5**

3. a) A mixture of ideal gas consists of 3 Kg of N_2 and 5 Kg of CO_2 at a pressure of 300 Kpa and a temperature 20°C, find :
   a) Mole fraction of each constituents
   b) Equivalent molecular weight of mixture
   c) Equivalent gas constant of mixture
   d) Partial pressure and partial volume
   e) Volume and density of mixture
   f) C_p and C_v of mixture.

   Take γ for CO_2 and N_2 to be 1.286 and 1.4 respectively. **7**

   b) Write note on Vander wall's equation. **6**

   c) Write note on equation of state of real gases. **5**

SECTION – II

4. a) What is adiabatic flame temperature and explain how it can be derived ? State its importance in combustion. **8**

   b) The products of combustion of an unknown hydrocarbon C_xH_y have following composition as measured by an Orsat apparatus.

   $CO_2 = 8\%$, $CO = 0.9\%$, $O_2 = 8.8\%$, $N_2 = 83.3\%$

   Determine :
   a) Composition of fuel
   b) A:F ratio
   c) Percentage of excess air used. **9**

5. a) Explain the term heat of reaction, heating value of formation. **6**

   b) Write note on Fugicity and activity. **6**

   c) What is exergy and anergy ? Explain in detail. **6**

6. Write short note on :

   a) Fluctuation hypothesis. **6**

   b) Statistical thermodynamics. **5**

   c) Importance of quantum effect. **6**

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M.E. (Mechanical-Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Thursday, 18-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) *Question no.* ***1*** *is* ***compulsory***.

      2) *Solve* ***any one*** *question out of question no.* ***2*** *and* ***3***.

      3) *Solve* ***any two*** *questions out of question no.* ***4, 5*** *and* ***6***.

      4) *Assume suitable data* ***wherever*** *necessary.*

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

      6) *Figures to the* ***right*** *indicates* ***full*** *marks.*

SECTION – I

1. Design a workable system to store 500 tons of Potato. Assume   **18**

   1) Initial temp. of potato is 30°C and storage temperature is 0°C.

   2) Use 100 mm PUF insulation with 1 mm GI laminates on both sides.

   3) Assume PUF and GI thermal conductivity is 0.026 and 115 W/mk respectively.

   4) Humidity to be maintained in the room is 95%.

   5) Space available for the storage is 15 m × 15 m. You can select any suitable height with justification.

   6) Pre cooling is not necessary.

   7) Specific heat of potato is 3.00 kJ/kgK.

   8) Both side heat transfer coefficient is 10 W/m^{2}K.

P.T.O.

2. a) Derive the relation for outlet temperature of counter flow heat exchanger in terms of VA value. **6**

   b) In a processing plant a material must be heated from 20 – 80°C in order for the desired reaction to proceed, whereupon the material is to be cooled in regenerative heat exchanger shown in figure. The specific heat of the material before and after the reaction is 3.0 kJ/kgK. If the VA of this counter flow heat exchanger is 2.1 kW/K and the flow rate is 1.2 kg/sec. What is the temperature 't' leaving the heat exchanger ? **11**
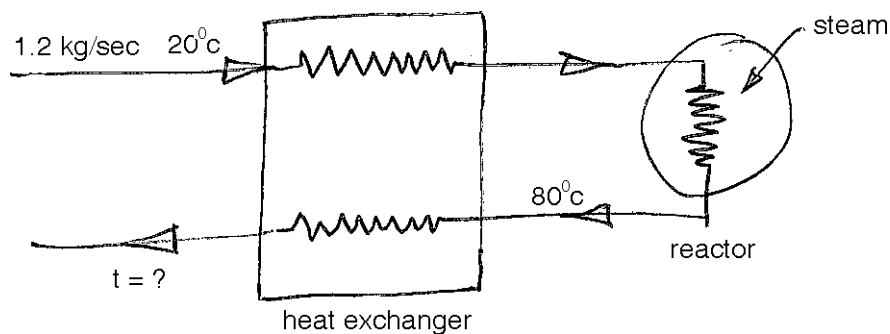
3. a) Using multiple equation Newton-Raphson method solve the following with trial value of SP = 200 Pa and Q = 10 m^3/sec.

   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 = airflow rate, m^3/sec. **10**

   b) Consider any suitable system from thermal engineering and simulate the same using successive substitution method. **7**

SECTION – II

4. a) Compute the constants in the equation $y = a_0 + a_1 x + a_2 x^2$ to provide a best fit in the sense of least squares for the following (x, y) points : (1, 9.8), (3, 13.0), (6, 9.1), (8, 0.6) **8**

   b) Consider mercury filled thermometer used for measurement of temperature. Model it and find out time constant and draw block diagram indicating transfer function. **9**

5. a) The power distribution system shown in figure has a source voltage of 220 V at point 1 and must supply power to positions 3 and 4 at 210 and 215 V, respectively with a current of 200 and 300 A respectively. The electrical resistance RΩ is a function of area and length of the conductor.
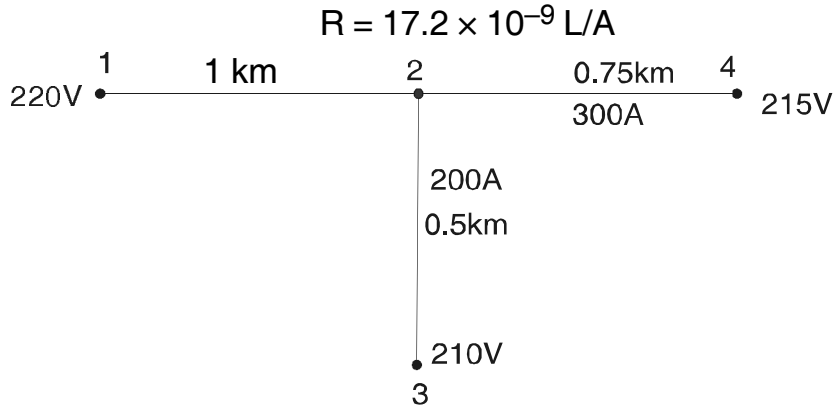
$$R = 17.2 \times 10^{-9} \, L/A$$ **12**

a) Set up the objective function for the total volume of the conductor and the constraints in terms of A_{1-2}, A_{2-4}, A_{2-3}.

b) Verify, using all the Lagranges multiplier equations that $A_{1-2} = 0.00273 m^2$.

b) Explain with one example Steepest-Ascent search method of optimization with one example. **6**

6. a) A pipeline of minimum cost is to be laid between station A to E. Using dynamic programming approach find shortest and longest pipeline path. **12**
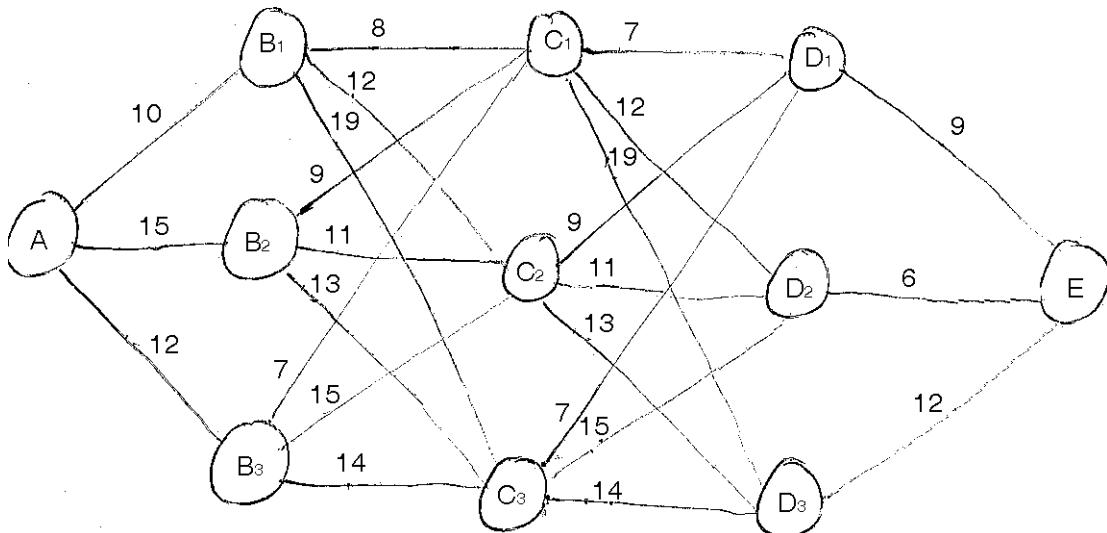
b) Explain linear programming method of optimization. **5**

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Seat No.

M.E. (Mech./Thermal Engineering) (Semester – II) Examination, 2017
(CBCS/CGPA Pattern)
Paper – VII : COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING

Day and Date : Saturday, 20-5-2017 　　　　　　　　　　　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) Using Regula-falsi method, compute the real root of the equation

   $3X + \sin X = e^X$ correct to three decimal places. 　　　　　　　**9**

   b) Write algorithm for Newton-Raphson method and explain the same method

   for finding solution of nonlinear equation. 　　　　　　　　　　　　**8**

2. a) Explain iterative methods in solving linear algebraic equation. 　　　**8**

   b) A rocket is launched from the ground. Its acceleration is registered during the

   first 80 seconds and is given in the table below. Using Simpson's $1/3^{rd}$

   rule, find the velocity of rocket at t = 80 seconds. 　　　　　　　　　**9**

t(sec)	0	10	20	30	40	50	60	70	80
f(cm/sec²)	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

3. a) Using Eulers method, solve for y at x = 0.1 from $\dfrac{dy}{dx} = x + y + xy$, $y(0) = 1$

   taking step size h = 0.025. 　　　　　　　　　　　　　　　　　　　**8**

P.T.O.

b) The result of measurement of electric resistance R of a copper bar at various temperatures t°C are listed below.   **10**

t	19	25	30	36	40	45	50
R	76	77	79	80	82	83	85

Find relation R = a + bt when a and b are constants to be determined by you.

SECTION – II

4. a) The population of a certain term is given below. Find the rate of growth of the population in 1931 and 1971.   **9**

Year(x)	1931	1941	1951	1961	1971
Population in thousand (y)	40.62	60.80	79.95	103.56	132.65

b) Explain backward difference along with table.   **8**

5. a) Explain Finite difference techniques in 2D heat conduction problem.   **8**

b) Apply the finite difference method to a plate of 3cm × 3cm. Find temperature at a distance of 1 cm from corner in x direction and 1 cm from a corner in y direction.   **9**

6. Write short notes on **any three** of the following :   **18**

a) Elements in F.E. analysis.

b) Displacement function, element stiffness and load matrices.

c) Difference between FDM and FEM.

d) Shape function.

Seat No.	

M.E. Mechanical (Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : THEORY AND DESIGN OF I.C. ENGINE

Day and Date : Monday, 22-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Answer **any two** question 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) The following data is given for the cap and bolts of the big end of the connecting rod :
   Engine speed = 1500 rpm
   Length of connecting rod = 320 mm
   Length of stroke = 140 mm
   Mass of reciprocating parts = 1.75 kg
   Length of crank pin = 54 mm
   Diameter of crank pin = 38 mm
   Permissible tensile stress for bolts = 120 N/mm^2

   Calculate the nominal diameter of bolts and thickness of cap for the big ends. **9**

2. a) Explain in detail various effects of knocking in IC 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**

3. a) Explain principle of combustion chamber design in CI engine.　　　　　**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 ration = 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 = 10 N/mm^2

   The torque on the crank is maximum when the crank turns through 25° from the top dead center and this position the gas pressure inside the cylinder is 2 MPa. 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.　　　　　**9**

SECTION – II

4. a) Explain recent advances in I.C. Engine for improving efficiency of I C Engine. **8**

   b) Design exhaust valve for a horizontal diesel engine 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**

5. a) List various recent advances in pollution control and explain catalytic converter with figure. **8**

   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 of crank pin bearing = 10 MPa, **9**

6. a) Explain need of lubrication system in IC Engine. Discuss various important properties of lubricating oil. **9**

   b) What is importance of balancing in I.C. Engine ? Explain in detail. **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 (v_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

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Seat No.

M.E. (Mech. – Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – IX : DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM

Day and Date : Wednesday, 24-5-2017   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 cascade refrigeration system is required to meet a load of 100 TR at – 60°C evaporator temperature. If uses R-22 refrigerant for low temperature system having cascade temperature of – 10°C. NH_3 is used for High temperature refrigeration condenser temperature of 40°C and cascade evaporator temperature of – 20°C. Assume that refrigerants become dry-saturated vapour at entry to their respective compressors and liquid refrigerants are not subcooled Find.

    i) Mass flow rate of refrigerants R – 22 and R – 717

    ii) Total Compressor power

    iii) COP of Cascade system.   **12**

   b) Explain centrifugal compressor.   **6**

2. a) The readings from a sling psychrometer are as follows DBT = 30°C, WBT = 20°C, Barometric reading = 740 mm of Hg, Determine

    1) Dew point temperature

    2) Relative humidity

    3) Specific humidity

    4) Degree of saturation

    5) Vapour density

    6) Enthalpy of mixture per kg of dry air.   **9**

   b) Explain mass transfer by molecular diffusion and convection.   **8**

                                                                        P.T.O.

3. Write note on the following :

   a) Applications of air conditioning. **6**

   b) Evaporative condenser. **6**

   c) Comfort scales. **5**

SECTION – II

4. a) Explain Electrolux refrigeration system. **8**

   b) Explain in detail methods of duct design. **9**

5. a) A building has the following calculated cooling roads,

   RSH = 310 kW, RLH = 100 kW, The space is maintained at the following conditions.

   Room DBT = 25°C, Room RH = 50%, Outdoor air is at 28°C and 50% RH and 10% by mass of air supplied to the building is outdoor air. If the air supplied to the space is not to be at a temperature lower than 18°C. Find

   i) Minimum amount of air supplied to space in M^3/S

   ii) Capacity of cooling air

   iii) BPF. **12**

   b) Explain Enthalpy – Concentration diagram for binary mixture. **6**

6. a) Design of cooling and dehumidifying coils. **9**

   b) Explain solar space heating and cooling system. **8**

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M.E. (Mech./Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : POWER PLANT ENGINEERING (Elective – II)

Day and Date : Friday, 26-5-2017   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 non-programmable calculator is **allowed**.

SECTION – I

1. a) A simple Rankine cycle works between pressure 28 bar and 0.06 bar initial condition of steam being dry saturated. Calculate the cycle efficiency, work ratio and specific steam consumption.   **8**

   b) Explain unit pulverized system and bin pulverized system with neat sketch.   **6**

   c) Draw and explain layout of modern steam power plant.   **4**

2. a) A Kaplan turbine is to be designed develop 9100 kW. The net available head is 5.6 m. if speed ration is 2.09, flow ration is 0.68, overall efficiency 86% and diameter of boss is $1/3^{rd}$ times the diameter of runner find the diameter of runner its speed and specific speed of turbine.   **8**

   b) Draw layout of diesel engine power plant and explain essential components of diesel power plant.   **5**

   c) Describe different safety protections provided in nuclear power plant.   **4**

3. a) Explain working of pumped storage hydro-electric power plant with neat sketch. **6**

   b) Explain mechanical dust collection system also explain working of electrostatic precipitator.   **6**

   c) What are different types of nuclear fuels ?   **5**

P.T.O.

SECTION – II

4. a) Why it is necessary to operate hydro and steam power plant in combination ?
      Write in detail. **8**

   b) Write a short note on economics of load sharing. **4**

   c) Explain electromagnetic transducer with neat sketch. **6**

5. a) Find the cost of generation/Kwh from the following data :

      Capital cost = 1200/Kw installed

      Interest and depreciation cost is = 10% of capital

      Fuel consumption = 1.2 Kg/Kwhr

      Fuel cost = Rs. 400/Ton

      Salary and maintenance = Rs. 6,00,000/year

      Max demand is 80 MW and load factor is 40%

      Capacity of plant is 120 MW. **7**

   b) Write a short note on pollution due to nuclear power station and its control. **6**

   c) Write a short on radioactive pollution. **4**

6. a) Write a short note on general tariff system and explain Hopkinson demand
      rate. **6**

   b) Write a short note on gaseous emission. **5**

   c) Write a short note on pollution due to nuclear power station and its control. **6**

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Seat
No.

**M.E. (E & TC) (Digital Electronics and Communication System) (Semester – I)
(CBCS) Examination, 2017
RESEARCH METHODOLOGY (Paper – I)**

Day and Date : Friday, 12-5-2017   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 the **right** indicates **full** marks.
      3) **Assume** suitable data it **necessary**.
      4) **Use** of nonprogrammable **calculator** is allowed.

SECTION – I

1. a) What is research ? What are different types of research ?   **8**

   b) Explain criteria required to satisfy good scientific research.   **9**

2. a) What is need of literature review ? Explain the method carry out literature review.   **8**

   b) What is theory ? Explain role of theory with example.   **9**

3. a) What is need of Mathematical modelling ? Explain steps of modelling.   **9**

   b) Explain model to minimize makespan.   **9**

SECTION – II

4. a) Explain layout of the research report.   **8**

   b) Which are precautions taken for writing research report ?   **9**

5. a) Explain strategy of experimentation with example.   **8**

   b) Explain properties of sample mean of variance.   **9**

6. a) Explain how to write an Abstract.   **9**

   b) Explain types of error with example in detail.   **9**

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SLR-VC – 169

M.E. (E&TC) (Digital Electronics and Communication System) (Semester – I) (CBCS) Examination, 2017
Paper – II : COMMUNICATION NETWORKS

Day and Date : Saturday, 13-5-2017   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) Draw ATM cell header format and explain it.

   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) Explain fully qualified and partially qualified domain name space.   **10**

   b) Draw and explain Gigabit Ethernet architecture.   **10**

OR

   b) Explain principle of FTP.   **10**

5. Attempt **any two** :   **15**
   a) Explain Hierarchical name space for machine.
   b) Explain TFTP.
   c) Explain structure of 802.32

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Seat
No.

**M.E. (E&TC) (Digital Electronics and Communication System)
(Semester – I) (CBCS) Examination, 2017
CMOS VLSI DESIGN (Paper – III)**

Day and Date : Monday, 15-5-2017   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) Explain accumulation, depletion and inversion modes with the help of physical structure of NMOS enhancement transistor. **6**

   b) Explain second order effects for MOS transistor. **5**

2. a) Explain static power dissipation of CMOS Inverter. **6**

   b) Explain dynamic power dissipation in CMOS Inverter. **5**

3. a) Draw and explain pass transistor logic. **6**

   b) Explain detail complementary CMOS. **6**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Leakage in dynamic circuits.

   b) Dynamic CMOS logic. Basic principles.

   c) Cascading dynamic gates.

   d) Technology scaling.

SECTION – II

5. a) Explain Master-Slave Edge triggered register using multiplexers. **6**

   b) Explain Bistability principle. **5**

6. a) Explain any two timing classification of digital system. **6**

   b) Explain clock skew in detail. **5**

7. a) Explain designing of DRAMS. **6**

   b) Explain designing of fast adders. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) C^2MOS registers.

   b) True Single Phase Clocked Register (TSPCR).

   c) Synchronizers and arbiters.

   d) PLL for clock synchronization.

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Seat No.

M.E. E&TC (Digital Electronics and Comm. System) (Semester – I) (CBCS) Examination, 2017
MODERN DIGITAL SIGNAL PROCESSING (Paper – IV)

Day and Date :Tuesday, 16-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Which are the different types of windows used for design of FIR filter ? Explain in detail by considering following points eq^n of windows frequency response, transition region, side lobe level. **8**

   b) Design an ideal high pass filter with a frequency response-

   $$H_d(e^{j\omega}) = 1 \text{ for } -\frac{\pi}{4} \le \omega \le \pi$$

   $$= 0 \text{ for } |\omega| \le \omega\frac{\pi}{4}$$

   Find the values of h(n) for N = 11. Find H(z). **9**

2. a) Derive the equation of reflection coefficient from the sequence of function using Schur algorithm. **8**

   b) Explain Wiener filter for filting and prediction. **9**

3. a) Derive the fundamental equations for the discrete time implementation of sampling rate conversion. Draw the diagram for timing relations for sampling rate conversion. **9**

   b) Explain polyphase structures in detail. **9**

SECTION – II

4. a) Derive equation of bilinear transformation for mapping from S-plane to Z-plane. **8**

   b) Using bilinear transform design a highpass filter, monotonic in pass band with cut off frequency of 1000 Hz and down 10 dB at 350 Hz. The sampling frequency is 5000 Hz. **9**

5. a) Design a Chebyshev filter for following specifications using impulse invariance method.

   $0.8 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq 0.2\pi$

   $|H(e^{j\omega})| \leq 0.2 \qquad 0.6\pi \leq \omega \leq \pi$. **9**

   b) How DFT is used in power spectrum estimation ? **8**

6. a) Explain addressing modes used in TMS320C50. **9**

   b) Explain with diagram Multiplier/Adder unit. **9**

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SLR-VC – 172

Seat No.	

M.E. (E&TC-Digital Electronics and Communication Systems) (Semester – I) (CBCS) Examination, 2017
Elective – I : COLOR IMAGE AND VIDEO PROCESSING (Paper – V)
(New CBCS Pattern)

Day and Date : Wednesday, 17-5-2017   Total Marks : 70

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

Instructions : 1) *Figures to **right** indicates **full** marks.*

               2) ***All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** :   **20**
   a) Explain image histogram equalization.
   b) Explain different color models in detail.
   c) Explain different filters used in color image processing.

2. Attempt **any two** :   **15**
   a) Explain image sampling and quantization with example.
   b) Enlist edge detection operators. Explain it.
   c) Explain Alfa Trimmed filter in detail.

SECTION – II

3. Attempt **any two** :   **20**
   a) Explain edge linking segmentation.
   b) Explain MAP detection.
   c) Explain types of video.

4. Attempt **any two** :   **15**
   a) Explain Region based segmentation.
   b) Explain block based method for motion detection.
   c) Explain three dimensional image formations.

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SLR-VC – 173

M.E. E & TC – Digital Electronics and Communication Systems (Semester – I) (CBCS Pattern) Examination, 2017
Elective – I : FUZZY LOGIC (Paper – V)

Day and Date : Wednesday, 17-5-2017   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 linguistic hedges.
   c) Explain DSW algorithm for approximate methods of extension for fuzzy arithmetic.
   d) Explain properties of fuzzy sets.

2. Attempt **any two** :   **(2×10=20)**
   a) Explain membership value assignment techniques.
   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 image processing.
   b) Draw and explain simple fuzzy logic system.
   c) Explain fuzzy logic in aeroplane landing system.
   d) Explain genetic algorithm.

4. Attempt **any two** :   **(2×10=20)**
   a) What is clustering ? Explain HCM and FCM.
   b) Explain Fuzzy logic application in liquid level control.
   c) Explain Fuzzy Cognitive map.

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Seat
No.

M.E. (E&TC-Digital Electronics and Communication Systems) (Semester – I) Examination, 2017
Elective – I : SPEECH PROCESSING (Paper – V)
New CBCS Pattern

Day and Date : Wednesday, 17-5-2017   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 speech enhancement techniques.
    b) How do you estimate the noise in speech signal ? Explain in brief.
    c) Explain basic concept of speech processing with diagram.

2. Attempt **any two** :   **15**
    a) Enlist different types of speech signals and explain it.
    b) Enlist different types of DWT. Explain Discrete Wavelet Transform (DWT).
    c) Explain Pitch Frequency Estimation.

SECTION – II

3. Attempt **any two** :   **20**
    a) Explain sampling and quantization of speech signal with example.
    b) Explain the use of SVM in speech recognition technique.
    c) Explain segmentation of speech wave.

4. Attempt **any two** :   **15**
    a) Explain digital speech coding in detail.
    b) Explain text to speech morphological analysis.
    c) Explain Viterbi Algorithm.

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Seat No.

M.E. (E&TC – Digital Electronics and Communication Systems) (Semester – I) (Old - CGPA) Examination, 2017
Paper – IV : PROBABILITY AND RANDOM PROCESS

Day and Date : Friday, 12-5-2017   Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : 1) *Figure to **right** indicates **full** marks.*
                       2) ***All*** *questions are **compulsory**.*

SECTION – I

1. Attempt **any two** of the following :   **20**

   a) Six dice are tossed. Using the generating function, find the probability that the sum of the faces of the dice add to 24.

   b) Explain Laplace Distribution in detail.

   c) Consider a family of exactly two children. We will find the probabilities (1) that both are girls, (2) both are girls given that one of them is a girl, (3) both are girls given that the elder child is a girl and (4) both are girls given that both are girls.

2. Explain **any two** :   **15**

   a) An urn contains 5 red, 12 green and 8 yellow balls. Three are drawn without replacement.
      i) What is the probability that a red, a green and a yellow ball will be drawn ?
      ii) What is the probability that the last ball to be drawn will be green ?

   b) On a toss of a die, a person wins $ 10 if {1} or {3} results, loses $ 5 if {4} or {6} results, wins $ 5 if {2} results and loses $ 10 if {5} results. Find expected value of winning.

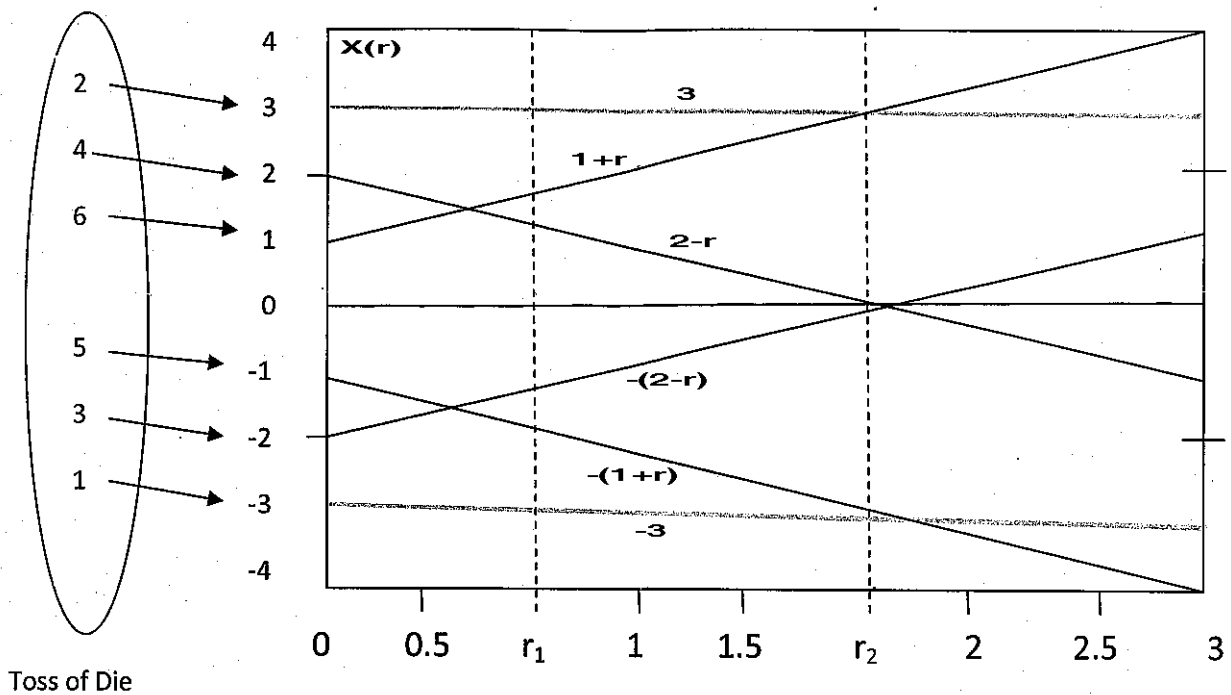   c) Explain probability generation function.

SECTION – II

3. Explain **any two** :   **20**

   a) Explain Stationary Random Process.

   b) Explain Markov processes in detail.

   c) A die is tossed and corresponding to the dots S = {1, 2, 3, 4, 5, 6}, a random
      process X(t) is formed with the following time functions as shown in Fig. below :

      X(2 : r) = 3, X(4 : r) = (2 − r), X(6 : r) = (1 + r)

      X(1 : r) = − 3, X(3 : r) = − (2 − r), X(5 : r) = − (1 + r)

Toss of Die

   Check whether X(t) is stationary ?

4. Attempt **any two** :   **15**

   a) Define Random process. Also give its interpretations.

   b) Explain Ergodic processes.

   c) A random process X(t) = A, where A is random variable uniformly distributed
      over [0, 1]. Since E[A] = ½ and $R_A(\tau) = E[A^2] = 1/3$, this process is stationary.
      Check whether ergodicity in the mean or not ?

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Seat No.	

M.E. (E&TC-Digital Electronics and Communication Systems) (Semester – II) Examination, 2017
MICROWAVE DEVICES AND CIRCUITS (Paper – VI)
(CBCS Pattern)

Day and Date : Thursday, 18-5-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note : 1) **All** questions are **compulsory**.
        2) Figures to **right** indicates **maximum** marks.
        3) Consider the data **whenever** necessary.

SECTION – I

1. Attempt **any three** :   **15**
   a) Why vacuum tubes are not used at microwave frequency ?
   b) Explain hybrid ring with its S parameter.
   c) Explain waveguide terminators in details.
   d) Explain Maxwell's Equation for air.

2. Attempt **any two** :   **20**
   a) Explain EM wave equation for air.
   b) Explain Helical TWT in details.
   c) Explain circular to rectangular waveguide transition.

SECTION – II

3. Attempt **any three** :   **15**
   a) Explain PIN diode in details.
   b) Explain parametric amplifier.
   c) Explain MMIC formation.
   d) Explain MESFET in details.

4. Attempt **any two** :   **20**
   a) What is avalanche effect ? Explain TRAPATT diode in details. Also draw its V-I characteristics.
   b) Explain InP diode in details. Also draw its V-I characteristics.
   c) Explain Tunneling effect in Tunnel diode in details with its energy diagram. Also draw its V-I characteristics.

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Seat No.

M.E. (E and TC) Digital Electronics and Communication System (Semester – II) (CBCS) Examination, 2017
Paper – VII : HIGH SPEED DIGITAL DESIGN

Day and Date : Saturday, 20-5-2017   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) Explain the following electrical properties of wires.
    i) Resistance
    ii) Capacitance
    iii) Inductance.   **6**
   b) Explain balanced and symmetric transmission lines.   **5**

2. a) Explain local loads and signal loads in detail.   **6**
   b) What is IR drops ? Explain with neat sketch an on chip power distribution network for a chip with peripheral bonding.   **5**

3. a) What are the major variables in the design of the transmitter ? Explain with neat figures current mode transmission and voltage mode transmission.   **6**
   b) Explain signaling over lumped transmission media.   **6**

4. Write short note on **any three** of the following :   **(4×3=12)**
   a) High speed properties of logic gates.
   b) Lossless LC transmission lines.
   c) Noise sources in digital system.
   d) Cross talk.

P.T.O.

SECTION – II

5. a) Explain simulation tools in high speed electronics. **6**

   b) Explain power supply conditioning with low dropout references. **5**

6. a) What is under sampling and harmonic sampling ? Explain antialiasing filters in under sampling applications. **6**

   b) Explain with neat diagram quantization noise and distortion sources. **5**

7. a) Explain high speed ADC AD 9066. **6**

   b) Draw and explain ADC model showing noise and distortion sources. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Grounding in high speed systems.

   b) EMI/RMI considerations.

   c) Direct IF to digital conversion.

   d) Latency of ADCs.

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Seat No.

M.E. (E & TC) (Digital Electronics and Communication System) (Semester – II) Examination, 2017 (CBCS)
ADVANCED EMBEDDED SYSTEM (Paper – VIII)

Day and Date : Monday, 22-5-2017　　　　　　　　　　　　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 **wherever** necessary.

SECTION – I

1. a) Explain block diagram of basic 8051 architecture. **6**

   b) Explain location, power consumption, way of data storage for following types of memories. **6**
      1) Processor memory
      2) Cache memory.

2. a) Explain construction of EPROM and SRAM. **6**

   b) Explain conditional statements and conditional loops in 'C'. **6**

3. a) Explain compilation process used in embedded system. **5**

   b) Explain debug and test features of embedded system. **6**

SECTION – II

4. a) What is task ? Explain task states. **6**

   b) Define real time system. Explain basic model of real time system. **6**

5. a) Explain concept of Circular buffer. **6**

   b) Define and explain inter process communication. **6**

6. a) Explain basic ARM memory interface. **6**

   b) What is priority inversion problem ? How it can be solved ? **5**

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Seat No.

M.E. (E&TC – Digital Electronics and Communication Systems) (Semester – II) (CBCS) Examination, 2017
CRYPTOGRAPHY AND NETWORK SECURITY (Paper – IX)

Day and Date : Wednesday, 24-5-2017

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 types of distribution of Public Key ? Explain any two.

   b) Explain RAS algorithm.

   c) Explain triple data encryption with two keys in detail.

2. Attempt **any two** : **15**

   a) Explain encryption technique.

   b) Explain principle of ciphers.

   c) Explain steganography in detail.

SECTION– II

3. Attempt **any two** : **20**

   a) What do you mean digital signature ? Why it is necessary ?

   b) What is public key infrastructure ? Explain it.

   c) Explain viral threats.

4. Attempt **any two** : **15**

   a) Explain message authentication code.

   b) Explain birthday attack.

   c) Explain IP security. Explain with its scenario.

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Seat No.

M.E. (E&TC Digital Electronics and Communication Systems) (Semester – II) (CBCS) Examination, 2017
Paper – X : ARTIFICIAL NEURAL NETWORKS (Elective – II)

Day and Date : Friday, 26-5-2017

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 Habbian learning method for artificial neural network model.

   b) Define Perceptron. Explain the structure of perceptron.

   c) Explain delta learning laws for artificial neural network model.

2. Attempt **any two** : **15**

   a) Explain artificial neural network terminologies.

   b) What are the requirements of learning laws ?

   c) What are the types of activation functions in Neural Network ? Explain.

SECTION– II

3. Attempt **any two** : **20**

   a) Explain Hamming Net.

   b) Explain MAXNET.

   c) Explain radial basis function.

4. Attempt **any two** : **15**

   a) Explain hopfield network algorithm.

   b) What are the classifiers for RBF ? Explain any one.

   c) Explain principle component analysis.

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Seat No.

M.E. (E & TC Digital Electronics and Communication Systems) (Semester – II) (Old – CGPA) Examination, 2017
Elective – II : IMAGE AND VIDEO PROCESSING AND BROADCASTING (Paper – X)

Day and Date : Thursday, 18-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

Instructions : 1) Figure to **right** indicates **full** marks.
2) **All** questions are **compulsory**.

SECTION – I

1. Attempt **any two** : **20**

   a) Explain Singular Value Decomposition (SVD).

   b) Explain image perception in detail.

   c) Explain Karhune-Loeve (K – L) Transform.

2. Attempt **any two** : **15**

   a) Explain image sampling and quantization in detail.

   b) Explain Least Square filter.

   c) Explain Spatial Domain filters.

SECTION – II

3. Attempt **any two** : **20**

   a) Explain Boundary Extraction technique.

   b) Explain Region Representation technique.

   c) Explain MPEG.

4. Attempt **any two** : **15**

   a) Explain Edge detection Operators.

   b) Explain Radon Transform.

   c) Explain Inter frame coding.

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Seat
No.

**M.E. (E & TC Digital Electronics and Communication Systems)
(Semester – II) (Old – CGPA) Examination, 2017
WIRELESS AND MOBILE NETWORKS (Paper – IX)**

Day and Date : Saturday, 20-5-2017   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) Draw Wireless communication system. 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 time diversity.

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 Ad-hoc Network. Also explain ad-hoc routing.

4. Attempt **any two** :   **15**
   a) Explain 802.11 protocols.
   b) Explain MAC protocol frame format for 802.11.
   c) Explain Wireless Application Protocol.

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Seat No.	

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
POWER ELECTRONICS (Paper – I)

Day and Date : Friday, 12-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain :

   a) Stages of evolution of Power Electronics.   **10**

   b) Structural difference of power electronics from low power analog electronics.

2. a) What is an IGBT ? Draw its switching characteristics. What are its advantages over BJT and MOSFET ?   **10**

                    OR

   b) Draw the vertical cross section of a power MOSFET and explain the following :   **10**
      i) Reason for body source short in the MOSFET structure.
      ii) Presence of integral reverse diode in the structure.

3. a) Explain :
      a) Single phase and
      b) Three phase full bridge rectifier with dc link capacitive filter and discuss the issue of harmonics.   **15**

                    OR

   b) A three phase bridge rectifier charges a 240 V battery. Input voltage to rectifier is 3-phase, 230 V, 50 Hz. Current limiting resistance in series with battery is 8Ω and an inductor makes the load current almost ripple free. Determine :

      a) Power delivered battery and load

      b) Input displacement factor

      c) Current dissipation factor

      d) Input power factor.   **15**

SECTION – II

4. Show the circuit diagram of single phase semi converter and explain the operation, assuming constant load current. Sketch waveforms of output voltage and current in one SCR for a firing angle is 45°. **10**

5. a) With the help of neat circuit diagram, approximate equivalent circuits and relevant waveforms, explain the operation of boost converter. Derive the expression of average output voltage and chopping frequency. **15**

OR

   b) A step-down chopper has a resistive load $R = 10\,\Omega$ and input voltage $V_s = 200$ V. When the chopper remains on, its voltage drop is 2 V. The chopper frequency is 1 KHz. If the duty cycle is 50% determine :

   i) Average output voltage

   ii) rms output voltage

   iii) Chopper frequency. **15**

6. a) Draw the relevant circuit diagram and wave diagrams of a 3-phase full wave AC voltage regulator feeding an star connected load. **10**

OR

   b) Explain with neat circuit diagram of three phase 120° mode inverter circuit with resistive load. Also draw suitable waveforms. **10**

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SLR- VC – 190

M.E. (Electrical) (Semester – I) (CBCS/CGPA) Examination, 2017
POWER SYSTEM DYNAMICS AND CONTROL (Paper – II)

Day and Date : Saturday, 13-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain in detail the control hierarchy of power system in India and also explain the typical feedback control used in power system control. **18**

2. a) Using Euler's method find an approximate value of 'y' corresponding to

   x = 1, given that $\dfrac{dy}{dx}$ = x + y and y = 1 when x = 0. **9**

   b) Derive Park's transformation. **8**

SECTION – II

3. a) Explain the excitation control system and its protective circuit. **9**

   b) What is the necessity of prime mover control ? And also explain the basic structure of prime mover and energy supply system. **8**

4. a) Explain the effect of change in excitation on stability. **9**

   b) Explain the reason for torsional oscillations and its effects. **9**

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Seat No.

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – III : DC DRIVES

Day and Date : Monday, 15-5-2017

Max. Marks : 70

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

SECTION – I

1. Attempt **all** :

   a) Derive condition for steady state stability of operating point of motor load combination. **8**

   b) Explain various braking method for separately exited dc shunt motor. **9**

   ### OR

   A 220 V, 1500 rpm, 10 A separately exited dc motor is fed from single phase full wave half 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 1000 rpm (b) Rated motor torque and 500 rpm.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) Draw speed torque characteristics for various types of load.

   b) How 4 quadrant operation of dc motor is obtained with single unit of full control converter ?

   c) Compare the performance of single phase converter fed dc drive with 3-phase converter fed dc drive.

SECTION – II

3. Attempt **all** :

   a) Explain with neat sketch the operation of single phase dual converter fed dc drive. **8**

   b) Explain with neat circuit diagram operation of two quadrant chopper fed dc drive. **9**

   OR

   Explain various protections provided in closed loop speed control drive.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Explain regenerative Braking operation in four quadrant converter fed dc drive.

   b) A 220 V, 24 A, 100 rpm, separately excited dc motor has an armature resistance of 2 ohm. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm.

   c) Draw the block diagram speed control drive and state the application of speed control drive.

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Seat No.

M.E. Electrical (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – IV : CONTROL ENGINEERING

Day and Date : Tuesday, 16-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.
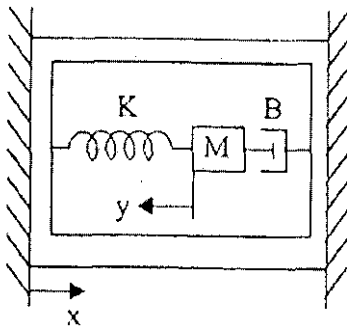
SECTION – I

1. Attempt **any four** :   **(4×6=24)**

   a) What are the control objectives of feedback control system ?

   b) Explain the basic structure of a feedback control system.

   c) Explain the effect of feedback on system sensitivity in control systems.

   d) Obtain the transfer functions for the following mechanical translational system.

   $$T(s) = \frac{Y(s)}{X(s)}.$$

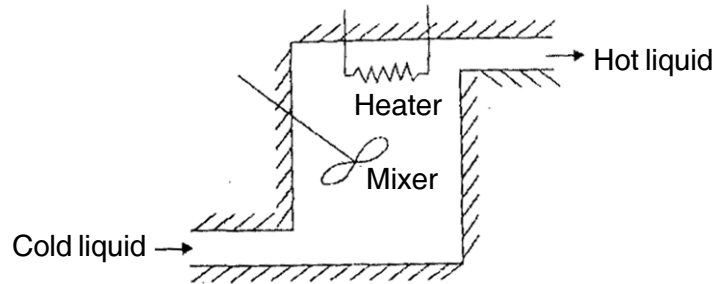   e) Explain the construction and operational features of the electro pneumatic transducer.

2. Attempt **any one**.   **(1×11=11)**

   a) In the thermal system shown, heater coil is used to heat the liquid entering the insulated tank at temperature θi to hot liquid at temperature θ. The liquid is thoroughly mixed to maintain uniform temperature of the liquid in the tank. If M is the mass of the liquid in the tank in Kg, C is the specific heat of liquid in J/Kg/°K, W is the steady state liquid flow rate in kg /sec and hi is the heat input rate in J/sec, obtain the transfer function of the system when,

i) Heat input rate is changed, with inlet temperature of liquid kept constant and

ii) Inlet temperature is changed with heat input rate held constant. Also write the differential equation when heat input rate and inlet liquid temperatures are changed.

b) Using appropriate diagrams, give the constructional and operational features of a hydraulic actuator. Derive the transfer function of the actuator.

SECTION – II

3. Attempt **any four** :   **(4×6=24)**

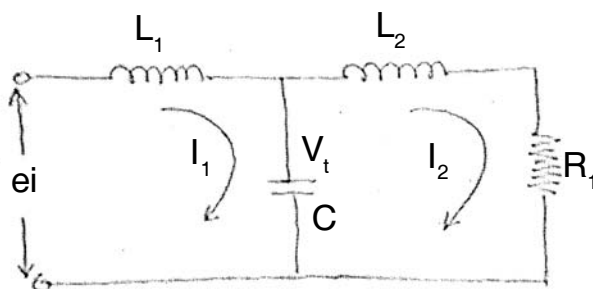a) Obtain the state equation and output equation of electric network as shown in fig.1

Fig. 1

b) The state space representation of a second order system is

$$\dot{x}_1 = -x_1 + u$$

$$\dot{x}_2 = x_1 - 2x_2 + u$$

State whether the system is controllable or not .

c) Determine the breakway points, angles of departure and centroid of the root locus for the system,

$$G(s)H(s) = \frac{k(s+3)}{2s(s+5)(s+6)(s+2s+2)}.$$

d) A feedback system has a transfer function $\frac{Y(s)}{R(s)} = M(s) = \frac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$, $\zeta < 1$.

Derive the expression for peak overshoot M_p and peak time t_p of the time response of the given system.

e) Sketch the Bode plot for the following system and determine the value of K for which the magnitude plot crosses the 0 db line at $\omega = 15$ rad/sec.

$$G(s) = \frac{k(s+2)}{s(s+4)(s+10)}$$

4. Attempt **any one**.   (1×11=11)

a) The controlled plant of unity feedback system is $G(s) = \frac{k}{s(s+10)^2}$. It is specified that velocity error constant of the system to be equal to 20. While the damping ratio of the dominant roots be $\xi = 0.707$. Design a suitable cascade compensation scheme to the specifications.

b) Consider a type -1 unity-feedback system with an open loop transfer function,

$$G(s) = \frac{k}{s(s+1)}.$$ It is desired to have the velocity error constant Kv =10. Furthermore, desire the P.M. of the system be atleast 45°.

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Seat
No.

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – V : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS (Elective – I)

Day and Date : Wednesday, 17-5-2017　　　　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :

   a) Explain about basic engineering aspects in ehv ac transmission.　　**8**

   b) Why the inductance and capacitance transformation required in
      sequence quantities in EHV-AC lines ?　　**9**

   　　　　　　　OR

   Derive the expression $P_c = \dfrac{1}{2} KC \left(V_m^2 - V_o^2 \right)$ for the energy loss from charge-

   voltage diagram.

2. Solve **any two** questions from the following :　　　　　　**(2×9=18)**

   a) A power of 12000 MW is required to be transmitted over a distance of 1000 km.
      At voltage levels of 400 kV, 750kv, 1000kv, and 1200 kv determine.

      i) Possible no of circuits required with equal magnitudes for sending and
         receiving end voltages with 30° phase difference;

      ii) The currents transmitted and

      iii) The total line losses.

   b) Explain the relation between the temperature rise and current carrying
      capacity of EHV-AC line.

   c) Surface voltage Gradient on conductors under

      i) Single conductor

      ii) 2 conductor bundle.

SECTION – II

3. Attempt **all** :

   a) Obtain the time function of open end voltage equation using step response considering :

   i) Omit losses

   ii) Omit only g. **8**

   b) Explain different type of lightning arresters and protective characteristics. **9**

   OR

   Derive the generalized constants of a distributed parameter transmission line.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Derive the differential expression and their solutions for a transmission line with distributed inductance and capacitance.

   b) What are the general principles of the lightning protection problem ?

   c) 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) ?

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SLR-VC – 196

M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM
(Paper – VI)

Day and Date : Thursday, 18-5-2017   Max. Marks : 70

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

SECTION – I

1. Attempt **all** :

   a) Explain voltage space vector representation of 3-level voltage source inverter. **8**

   b) Explain principle of uncompensated lossless transmission line and derive the expressions for real and reactive power at receiving end of a line. **9**

            OR

   b) Explain the following main objectives of load compensation with suitable diagrams. **9**
     i) Power factor improvement
     ii) Voltage regulation.

2. Attempt **any two** :

   a) Explain how to balance three phase unbalanced system by using passive elements with relevant diagrams and equations. **9**

   b) Explain various factors which limit the loading capability of transmission lines. **9**

   c) The particular of the shunt compensated transmission line are V = 230 V, f = 50 Hz, X = 1.5 Ω and δ = 60°. The degree of compensation is r = 60%. Find : **9**
     a) the line current I
     b) the active power Pp
     c) the reactive power Qp.

P.T.O.

SECTION – II

3. Attempt **all** :

a) What are the components used in basic HVDC transmission system ? Explain in detail. **8**

b) Explain how UPFC is signified by the adjective "unified" in its name. **9**

OR

b) What is the main objective of shunt compensation ? Derive real and reactive power expressions of a shunt compensated at mid-point of a transmission line. **9**

4. Attempt **any two** :

a) Explain fixed capacitor thyristor controlled reactor type var generator with basic diagram and output characteristics. **9**

b) Explain basic concept of voltage and phase angle regulation. **9**

c) Explain operation of 12 pulse converter with suitable diagram and waveforms. **9**

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Seat No.

M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
POWER QUALITY (Paper – VII)

Day and Date : Saturday, 20-5-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. a) Explain the various types of power quality disturbances and their impacts on power quality. **9**

   b) What is an interruption ? Clearly differentiate 'Failure', 'Outage' and 'Interruption'. **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) What is the advantage of three phase converter ? What is the disadvantage of 12 pulse drive ? **9**

   b) Explain the role of combined series and shunt controller for voltage mitigation. **8**

   OR

   b) Explain schematic and working of unified power conditioner. **8**

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M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : AC DRIVES

Day and Date : Monday, 22-5-2017   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) Explain with neat diagram, shift of operating point from initial frequency "f" to a new frequency "0.7f" under E/f control strategy.   **9**

2. Solve **any two** :   **(2×9=18)**

   a) 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.

   b) Draw and explain typical power circuit configuration used for three phase induction motor speed control. Explain need of dynamic braking resistance in this configuration.

   c) With neat circuit schematic explain static Scherbius drive. State basis philosophy used for operating induction motor in variable speed mode in this drive.

SECTION – II

3. Attempt **all** :

   a) What are speed control strategies used in three phase synchronous motor ? Compare these strategies with each other.   **8**

   b) Explain operation of Switched reluctance motor. How speed of such motor is controlled using drive ?   **9**

P.T.O.

4. Solve **any two** : **(2×9=18)**

a) 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.

b) Explain converter or inverter circuit used of SRM.

c) Derive the expression of electromagnetic torque of indirect vector control.

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M.E. Electrical (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – IX : ADVANCED CONTROL ENGINEERING

Day and Date : Wednesday, 24-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any two** :   **(2×9=18)**

   a) What are the control structures for controlling various plants ? Explain in detail.

   b) How do identify the dynamics models of plant in frequency – domain based identification ?

   c) Design the series-compensation scheme having the process model and the controller transfer function be $G(s) = \dfrac{4}{s(2s+1)}$ and $G_c(s) = 2\left(1 + \dfrac{1}{2s}\right)$ for unit step input.

2. How to overcome the effect of noise and load disturbances of PI controller ? Explain in detail.   **(1×8=8)**

3. Derive the equivalent gain of the relay.   **(1×9=9)**

OR

3. Design the series PID controller for SISO system having the plant dynamics $G(s) = \dfrac{e^{-2s}}{(8s+1)^2}$ and the controller $G_c(s) = K_p\left(1 + \dfrac{1}{T_i s}\right)(1 + T_d S)$. Estimate the series PID controller parameters by choosing G.M. $(A_m) = 3$ and P.M. $(\phi_m) = 45°$.

P.T.O.

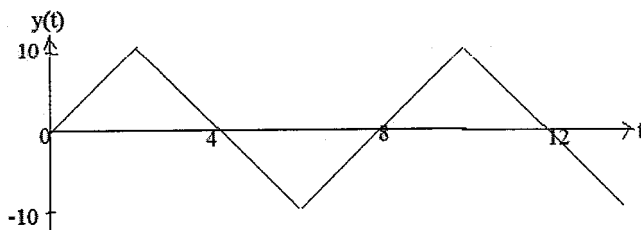## SECTION – II

4. Attempt **any two** :   **(2×9=18)**

   a) Derive the analytical expressions for the parameters of the transfer function

   with integrator and delay is $G(s) = \dfrac{ke^{-\theta s}}{s}$.

   b) The output waveform is as shown below. Identify the system model.

   c) How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

5. What are the conditions for sustained oscillatory output of FOPDT transfer function model ?   **(1×8=8)**

6. Describe the first order system by using state-space analysis.   **(1×9=9)**

                              OR

6. Derive the expression for determining exact conditions for existence of limit cycles.

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Seat No.

**M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA)
Examination, 2017
Paper – X : HIGH VOLTAGE DC TRANSMISSION (Elective – II)**

Day and Date : Friday, 26-5-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :
   a) Write differences between HVAC and HVDC. With neat sketches explain the different kinds of D.C. links available. **8**
   b) Write down desired control features of HVDC system. Explain system control hierarchy. **9**

2. Solve **any two** :   **(2×9=18)**
   a) For a 3-φ, 6 pulse Graetz's circuit, draw the timing diagram considering overlap angle is less than 60° and without overlap for the following :
      i) Voltage across load   ii) Voltage across any value.
   b) Describe about starting and stopping of DC link.
   c) With block diagram, discuss the principle of operation of a basic power controller.

SECTION – II

3. Attempt **all** :
   a) Explain protection against over voltages. **8**
   b) Write short notes on the following :
      i) Telephone influence factor
      ii) Harmonic distortion
      iii) IT product. **9**

4. Solve **any two** :   **(2×9=18)**
   a) Discuss the various faults exist in converter station ? Explain.
   b) What are the filter configurations that are employed for HVDC converter station ? Give design aspect of one such filter.
   c) What do you understand by a load flow ? Classify the solution methodology for AC-DC load flow and explain.

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