SLR-TK – 1

Seat No.

Set **P**

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

Day and Date : Thursday, 14-12-2017   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) Find values of k_i for following Airy's Stress function to satisfy equilibrium equation **11**

   $\phi = 2K_1 x^4 + 3\ xy\ (K_2 x^2 + 2K_3 xy + K_4 y^2) + K_5 y^4$.

   b) Discuss plain stress and plain strain problems with suitable examples. **6**

2. a) Derive differential equations of equilibrium for 3-D problem in rectangular coordinate system. **12**

   b) Write Differential Equilibrium equation of 3-D cylindrical coordinate systems. **6**

3. a) Find stress distribution in a thick cylinder subjected to internal bursting pressure 20 Mpa. Take inner and outer radii as 250 mm and 350 mm respectively. Hence find the maximum shear stress developed. **12**

   b) Explain St. Venant's Principle. **6**

SECTION – II

4. a) Find yield stress in unidirectional tension using Mises criterion for a material with following state of stress :

   $\sigma_x = 100$ MPa, $\sigma_y = 83$ MPa $\tau_{xy} = 45$ Mpa. **8**

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

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

5. Find a Collapse load for a clamped circular plate subjected to U.D. L. on entire area. Use Tresca criterion. **17**

6. a) Explain Membrane Analogy. **6**

   b) Establish the relation of torsion of a bar with elliptical cross section subjected to end torsion. **12**

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

Day and Date : Saturday, 16-12-2017

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

Total Marks : 70

Instructions : 1) *Solve **any 3** questions from **each** Section.*

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

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

SECTION – I

1. A continuous beam ABCD consists of span AB = CD = 6m and span BC = 10 m. Moment of inertia of span AB and CD is 2I and that of BC is 3I. Draw ILD for BM and SF at center of span AB. All supports are simple support. **12**

2. Draw ILD for BM, normal thrust and radial shear at quarter span of 2 hinged parabolic arch. **12**

3. A uniform cross section rigid horizontal bent ABC is fixed at A and free at C as shown in fig. 1. Determine the vertical deflection of point C. Assume ratio of flexural rigidity to shear rigidity as 1.25. **11**
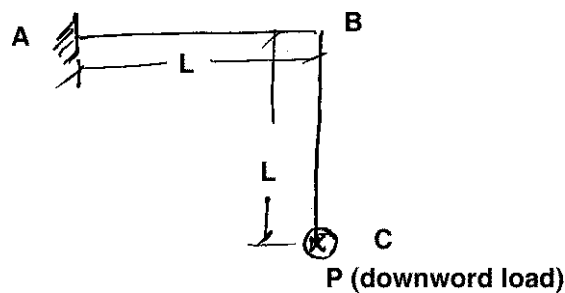

Fig. 1

4. Draw SF, BM, deflection and foundation pressure diagram for a semi-infinite beam on elastic foundation fixed at one end and subjected to udl of 'w' throughout the length. **11**

SECTION – II

5. A simply supported beam column is subjected to constant axial force 'P' and udl of 'w' throughout it's length. Find maximum deflection and maximum BM in the beam column. **12**

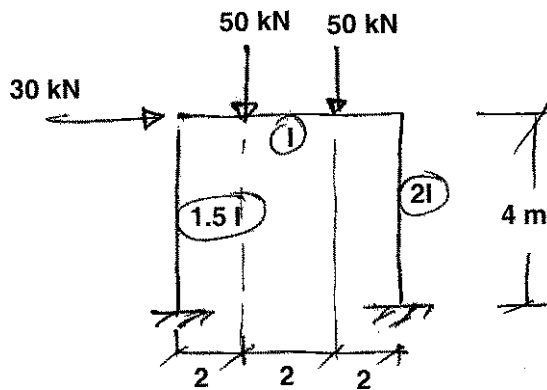6. Analyze the frame shown in fig. 2 by stiffness method. Draw BMD. **12**

Fig. 2

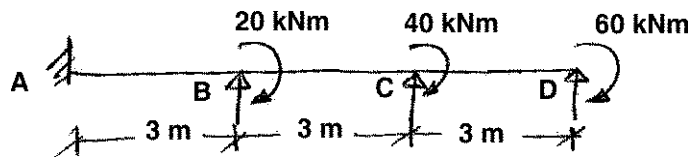7. Analyze the beam shown in fig. 3 by stiffness method. Draw BMD. **11**

Fig. 3

8. A) Derive member oriented stiffness matrix for a pin jointed plane frame member. Transform this matrix to structure oriented axis by using concept of rotation of axis. **7**

   B) Write on advantages of stiffness method of analysis. **4**

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

Day and Date : Monday, 18-12-2017   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. Design the typical interior panel of a flat slab floor of size 5 m × 5 m with drop to support a live load of 4 kN/m^2. The floor is supported by columns of size of 450 m × 450 mm. Use M_{20} concrete and Fe_{415} steel. Sketch the reinforcement details of the slab. **17**

2. Design a combined rectangular footing for columns C1 and C2 located at distance of 4.2 m center to center. Column C1 is 400 mm × 400 mm in size and carriers a load of 900 kN. Column C2 is 500 mm × 500 mm in size and carries a load of 1200 kN. The safe bearing capacity of the soil is 200 kN/m^2. Use M_{20} concrete and Fe_{500} steel. Sketch the reinforcement details. **18**

3. Design a circular tank of capacity 12 lakh litres. The depth of water tank including free board is restricted to 5 m. The joint between floor and wall of the tank is rigid. Use I.S. code method of design. Consider M_{25} concrete and Fe_{415} steel. **17**

SECTION – II

4. a) A rectangular P.S.C. beam has a span of 15 m, bears a live load of 15 kN/m excluding self weight. Given the permissible stresses in concrete and steel as 14 N/mm^2 and 1100 N/mm^2, design the beam using 6 mm tendon. **9**

   b) The end block of a post tensioned member is 250 mm wide and 600 mm deep is subjected to an axial pretress force 1250 kN. Design the end block by Guyon's method. **8**

5. a) A PSC beam provided with parabolic profile tendon has a simply supported span of 6 m. The beam has a rectangular cross section of 300 mm × 400 mm. The total external load on the beam is 45 kN/m on whole span and the tendon carries a prestressing force of 1100 kN. The parabolic tendon has 125 mm eccentricity at mid span. Calculate the extreme fiber stresses for mid span section using stress concept, strength concept and load balancing concept. **11**

   b) Explain the advantages and disadvantages of prestressed concrete over reinforced cement concrete. **6**

6. a) A post tensioned continuous beam consisting of two span each 19 m long. The external loading other dead load of beam is 25 kN/m. Design the beam. **14**

   b) Explain the partial prestressing. **4**

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

Day and Date : Wednesday, 20-12-2017   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 the **right** indicate **full** marks.

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

SECTION – I

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

2. A system is modelled by two freely vibrating masses m1 and m2 interconnected by a spring having a constant k. Determine for this system the differential equation of motion for the relative displacement u = y2 – y1 between the two masses. Also determine the corresponding natural frequency of the system. **17**

3. A SDOF system is subjected to a transient force as shown in fig. Derive the expression for Magnification factor for the forced as well as free vibration phases. **17**
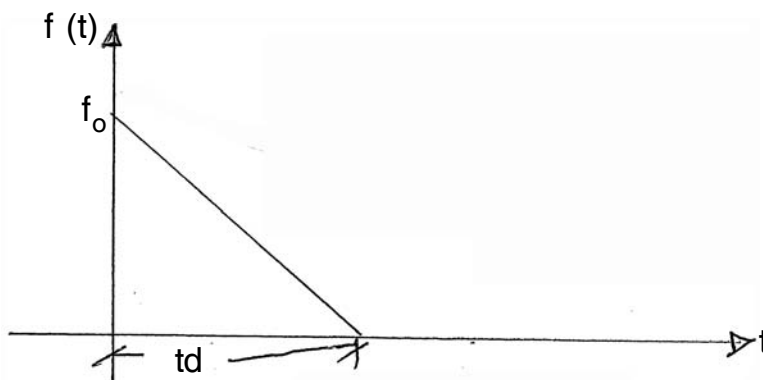
Figure Q. 3.

SECTION – II

4. a) Discuss the modal superposition method of analyzing structures subjected to dynamic loading. What are the limitations of the method ? **10**

   b) Derive from basic principle the equations to calculate displacement in a multi degree freedom system. **7**

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

6. Write short note on **any three** : **18**

   i) Dunkerly's Method.

   ii) Rayleign-Ritz Method

   iii) Structural modeling with distributed properties.

   iv) Model analysis of damped system.

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

Day and Date : Friday, 22-12-2017   Max. 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** indicate **full** marks.

SECTION – I

1. A) State assumptions and explain limitations made in Terzhaghi's bearing capacity equation of shallow foundations. **5**

   B) The following data were obtained from plate load test carried out on a 60 cm square test plate at a depth of 2 m below ground surface on a sandy soil which extends upto a larger depth. Determine the settlement of foundation 3 m × 3 m carrying a load of 1100 kN and located at a depth of 2 m below ground surface. **7**

Load intensity in kN /m²	0	50	100	150	200	250	300	350	400
Settlement in mm	0	2	4	7.5	11	16.3	23.5	34	45

2. A) Explain the procedure for the design of Trapezoidal combined footing. **5**

   B) Design a strap footing for the following data :

   Column A has to carry a load of 725 kN and Column B has to carry a load of 1000 kN. Allowable pressure is 150 kN/m². Distance of c/c of column is 5.4 m. Projection beyond column A not to exceed 0.5 m. **6**

3. A) With the help of neat sketches describe various types of raft foundations. **5**

   B) Design a raft foundation for 4 columns spaced at a distance of 4 m c/c in either direction (square pattern). All four columns carry an equal load of 1000 kN. SBC = 110 kN/m². Use M20 concrete and Fe415 steel. **7**

P.T.O.

SECTION – II

4. A) What do you understand by under reamed piles ? Describe the methodology
   used for its construction with neat sketches.   **5**

   B) A square group of 25 piles extend between depth of 2 m and 12 m in a deposit
   of 20 m thick stiff clay overlaying rock. The piles are 0.5 m in diameter and
   are spaced at 1 m c/c in the group. The undrained shear strength of the clay
   at the pile base is 180 kN/m^2 and the average value of the undrained shear
   strength over the depth of the pile is 110 kN/m^2. The adhesion coefficient is
   0.45. Estimate the capacity of the pile group considering an overall factor of
   safety equal to 3 against shear failure.   **7**

5. A) Explain Chicago method of construction of drilled piers.   **5**

   B) Explain the construction procedure of well foundation with various steps.   **7**

6. A) Describe the various types of machine foundations.   **5**

   B) Explain the Barken's method to determine the natural frequency of foundation
   of soil system.   **6**

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No.

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

Day and Date : Friday, 22-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. a) Enlist different methods of construction of Ferro cement concrete. Explain
      any one in detail.   **6**

   b) Explain behaviour of Fibre Reinforced Concrete under compression.   **6**

   c) Explains the advantages and disadvantages of Ferro cement.   **6**

2. a) What is the different workability tests used for Fibre Reinforced Concrete ?
      Explain any one in detail.   **6**

   b) What are the mechanical properties of materials used in Ferro cement
      concrete ?   **6**

   c) Explains the factors affecting the properties of Fiber Reinforced Concrete. **6**

3. a) What are the applications of Ferro cement concrete ?   **6**

   b) What are the differences between Fibre Reinforced Concrete and Ferro cement
      concrete ?   **6**

   c) Explain applications of Fibre reinforced concrete.   **6**

SECTION – II

4. What is Silica Fume Concrete and explain in detail its properties with respect to :

   a) Physical properties.   **6**

   b) Properties of fresh concrete.   **6**

   c) Durability of concrete.   **5**

5. a) State the applications of Silica Fume Concrete.   **6**

   b) Explain the comparison of important properties of normal concrete with those

      of polymer concrete.   **6**

   c) Write note on types of polymer concrete.   **5**

6. a) What are the applications of polymer impregnated concrete and polymer

      concrete ?   **5**

   b) Briefly explain the following :   **(6×2)**

      i) Classification of polymer concrete.

      ii) Advantages of silica fume concrete.

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

Day and Date : Friday, 8-12-2017   Max. 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**.*

SECTION – I

1. a) State the assumptions made in developing bending theory of thin plates with small deflections. **3**

    b) Distinguish between theory of thin plates with small deflections and thin plates with large deflections. **6**

    c) Differentiate between thin plates and thick plates **3**

2. a) Obtain differential equation for cylindrical bending of elemental strip of rectangular plates subjected to transverse load that does not vary along the length of plate, in terms of bending moment and flexural rigidity. **8**

    b) Write a note on different boundary conditions for rectangular plates. **4**

P.T.O.

3. A simply supported rectangular plate of size b × a is subjected to hydrostatic pressure as shown in Figure 1. Find maximum deflection at centre of plate for a = b, i.e., square plate. Use Navier's solution. **11**
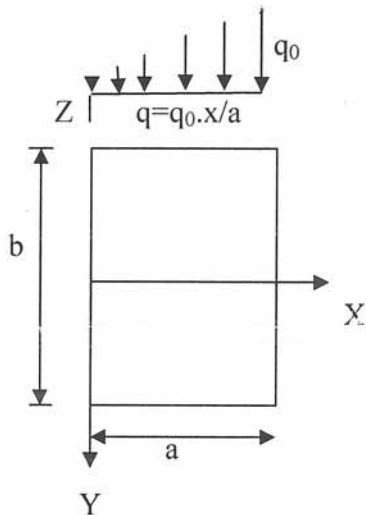

Fig. 1

4. a) What is the difference in behaviour of rectangular and circular plate under the effect of external loading ? Explain. **4**

   b) Obtain governing differential equation for simply supported circular plate subjected to concentrated load at centre. **8**

SECTION – II

5. a) Give the classification of shells. Draw neat sketches. **5**

   b) Give the advantages of shells over plates under the effect of external loading. **6**

6. a) Explain membrane theory of bending of shells. **5**

   b) Find equation of equilibrium for an arbitrarily loaded shell of revolution. Use membrane theory. **6**

7. Derive Finsterwalder's differential equation as applied to analysis of shell roofs. **12**

8. Explain : **12**

   1) Bending theory   2) Schorer theory.

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

Day and Date : Saturday, 9-12-2017　　　　　　　　　　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**, question number **4** is **compulsory**. Solve **any one** in the remaining **two** questions.
　　　　　　　　 3) **Use** of non-programmable calculator is **allowed.**
　　　　　　　　 4) Assume additional data **if necessary** and mention **it clearly**.

SECTION – I

1. a) A short rod of length 'l' is rigidly supported at both ends and axial load 'P' is applied at the mid length. Taking 2 finite elements, find out the displacement at the point of load. Also find out the support reactions. Consider the Area of Cross Section of the rod is 'A' and Young's modulus is 'E'.　　**12**

   b) Explain about plane stress and plane strain problem.　　**5**

2. a) Determine the shape functions of a 'Constant Strain Triangle' (CST) element. Use polynomial functions.　　**8**

   b) For the truss shown in fig. 1 below, find the horizontal and vertical displacements in each node. 400N load is acting at node 3, Elements 1 and 2 are made up of Aluminum of cross sectional area 200 mm^2, Young's modulus 0.69×10^5 N/mm^2, element 3 is made up of steel of cross sectional area 100 mm^2, Young's modulus 2.07×10^5 N/mm^2.　　**10**
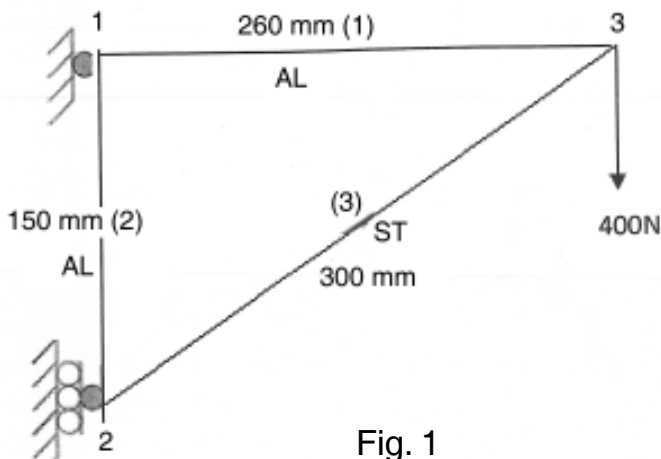

Fig. 1

P.T.O.

3. a) Derive shape functions of a four noded rectangular element in natural
co-ordinate system, using Lagrange polynomials. **8**

   b) A four noded rectangle has its nodes (–0.5L, –0.5L), (1.5L, –0.5L),
(1.5L, 1.5L), (–0.5L, 1.5L). Derive shape functions. Also find consistent nodal load
vector if a vertical downward point load 'P' acts at (0.8333L, 1.5L). **9**

SECTION – II

4. A problem of plane stress is analysed using a 4 noded quadrilateral element. The
co-ordinates are (0, 0), (60, 0), (65.7735, 10), (5.7735, 10). Find strain
displacement matrix [B] at gauss point (0.57735, 0.57735). **18**

5. a) Write a short note on axis symmetric problem. **5**

   b) Derive [K] matrix for triangular ring element. **12**

6. a) Define isoparametric, subparametric and super parametric elements. **5**

   b) Write consistent mass matrix and lumped mass matrix of a beam element.
Derive elements M11, M12 of consistent mass matrix using shape functions
of a beam element. **12**

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

Day and Date : Monday, 11-12-2017   Max. Marks : 70
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 **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. **10**

    b) Discuss briefly the two measures of an earthquake.   **8**

2. Obtain an expression for dynamic magnification factor for an under-damped SDOF system subjected to a harmonic loading $F(t) = F_0 \sin \omega t$.   **17**

3. Compute the natural frequencies and modes for the shear frame as shown in figure and prove the orthogonality of modes. The $EI = 5 \times 10^6 \, Nm^2$, $m = 501 \times 10^3$ kg, storey height = 3.00 m, span = 5m.   **17**
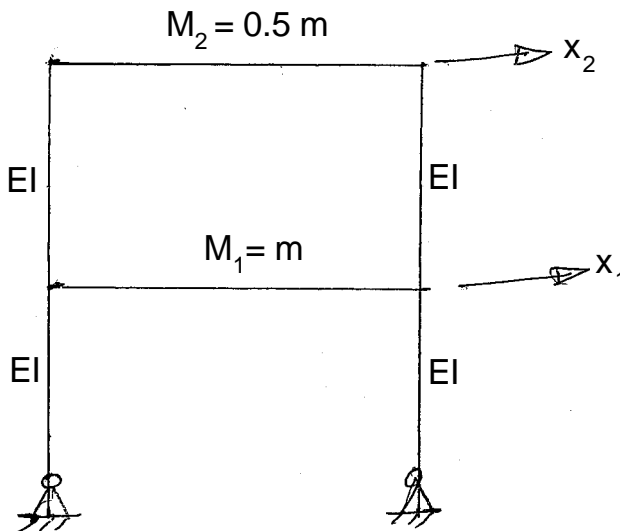

Fig. Q. 3

SECTION – II

4. What are the two seismic design requirements an engineer has to account for the analysis and design of earthquake-resistant building ? Discuss briefly how these are incorporated to achieve the objective. **17**

5. A five storey building 4.5 m × 4.5 m in plan is supported by four columns at the corners each storey is 3.35 m height. Slab of each floor is 120 mm thick and the beams are 230 mm × 530 mm in size. All the columns are 300 mm × 300 mm and walls are of 230 mm thick brick masonry. The building is to construct in Solapur city. Assuming live load category 2 kN/m² over the slab, evaluate the lateral forces and storey shear. **18**

6. What is meant by Base isolation ? Explain any one base isolation system in detail. **17**

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

Day and Date : Tuesday, 12-12-2017   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 **allowed**.
　　　　　　　　iii) Assume suitable data if necessary.
　　　　　　　　iv) Draw **neat** sketches **wherever** necessary.

SECTION – I

1. The effective span of a through type girder railway bridge is 45 m for a single lane B.G. track. The cross girders a spaced at 4.5 m apart. The stringers are spaced at 2 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 are of size 2.5 m × 0.25 m × 0.35 m. The main girders are provided at 6.5 m apart, determine the design forces in top, bottom, vertical and diagonal members of central panel. Design the bottom chord member and vertical member. The bridges is to carry a equivalent U.D.L. live load of 4100 kN for B.M. and 4300 for shear force. **18**

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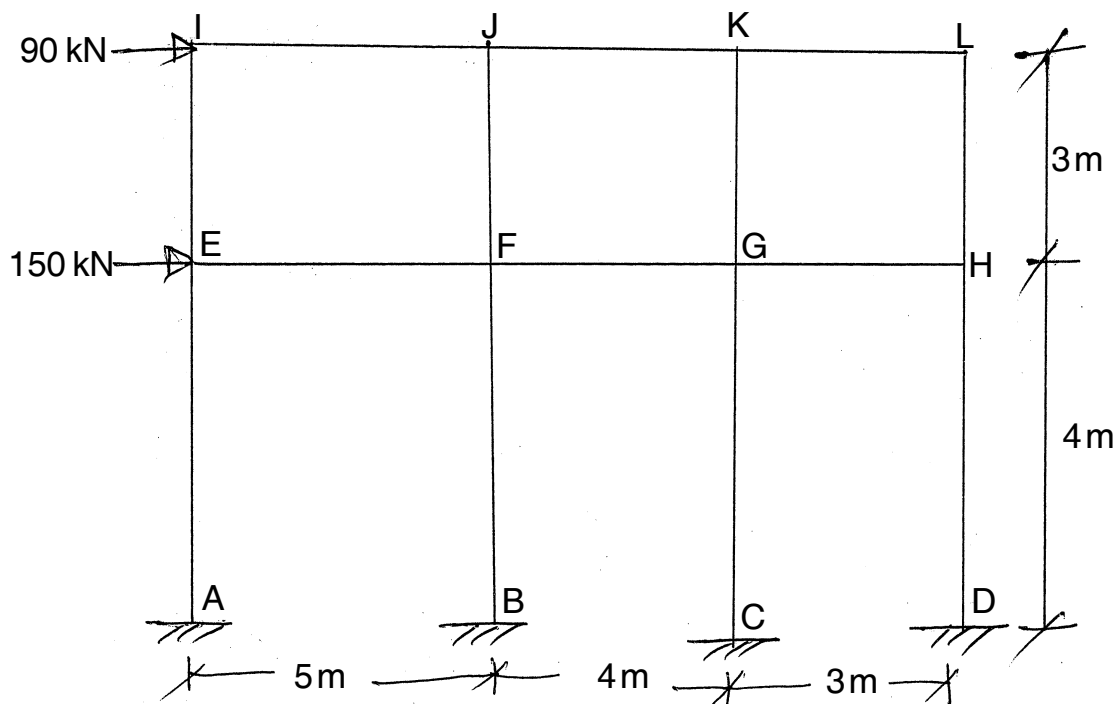

Figure 1

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

   b) Write on high rise tabular frames. **5**

   c) Find moment of resistance of the hot section 100 mm × 150 mm × 6 mm with lip 50 mm. **7**

SECTION – II

4. a) Explain different collapse mechanisms. **6**

   b) A fixed beam of span 6 m carries a uniform distributed load 4 kN/m on the right hand 3 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**

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

   b) Determine the values of fully plastic moment of the frame, when loaded up to portal collapse. The portal frame has vertical portion AB = 3 m, CD = 5 m and horizontal portion BC = 6.5 m. The end A is fixed and is also fixed. A horizontal load of 30 kN towards B is acting at B and a vertical load of 42 kN acting downwards is a 2 m from B on BC portion. The plastic moment of the frame is uniform through out. Draw BMD also. **12**

6. a) Design a composite foot bridge having clear width of 4 m and effective span of 12 m. The bridge is to be designed for live load of 4 kN/m^2. Assume kerb 45 cm × 35 cm and two steel girders at 1.6 m c/c are provided. **12**

   b) Design a cased column to carry a load of 1000 kN. The effective length of column is 4.2 m. **5**

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

Day and Date : Wednesday, 13-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. Answer the following :

 A) Explain the Piguad's theory for the analysis of slab panels. What are the limitations of this theory ? **6**

 B) What is economic span ? How it is calculated ? Derive the equation for the same. **6**

2. Design a slab panel of 'T' beam bridge for following data :

 1) Panel dimension 3.0×3.5 m

 2) Live load – IRC Class AA tracked

 3) Thickness of slab panel = 0.23 m

 4) Thickness of wearing coat = 0.1 m

 5) For $\dfrac{U}{B} = 1, \dfrac{V}{L} = 1$ and $\dfrac{B}{L} = 0.85$, $m_1 = 0.35$, $m_2 = 0.030$.

 6) For $\dfrac{U}{B} = 0.35, \dfrac{V}{L} = 1$ and $\dfrac{B}{L} = 0.85$, $m_1 = 0.085$, $m_2 = 0.060$. **11**

3. 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. Design longitudinal girders for following additional data,

 a) Carriage way width – 9 m

P.T.O.

b) Span of bridge – 18 m

c) Live Load – IRC class A Two Lane

d) Kerb – 600 mm wide, 400 mm deep

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

f) Longitudinal Girder spacing – 3.0 m

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

4. Design a solid deck slab for two lane bridge with following data :

a) Effective span – 7.5 m

b) Carriage way width – 9 m

c) Kerb – 600 × 280 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

Use $\alpha = 2.64$. **12**

SECTION – II

5. Write a note on following (**any four**) : **(3×4=12)**

a) Erection methods for bridges

b) Well foundation

c) Expansion joints

d) Types of bearing

e) Forces on piers.

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

To width of pier – 1.7 m, Height of pier upto springing level – 12 m, C/C distance of bearing – 1 m, Side batter 1 : 15, HFL – 1.3 m below the bearing level, Span of bridge – 15 m, Reaction due to D.L. from each span = 2200 kN, Reaction due to L.L. from each span = 1200 kN, Live load – IRC Class AA tracked

Material of pier = M20 concrete. **11**

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7. Verify the suitability of abutment as shown in the fig. 1. Use following data Density of soil – 18.7 kN/m³, Friction angle of soil $(\phi) = 30°$
   Coefficient of friction – 0.58, Live load IRC class AA tracked. **12**
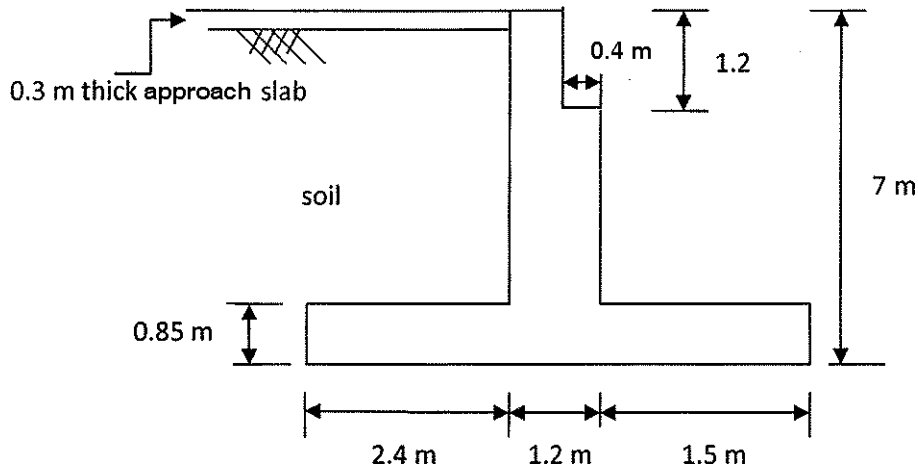

Figure 1.

8. A) Design a elastomeric unreinforced bearing pad for following data.
   Vertical load (sustained) = 190 kN,
   Vertical load (dynamic) = 40 kN,
   Horizontal force = 60 kN
   Modulus of rigidity of elastomer – 1 N/mm²
   Coefficient of friction = 0.3. **6**

   B) Write a note on inspection of bridges. **6**

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

Day and Date : Thursday, 14-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. a) What is Interpolation ? Derive Interpolation formula for unequal intervals. **8**

   b) Write the normal equations for $y = a + bx^2 + cx^3$.
   The curve $y = cd^x$ is fitted to the data

x :	2	3	4	5	6	8
y :	8.3	15.4	33.1	65.2	126.4	146

   Find the best values of c and d. **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 $A = \begin{pmatrix} 1 & \sqrt{2} & 2 \\ \sqrt{2} & 3 & \sqrt{2} \\ 2 & \sqrt{2} & 1 \end{pmatrix}$. **9**

   b) From the following table find the minimum values of y : **8**

x :	3	4	5	6	7	8
y :	0.205	0.240	0.259	0.262	0.250	0.224

3. a) Write a note on quadrature method and formulae pertaining to it. Evaluate the

   integral $I = \int\limits_{0}^{2} \dfrac{dx}{x^2 + x + 1}$ by Simpsons one third rule by dividing interval in eight

   parts. **9**

b) Using central differences derive the Everett's formula. Hence find f (30) from the following table using Bessels formula. **8**

x :	20	28	36	44
y :	2854	3162	7088	7984

SECTION – II

4. a) What is mathematical modelling in research and technology ? Explain with examples modelling that phenomena. **8**

   b) Write a note on numerical solution of ordinary differential equations. Classify different numerical schemes as single step and step by step schemes. Solve the differential equation below by Runge Kutta Method in two steps at $x = 1.4$

   $$\frac{dy}{dx} = \frac{2xy + e^x}{x^2 + xe^x}$$ given $y(1) = 0$. **10**

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

   b) Solve $\frac{\partial u}{\partial t} = \frac{\partial^2 u}{\partial x^2}$ in $0 < x < 5$, $t \geq 0$ given that $u(x, 0) = 20$, $u(0, t) = 0$, $u(5, t) = 100$. Compute u for the time step with $h = 1$ by Crank Nicholson method. **9**

6. a) Write a note on numerical solution of partial differential equations using finite difference method. Given the values of $u(x, y)$ on the boundary of the square in the figure given below satisfying $\nabla^2 u = 0$. **9**
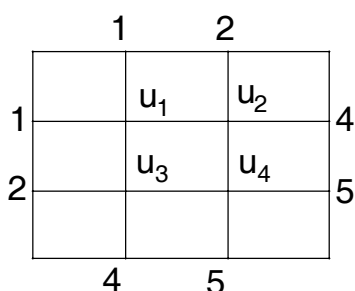
   b) Explain Rayleigh-Ritz method. **4**

   c) Derive the Picards n^{th} approximation formula for solving differential equation. **4**

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Set P

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

Day and Date : Saturday, 16-12-2017   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 free vibrations with coulomb damping.   **7**

    b) Write a note on rotating unbalance.   **7**

2. a) What is coordinate coupling ? Explain different types of coupling.   **7**

    b) Two masses are fixed on tightly stretched string as shown below. Find out two natural frequencies and corresponding mode shapes.   **7**
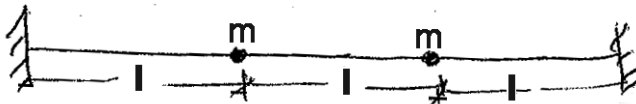
3. a) Write a note on Lagrange's equation to derive equation of motion.   **7**

    b) What is multi degree of freedom system ? Enlist various methods of obtaining natural frequency of multi degree freedom system.   **7**

4. a) Explain Rayleigh's method to find natural frequency of multi degree freedom system.   **7**

    b) Derive equation of motion for torsional vibrations of circular uniform shaft.   **7**

5. a) Write a note on phase plane method.   **7**

    b) Explain nonlinear vibrations with examples.   **7**

6. a) Write a note on FFT analyzer. **7**

   b) Write a note on power spectral density. **7**

7. a) What are random vibrations ? Explain with examples. **7**

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

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Set **P**

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

Day and Date : Monday, 18-12-2017   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) State the stress components using stress-strain relationship. **3**

   b) Derive the compatibility equation for plane stress problem in polar coordinates. **8**

2. Investigate what problem of plane stress can be solved by using the following

   Airy stress function $\phi = \dfrac{-F}{d^3} xy^2 (3d - 2y)$ for the region included by y = 0 to

   y = d and $0 \le x \le 1$. **11**

3. a) Derive the expression for stresses induced in the rotating disc of uniform thickness. **8**

   b) Write a note on shell of uniform strength. **4**

4. a) Explain the membrane analogy used to solve torsion problem. **6**

   b) Derive the differential equation of equilibrium for plane stress problem in Cartesian coordinates. **6**

SECTION – II

5. a) State the assumptions made in theory of contact stresses. **4**

   b) Derive the expression for pressure and area of contact in case of two cylindrical rollers in contact subjected to compressive load. **8**

P.T.O.

6. Locate the shear centre for the following section having uniform thickness of 2 mm. **11**
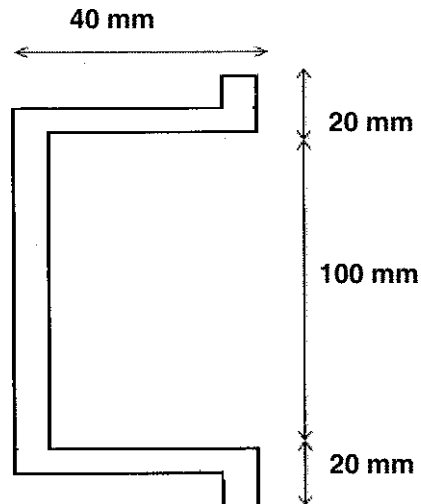
7. Derive the expression for torque and angle of twist for a prismatic bar having elliptical cross section. **11**

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

   i) Hydrodynamic analogy.

   ii) Membrane stresses in partially filled spherical storage tank.

   iii) Static load carrying capacity of ball bearings based on Hertz contact stresses.

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

Day and Date : Wednesday, 20-12-2017　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) What are different types of research ? Explain any two with suitable
　　 examples. **7**

　 b) Why one should publish his research work ? How you will find right journal
　　 for publication of your research ? **7**

2. a) What is literature survey on research ? Explain its importance and methods. **7**

　 b) Explain Replication, Randomization and Blocking. **7**

3. a) Give classification of mathematical models. State benefits of modeling and
　　 simulation. **7**

　 b) Explain use of Analogy, Models as Approximations. **7**

4. a) What is analysis of variance ? Give its types with suitable examples. **7**

　 b) What is creativity ? Explain various techniques for improving creativity. **7**

5. a) Explain steps involved in developing empirical model. What are the
　　 drawbacks of empirical model ? **7**

　 b) Explain principles of thesis writing. **7**

6. a) Explain principles of DOE. **7**

　 b) Explain factorial Experimental Design. **7**

7. Write short notes on **any two** : **14**
　 a) Delphi Method
　 b) Data collection techniques
　 c) Creative problem solving
　 d) Taguchi method.

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

Day and Date : Friday, 22-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

Instructions : 1) *Answer figures to the **right** indicate **full** marks.*
2) *Assume **any three** questions from **each** Section.*
3) *Suitable data **if necessary** and mention **it clearly**.*
4) ***Use** non programmable calculators is **allowed**.*

SECTION – I

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

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

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

   b) Derive Freudensteins equation. **6**

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

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

4. Write notes on the following : **11**
   a) Task of kinematic synthesis
   b) Ball point.

P.T.O.

SECTION – II

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

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

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

   $W_2 = 1$ rad/sec $\alpha_2 = 20$ rad/sec^2

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

   Comment on the resulting mechanism. **6**

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

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

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

   b) Explain Pole triangle. **6**

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

   a) Return Circle

   b) Denavit-Herternberg Parameter.

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

Day and Date : Friday, 22-12-2017　　　　　　　　　　　　　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) Define standard of measurement and explain different types of standards.　**6**

   b) Define the following :　**6**
   　i) Accuracy　　　　　ii) Precision
   　iii) Linearity　　　　iv) Drift
   　v) Hysteresis　　　　vi) Resolution.

2. a) Derive an expression for output response of second order system to a step input.　**6**

   b) Explain different signal conditioning operations.　**5**

3. a) Explain Ionisation and Mechano-Electronic transducer.　**6**

   b) Explain Mechanical and Hydraulic Amplifying element.　**5**

4. Write short notes on **(any four)**.　**12**
   　i) Pneumatic Load Cell
   　ii) Belt Dynamometer
   　iii) Potentiometric type A-D converter
   　iv) Electrodynamic transducer
   　v) Vibrating String Transducer
   　vi) Differentiating and Integrating Elements.

P.T.O.

SECTION – II

5. a) Explain High Pressure measurement. **6**

   b) Explain variable area flow meter. **6**

6. a) Explain Resistance temperature detectors. **5**

   b) Explain Sound Pressure Level and Sound Power Level. **6**

7. a) Explain system analysis by harmonic testing. **6**

   b) Explain Particle counters. **5**

8. Write short notes on **(any four)**. **12**

   i) Random Force Testing

   ii) Capacitor type microphone

   iii) Seeback effect and Peltier effect

   iv) Pirani Gauge

   v) Permanent Monitoring system

   vi) Total Radiation pyrometer.

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M.E. (Mechanical – Design Engineering) (Sem. – I) Examination, 2017
(CBCS/CGPA)
Paper –V – Elective – I : RELIABILITY ENGINEERING

Day and Date : Friday, 22-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note :   1) **All** questions are **compulsory**.
       2) Assume suitable data if **necessary**.
       3) Figure to **right** indicates marks.

SECTION – I

1. A) Explain Taguchi parameter design concept with suitable example.   **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) A company supplies a box of 50 condensers of which five defective units get mixed up due to an error. If four items are drawn with replacement, what is the probability of
     1) Getting exactly 2 defective condensers.
     2) Getting at least 2 defective condensers.
     3) Getting at the most 2 defective condensers.   **6**

   B) The time-to-failure density function (PDF) for a system is

     $f(t) = 0.01 \quad 0 \leq t \leq 100$ days

     Find :
     1) R(t).
     2) The hazard rate function.
     3) The MTTF.
     4) The standard deviation.
     5) The median time to failure.   **6**

3. Write short note (**any three**) :   **(4×3=12)**

   1) Concept of quality loss function.

   2) Taguchi's approach to parameter design.

   3) Bayesian theorem of probability.

   4) Standby systems.

SECTION – II

4. A) What are the important benefits of FMECA ?   **5**

   B) Consider a system composed of three subsystems with the estimated failure rates of $\lambda_1 = 0.005$, $\lambda_2 = 0.003$ and $\lambda_3 = 0.001$ failure per hour, respectively. The system has a mission time of 20 hours. A system reliability of 0.95 is required. Find the reliability requirement for the subsystems.   **6**

5. A) Assume that an engineering system is composed of four independent and identical units in parallel. At least three units must operate normally for system success. Calculate the system mean time to failure if the unit failure rate is 0.0035 failures per hour.   **6**

   B) Explain reliability testing.   **6**

6. Write short note **(any three)** :   **(4×3=12)**
   1) Identification-as one maintainability design factor.
   2) Ideal reliability growth curve.
   3) Interchange ability-as one maintainability design factor.
   4) Reliability growth cycle.

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Set **P**

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

Day and Date : Friday, 8-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Solve **any three** questions from **each** Section.
            2) **Use** of Calculator is **allowed**.
            3) Figures to the **right** indicate **full** marks.
            4) Assume additional data **if** necessary and mention it **clearly**.

SECTION – I

1. A) What is SVAJ diagrams ? Explain importance of SVAJ diagrams.   **5**

   B) Design polynomial cam for the following data.
      - Dwell at zero displacement for $90°$
      - Rise of 30 mm in $90°$
      - Dwell of 30 mm in $90°$
      - Fall of 30 mm in $90°$
      Cam velocity is 10 rad/s   **6**

2. A) Define Tribology. With example discuss economical importance of Tribology.   **6**

   B) With neat sketch explain the mechanism of pressure development in hydrodynamic lubrications.   **6**

3. A) State and explain three laws of wear.   **6**

   B) Write note on converging and diverging films.   **6**

4. Explain Sommerfeld number and its importance, half Sommerfeld solution. Reynolds boundary conditions with Sommerfeld substitution.   **11**

P.T.O.

SECTION – II

5. A) Write short note on Weibull model. **5**

   B) Derive expression for R(t), z(t) and F(t) in case of distribution function and reliability analysis. **6**

6. A) Explain the methods of reducing thermal stresses. **6**

   B) Derive expression for the thermal stresses in flat walls. **6**

7. A) In a survival test conducted on 100 cartoons for their strength under impact loading following results were obtained. **6**

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

   Determine : i) Failure density   ii) Hazard Rate   iii) Reliability

   B) Explain design for manufacturing and assembly. **6**

8. A) Write note on hydrostatic and elasto hydrodynamic bearings. **6**

   B) Write note on bath tube curve. **5**

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ME (Mechanical – Design Engineering) (Sem – II) (CBCS/CGPA) Examination, 2017 FINITE ELEMENT ANALYSIS – (Paper – VII)

Day and Date : Saturday, 9-12-2017   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) What is meant by discretization of a structure ? Discuss the various aspects to be considered while discretising a structure for finite element analysis.   **6**

   b) Explain Finite Element method. Describe advantages and limitations of the method.   **5**

2. a) Explain principal of virtual work.   **6**

   b) Derive property matrix [D] for plane stress and plane strain condition.   **5**

3. a) Find axial deformation of uniform bar fixed at one end and subjected to an axial load at other end as shown in figure using weighted residual technique.   **8**
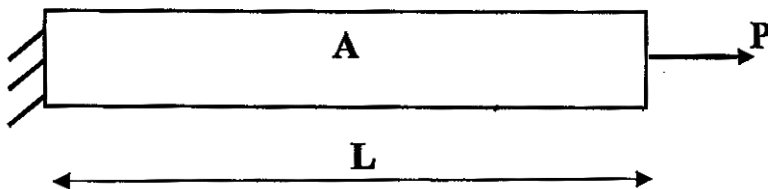
   b) Explain general procedure of finite element analysis.   **4**

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

   a) Rayleigh Ritz Method.

   b) Size and number of elements.

   c) Overview of CAE and CAE software.

SECTION – II

5. a) Using Lagrange's polynomial find shape function two and four noded bar element.   **5**

   b) Explain in brief Iso-parametric, sub-parametric and super-parametric elements along with its use.   **6**

6. Using finite element method find temperature distribution and heat flow through composite wall layer of insulation sandwiched between two brick walls as shown in figure.   **12**
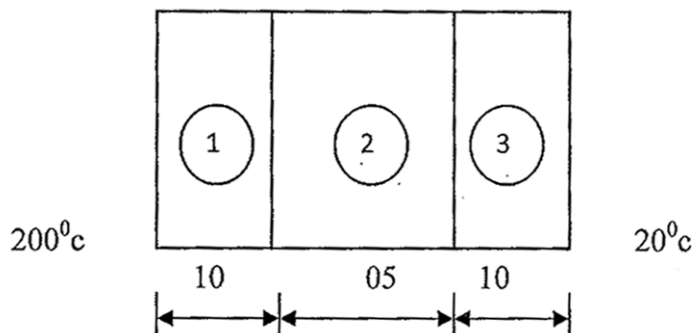
$K_1 = K_3 = 80*10^{-3}$ W/mm°c; $K_2 = 1* 10^{-3}$ W/mm°c; All dimensions are in mm. Assume unit cross sectional area of wall.

7. a) Explain sub-modelling and sub-structuring methods to improve modelling efficiency.   **6**

   b) Explain plane stress, plain strain and axis symmetric elements.   **5**

8. Write short note on (attempt **any two**) :   **12**
   a) Model validity and model accuracy.
   b) Concept of mapping.
   c) Transient analysis.

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

Day and Date : Monday, 11-12-2017   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 observed through analyzer when the stressed model is kept in plane polariscope.   **8**

   b) Explain any one compensator method.   **4**

2. a) Explain casting technique of Photo elastic material.   **6**

   b) Explain in detail holography.   **6**

3. a) Explain oblique incidence method.   **6**

   b) Explain in brief :   **6**

      i) Isoclinic

      ii) Isochromatic

      iii) Random light

      iv) Monochromatic light.

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

   a) Dynamic photo elasticity

   b) Fringe sharpening.

SECTION – II

5. a) The strain readings measured by an equiangular rosette at a point in the stressed body are as follows :

   •a = −845 micro-strain, •b = 1220 micro-strain, •c = 710 micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress.

   Take E = 200 GPa and μ = 0.285. **8**

   b) Explain selection of strain gauges. **4**

6. a) Derive the equation of output voltage for

   i) 4-arm sensitive (2 linear and 2 lateral) combination

   ii) 2-arm sensitive (1 linear and 1 lateral) combination. **8**

   b) Explain temperature compensation for a strain gauge. **4**

7. a) Explain Moiré fringe method. **7**

   b) Explain torque measurement by strain gauges. **5**

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

   a) Dynamics strain measurement

   b) Commercial strain gauge indicators.

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

Day and Date : Tuesday, 12-12-2017   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 concept of unity and of order with variety. **7**

    b) Visualize any industrial product and draw neat sketch. Explain how the ergonomic and aesthetic principles are incorporated in the design. Suggest desired modifications with proper justifications. **7**

2. a) Explain the design and development process of industrial product. **7**

    b) Explain proportion, rhythm and radiance with examples. **7**

3. a) How the creative ideas are generated with the help of brain storming session ? How it is effectively conducted ? **7**

    b) "Ergonomics and aesthetics are two sides of a coin, in industrial product design". Explain this statement with suitable examples. **7**

4. a) Explain ergonomic aspects in process equipments with suitable examples. **7**

    b) Discuss the use of colour for ergonomics and aesthetics of product. **7**

5. a) Explain role of maintenance aspects in product design with suitable examples. **7**

    b) Discuss the requirements of an industrial product and compare with those of consumer products. **7**

6. a) What is standardization ? Explain the importance of standardization in industrial product design. **7**

    b) What is interpretation of information ? Explain its necessity in the consumer products. **7**

7. a) Choose any consumer product and explain selection of color, form and style for this product with justification. **7**

    b) Explain proto type design and rapid prototyping. **7**

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

Day and Date : Wednesday, 13-12-2017   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. a) Derive the equation of law of adhesive wear as proposed by Archard and comment on it. **8**

   b) What do you mean by infinitely long bearing and infinitely short bearing ? Comment on pressure gradient and load carrying capacity in both cases. **5**

2. a) Following data refers to hydrostatic thrust bearings. **8**
   1) Shaft dia. = 500 mm
   2) Recess dia. = 300 mm
   3) Shaft speed = 750 mm
   4) Supply pressure = 6 N/mm^2
   5) Film thickness = 0.18 mm
   6) Viscosity of lubricant = 28 cP
   7) Specific gravity of lubricant = 0.86.
   8) Specific heat of lubricant = 1.76 kJ/kg°C

   Calculate :
   1) Load carrying capacity.
   2) Flow requirement in 1/min.
   3) Viscous power loss 4, Temp. rise.

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

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

   b) Write a note on Rayleigh step bearing. **4**

4. Briefly discuss :

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

   2) Lubrication of gears. **4**

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

SECTION – II

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

   b) A plate of 25 mm length and infinite width is separated from the plane by an oil film of 25 μ m thickness and having an viscosity of 0.05 N-s/m². If the normal load per unit width of 20 kN/m is applied on the plate. Determine

   1) The time required to reduce the film thickness to 2.5 μ m.

   2) The maximum pressure. **8**

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. a) Two cylinders of radii R_1 and R_2 and length L are transmitting a radial load W. Find the width of contact, if both the cylinders are made of same material with Young's modulus E and Poisson's ratio. **8**

   b) Explain in brief tribological aspects of metal rolling. **3**

8. Briefly discuss
   1) Lubrication in wire drawing and extrusion. **4**
   2) Piston pin lubrication. **4**
   3) Desirable properties of bearing material. **3**

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

Day and Date : Wednesday, 13-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain the plastic zone shape according to Tresca and Von Mises criteria.   **10**

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

2. a) Explain the Griffith's energy balance approach to identify catastrophic failure
      of material of a material.   **7**

   b) The stress intensity for partial through thickness flaw is given by

      $K = \sigma\sqrt{\Pi a}\sqrt{\sec\left(\dfrac{\Pi a}{2t}\right)}$ where a = depth of penetration of flaw through wall

      thickness t. If the flaw is 5 mm deep in a wall of 12 mm thick, determine
      whether wall will support the stress of 172 MPa if it is made from aluminum
      alloy. Take value of $K_{Ic} = 24$ MPa $\sqrt{m}$.   **10**

3. a) Explain microscopic and macroscopic failure mode related to fracture
      mechanics.   **6**

   b) What is modified Griffith criteria (Irwin's fracture criteria).   **6**

   c) Distinguish between the trans-granular and inter-granular fracture.   **6**

SECTION – II

4. a) Describe any two testing methods used for determination of fracture toughness **7**

   b) A large centre-cracked plate containing an initial crack of length $2a_o = 10$ mm is subjected to constant amplitude cyclic tensile stress ranging between a minimum value of 140 MPa and maximum value of 200 MPa. Assuming fatigue crack growth rate is governed by equation $\dfrac{da}{dN} = 0.44 \times 10^{-11} \, (\Delta k)^3 \, (m/cycle)$

      i) calculate crack growth rate when crack length has the following values $2a = 4$ mm, 6 mm. **10**

5. a) Determine the plastic zone length at fracture for mild steel length at fracture for mild steel with $K_{IC} = 60$ MPa $\sqrt{m}$ and $\sigma_{ys} = 450$ MPa for i) plane stress ii) finite thickness condition. **10**

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

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

   i) S-N diagram

   ii) Creep resistant materials.

   iii) Photo elasticity method for evaluating fracture toughness.

   _____

Seat No.

Set **P**

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

Day and Date : Wednesday, 13-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions :   1) Attempt **any two** questions.

     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 metal matrix composite in detail.   **6**

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

   1) Transformed compliance matrix

   2) Transformed reduced stiffness matrix

   If the applied stress is $\sigma x = 2$ MPa, $\sigma y = -3$ MPa, and $\tau xy = 4$ MPa, also find.

   3) Global strains

   4) Local strains

   5) Local stresses

   6) Principal stresses

P.T.O.

7) Maximum shear stress

8) Principal strains

9) Maximum shear strain. **12**
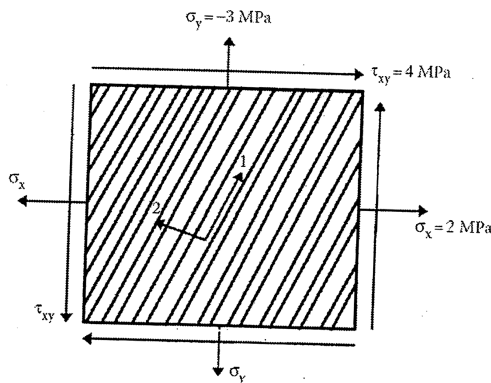
Applied stresses to an angle lamina

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) Explain Hooke's law for different types of materials. **6**

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

   B) Explain Tsa-Hill theory **7**

SECTION – II

4. A) Explain layup and curing related with manufacture of laminated fibre reinforced composite materials. **6**

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

   C) Explain NDT methods for composites. **5**

5. A) What are basic restrictions, assumptions and consequences for governing equation for bending, buckling and vibration of laminated plates. **8**

   B) Explain types of defects related with manufacture of composites. **9**

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

   a) Design of composite structures

   b) Kirchoff hypothesis related with macro-mechanical behaviour of laminates.

   c) Buckling equations for laminate plates. **Set P**

TABLE NO. [1]

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

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

Set P

SLR-TK – 31

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

Day and Date : Wednesday, 13-12-2017　　　　　　　　　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 classification of optimization problems and explain any 2 of them. **7**

　b) A beam of uniform rectangular cross-section is to be cut from a log having a circular cross-section of diameter 2a. The beam has to be used as a cantilever beam (the length is fixed) to carry a concentrated load at the free end. Find the dimensions of the beam that correspond to the maximum tensile (bending) stress carrying capacity. **7**

2. a) Write a note on solutions of system of linear simultaneous equations. **7**

　b) Explain unrestricted search method. **7**

3. a) Explain random walk method. **7**

　b) Explain sequential linear programming method for nonlinear problems of constrained optimization. **7**

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

　b) Write a note on genetic algorithms. **7**

5. a) Write a note on exhaustive search. **7**

　b) Explain standard form of linear programming. **7**

6. a) Explain selection of optimum configuration of mechanical systems. **7**

　b) Write note on multivariable optimization techniques. **7**

7. a) Explain the procedure of formulation of optimization problem. **7**

　b) Write note on characteristics of mechanical systems. **7**

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Seat No.

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

Day and Date : Thursday, 14-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *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 physical structure of PMOS transistor and explain accumulation, depletion and inversion modes. **6**

   b) What are second order effects for MOS transistor ? Explain any two. **5**

2. a) Draw circuit of CMOS inverter and explain how VTC of CMOS inverter is obtained. **8**

   b) Explain static power dissipation of CMOS inverter. **4**

3. a) What is Ratioed logic ? **4**

   b) Design full adder using ratioed logic. **8**

4. a) Explain basic principle of dynamic CMOS logic. **4**

   b) Design universal gates using dynamic CMOS logic. **8**

P.T.O.

SECTION – II

5. a) What is principle of Bistability ? **4**

   b) Explain master slave positive edge triggered register using multiplexers. **7**

6. a) Draw circuit of Ratioed CMOS SR latch and explain. **6**

   b) Explain latch based clocking. **6**

7. a) What are sources of clock skew and jitter ? **6**

   b) Explain designing of read only memories. **6**

8. Write notes on **any two** of the following : **(6×2=12)**

   a) Arbiters

   b) Designing fast adders

   c) TSPCR (True Single Phase Clocked Register).

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

SECTION – I

1. 1) Draw the block diagram of Backward linear predictor. Derive the equation for Backward prediction Error. **6**

   2) Discuss a pipelined architecture for implementing the Schur Algorithm. **6**

2. 1) Explain in detail use of DFT in power spectrum estimation. **6**

   2) Explain the relationship between the Autocorrelation and Model parameter. **6**

3. 1) Explain the design of Optimum Equiripple Linear phase FIR filter. **6**

   2) Explain the design of FIR Differentiator. **5**

SECTION – II

4. 1) Explain in detail Interpolation by a factor I. Draw the spectra of x(n) and v(n). **6**

   2) Explain polyphase structures in detail. **6**

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

   2) Design a digital low pass Butterworth filter using bilinear transformation with pass band and stop band cut-off frequencies 200 Hz and 500 Hz respectively. The pass band and stop band attenuation are –5db and –12db respectively. The sampling frequency is 5000 Hz. **6**

6. 1) Explain Discrete wavelet transform with phase of gain $\sqrt{2}$. **6**

   2) Explain the use of scaling function in case of multiresolution system. **5**

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Seat
No.

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

Day and Date : Monday, 18-12-2017   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 **if necessary**.*

SECTION – I

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

   1) What are the features of TCP ? Compare between TCP and UDP protocols.

   2) Specify various ICMP messages and their meanings. Draw message format of echo request and echo reply and explain.

   3) What are the types of filters ? Discuss packet level filter in detail.

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

   1) Draw the message format for address resolution and discuss importance of each field. What are ARP encapsulation policies ?

   2) Explain Kern's algorithm related to TCP. If R_{TT} in TCP is 32 msec currently and following acknowledgements are 26, 30 and 25 msec respectively. Find new R_{TT}, if α is 0.9 and β is 4.

   3) Draw architectural model of network management. What is MIB ? Specify some MIB variables and their meanings.

3. Answer following questions :

   1) What is secret key cryptography ? What are the steps in data encryption standard ? Discuss DES in detail.   **5**

   2) What is the purpose of IPsec authentication header ? Draw IPsec authentication header format and explain each field.   **6**

                              OR

   2) What is congestion ? What is the effect of congestion over quality ? Discuss TCP congestion control algorithm.   **6**

SECTION – II

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

   1) List various protocols used for streaming. Draw protocol attack for streaming and explain it.

   2) Explain JPEG image compression standard.

   3) Draw and explain functioning of MPEG audio encoder.

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

   1) What are the objectives of application layer QoS control ? Discuss technique employed for the same.

   2) Why IP is unreliable ? How RSVP is utilized to improve IP's performance ?

   3) What is error resilient approach for real time video transport ? Discuss error resilient video encoding.

6. Answer following questions :

   1) What is audio/video streaming ? Explain different methods of audio/video streaming. **5**

   2) What are essential parameters for real time streaming ? Discuss RTP for real time streaming. **6**

   OR

   2) What is digital video ? Explain video compression used in internet communication. **6**

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Seat
No.

Set **P**

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

Day and Date : Wednesday, 20-12-2017 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 the following :

   a) Define the probability distribution function. Give the properties of probability distribution function. **5**

   b) If the probability density function of a random variable X is $f_x(x) = ce^{-2x}$, $0 \leq x \leq \infty$ find
      i) The value of c
      ii) Mean
      iii) Variance. **6**

   OR

   b) A random variable X has a uniform distribution over (–3, 3) compute
      I) P(X<2), P(|X|<2), P(|X – 2|< 2)
      II) Find k for which P(X>k) = 1/3. **6**

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

   a) State the axioms of probability. Prove that the probability of an impossible event is zero.

   b) A company has two plants to manufacture scooters. Plant I manufactures 80% of the scooters and plant II the rest. At plant I, 85 out of 100 scooters are rated higher quality and at plant II, only 65 out of 100 scooters are rated higher quality. A scooter is chosen at random, what is the probability that the scooter came from plant II, if it is known that the scooter is of higher quality ?

P.T.O.

c) A balanced coin is tossed nine times. Find the probabilities of each of the following events :

   i) exactly 3 heads occurred;

   ii) at least 3 heads occurred;

   iii) at least 3 heads and at least 2 tails occurred.

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

a) The joint probability density function of two random variables X and Y is given by

$$f_{xy}(x, y) = \begin{cases} c\, x(1-y) & 0 \le x\, y \le 1 \\ 0 & \text{otherwise} \end{cases}$$

Find the covariance. Comment on the nature of X and Y.

b) Explain in brief how to obtain the expected value and variance of sum of two random variables.

c) Two random variables X and Y have mean and variance of

$\mu_x = 1$, Variance of X = 1

$\mu_y = 0$, Variance of Y = 4.

The correlation coefficient of these two random variables is $\rho = 0.5$

   i) Find the mean value of X

   ii) Find the variance of X and Y

   iii) Find E[XY]

   iv) Find E[(X + Y)(X – Y)].

SECTION – II

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

a) Write short note on : Estimation of autocorrelation function.

b) Let the random process be X(t) = (cos t + θ) where θ is a random variable with uniformly distributed in $(-\pi/2,\ \pi/2)$. Check whether the process is stationary or not ?

c) If X(t) and Y(t) are wide sense stationary processes, then prove that

$$\left| R_{XY}(\tau) \right| \le \sqrt{R_{XX}(0)\, R_{YY}(0)} \ .$$

Set P

5. Attempt the following :

   a) Define the cross spectral density between two random processes and explain. **5**

   b) Let X(t) be a random process having the following form :

   $X(t) = A \cos(\omega_0 t + \theta)$

   Where A and ω_0 are constants, θ is a random variable . Random variable θ is uniformly distributed random variable in $(0, 2\pi)$. Obtain the power spectral density Sx(f). **6**

   OR

   b) Find the power spectral density of a stationary process X(t) with

   $R_{XX}(\tau) = 6 + e^{-2|\tau|}$. **6**

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

   a) Explain how to estimate the frequency response of linear systems using frequency domain techniques.

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

   $R_X(\tau) = 5\delta(\tau) + 25$

   Is applied to the input of a linear system having an impulse response of the form

   $h(t) = \begin{cases} 4(1-t) & 0 \le t \le 1 \\ 0 & \text{elsewhere} \end{cases}$

   Find the mean value of the process at the output of the system.

   c) Define a Markov process. Prove that a Poisson process is a Markov Process.

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Set **P**

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

Day and Date : Friday, 22-12-2017   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 SAW filters ? What are issues associated with it ? **6**

   b) Design an active loop PLL synthesizer with frequency range 2.4 – 2.5 GHz (Center frequency 2.45 GHz), Vcc = 5 V, f_{ref} = 10 MHz, f_{com} = 100 KHz, channel spacing = 100 KHz, filter of third order, loop bandwidth = 2 KHz, charge pump gain = 1 mA, phase margin = 45°, T3/T1 ratio = 100%, PLL IC of National LMX2326, VCO of RFMD VCO790 – 2300T. **7**

2. Solve **any two**.

   a) What are passive mixer distortions ? **6**

   b) Explain how forward S parameters can be measured. **6**

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

3. Solve **any two**.

   a) Explain diplexer filters. **5**

   b) What are PLL fractional N synthesizers ? **5**

   c) Design a low cost variable bias VGA amplifier with reverse gain control. Assume suitable parameters. **5**

Set P

SECTION – II

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

   b) Discuss combiners. **6**

5. Solve **any two**.

   a) Draw and explain a superhetrodyne dual conversion receiver. **6**

   b) Discuss linear congruential and extended Fibonacci methods for random number generation. **6**

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

6. Solve **any two**.

   a) Design a passive RF diode single ended mixer for RF of 60 MHz and IF of 40 MHz. Assume suitable parameters. **5**

   b) Discuss AGC and issues associated with it. **5**

   c) Give a brief overview of methodology used for communication system simulation. **5**

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Set P

Seat No.

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

Day and Date : Friday, 22-12-2017　　　　　　　　　　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) What are WSN design challenges ?　　　　　　　　　　　　　　**7**

　 b) What are different hardware platforms available for realization of WSN ?　　**6**

2. Solve **any two** :

　 a) Explain any two applications of dynamic WSN in detail.　　　　　**6**

　 b) Explain D MAC.　　　　　　　　　　　　　　　　　　　　**6**

　 c) Explain any hybrid MAC.　　　　　　　　　　　　　　　　　**6**

3. Solve **any two** :

　 a) What are different energy based metrics used to evaluate performance of routing ?　　**5**

　 b) Explain SPIN-PP algorithm.　　　　　　　　　　　　　　　**5**

　 c) Explain any one type of on demand routing.　　　　　　　　　**5**

SECTION – II

4. a) Explain ZigBee functional layer architecture and protocol stack. **7**

   b) With suitable diagram explain, generic architecture of WSN node. **6**

5. Solve **any two** :

   a) Explain sensor MAC. **6**

   b) Explain energy efficient link layer. **6**

   c) Explain features of IEEE 802.15.4. **6**

6. Solve **any two** :

   a) What are challenges in time synchronization ? **5**

   b) Explain receiver-receiver synchronization. **5**

   c) Explain Ad hoc Positioning System (APS). **5**

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Seat
No.

Set **P**

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

Day and Date : Friday, 22-12-2017   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) What is sampling in image processing ? Explain 2-D sampling theory.

   2) Define DCT and explain 2-D DCT.

   3) Explain the singular value decomposition transform. Including its properties and application.

   4) Explain details basic gray level transformation operation (any two).

   5) Explain inverse and pseudo-inverse filtering.

   6) Explain 4 × 4 Harr transform.

2. Solve the following questions :

   1) Explain and perform K-L transform for the following matrix.   **(1×8=8)**

   $$X = \begin{array}{|c|c|} \hline 4 & 2 \\ \hline -1 & 3 \\ \hline \end{array}$$

   2) With reference to following example, explain Histogram equalization ?   **(1×7=7)**

2	3	3	2
4	2	4	3
3	2	3	5
2	4	2	4
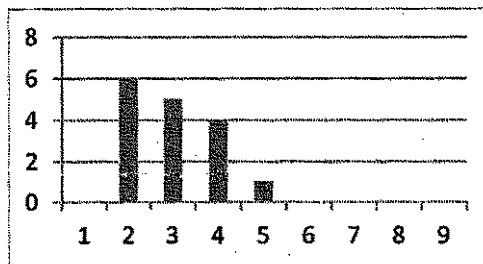
Fig (a) Image 4*4   Fig (b) Histogram

SECTION – II

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

1) Explain any two method of edge detection.

2) Explain details chain code for boundary detection.

3) Explain fundamental concept of video processing.

4) Explain details MPEG1, MPEG 2.

5) Explain in details Baseline JPEG.

6) What is image compression, explain transform coding technique ?

4. Solve the following questions :

1) Explain Huffman coding for given below example and find out efficiency of Huffman coding. **(1×8=8)**

5	6	4	3
2	6	4	4
3	3	5	2
2	3	4	4

2) Explain video compression technique. **(1×7=7)**

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Seat No.

Set **P**

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

Day and Date : Friday, 8-12-2017　　　　　　　　　　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) Discuss static and dynamic system models.　　**6**

　 b) Discuss research design. What are its features ?　　**6**

2. a) What is a need of literature review ? What are steps to carry it ?　　**5**

　　　　　　　OR

　 b) What is mathematical modeling ? Why it is required in research ? What are its features ?　　**5**

　 c) Discuss any five characteristics of mathematical modeling.　　**5**

3. a) With suitable example discuss significance of scope, assumptions and validation criteria in a typical research synopsis.　　**7**

　 b) With suitable example explain applied Vs fundamental research.　　**6**

　　　　　　　OR

　 c) With suitable engineering example explain Monte Carlo simulation.　　**6**

SECTION – II

4. a) Discuss various sections of a typical project report.　　**6**

　 b) What are the guidelines for design of experiment ?　　**6**

P.T.O.

5. a) With suitable example explain how to write an abstract of technical report. **5**

   OR

   b) Discuss role of ICT at different stages of research. **5**

   c) With suitable example discuss ethical practices to be followed in research. **5**

6. a) With suitable example explain strategy for experimentation. **7**

   b) Explain types of errors in design of experiments. **6**

   OR

   c) For a hypothetical engineering Research Project Report, write a 'Conclusion'. Explain its salient features. **6**

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Seat No.

Set **P**

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

Day and Date : Saturday, 9-12-2017

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

Total Marks : 70

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

SECTION – I

1. Describe the following instructions with example (**any five**) : **(5×3=15)**

   a) LDR

   b) ADD

   c) MOV

   d) LDMIA

   e) STR

   f) MVN.

2. Explain the operation of ARM9 pipeline for simple instructions. **10**

3. Explain embedded communication using I2C. **10**

OR

Draw and explain ARM core data flow model.

SECTION – II

4. How C/C++ is useful in embedded system programming ? **10**

5. Discuss the various debugging techniques and debugging challenges. **10**

6. Draw and explain basic system design of robotics (wireless). **15**

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

Day and Date : Monday, 11-12-2017

Max. Marks : 70

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

SECTION – I

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

    1) What is balanced data transmission ? List various advantages of balanced transmission. Draw grounding arrangement related to RS-485 connection.

    2) Explain different data transfer types in USB.

    3) What is enumeration process in USB ? Describe it in detail.

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

    1) How another GPIB device can be added ? Explain GPIB expander. List different drawbacks of GPIB.

    2) Design '4 to 20 mA' current loop to measure pressure. A pressure transducer with operating voltage of 13 V to 30 V DC is located at distance of 600 meter from the measuring device. Assume internal resistance of 3 Ω per 40 meter for connecting wire that connects transducer to measurement system.

    3) What is PCI master, slave and arbiter ? Draw and explain basic structure and timing waveforms of PCI bus arbiter.

3. Answer following questions :

    1) Draw and explain USB packet format for data transfer. List various versions of USB. **6**

    2) Draw and explain ISA bus cycles. **5**

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

    2) Explain interrupt handling mechanism in PCI. **5**

P.T.O.

SECTION – II

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

   1) What are system timer, DMA controller and video controller related to PC ?

   2) What is the function of line control register and line status register in case of PC 16550 UART ?

   Calculate value of divisor to be loaded into divisor latch register to communicate at 9600 bps, if clock frequency of 1.8432 GHz.

   3) Compare between analog, hybrid and digital communication protocols. What are field buses ?

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

   1) With neat sketch describe construction of PLC used in process control industry. What are the PLC selection criteria's ?

   2) Compare between performance of P, PI, PD and PID controllers.

   3) Name the layers of HART protocol. Draw and explain structure of HART telegram.

6. Answer following questions :

   1) Draw MODBUS message structure. Explain the frame format of MODBUS message for ASCII and RTU mode. **6**

   2) What are the characteristics of physical layer in DeviceNet ? Draw and explain DeviceNet frame structure. **5**

                    OR

   2) List data encapsulation and series of actions to send data from host on one network to host on another network using TCP/IP and ethernet protocol. **5**

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Seat No.

Set **P**

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

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

N.B. : 1) *Figures to the* **right** *indicate* **full** *marks.*
         2) *Assume suitable data whenever* **necessary**.

SECTION – I

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

   a) What are advantages of state space techniques over the transfer function techniques of analyzing the control systems ?

   b) Derive the state model in Jordan's canonical form for a system having transfer function

   $$T(s) = \frac{1}{s^3 + 4s^2 + 5s + 2}$$

   c) Find the inverse z transform for

   $$F(z) = \frac{2z^3 + z}{(z - 2)^2 (z - 1)}$$

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

   a) Find transfer function of the system for following state matrices.

   $$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & -1 & 1 \\ 0 & 1 & -10 \end{bmatrix}; \quad B = \begin{bmatrix} 0 \\ 0 \\ 10 \end{bmatrix}; \quad C = \begin{bmatrix} 1 & 0 & 0 \end{bmatrix}$$

   b) Explain sampling and quantization effect in detail.

P.T.O.

c) Find the response y (k) as function of k for following transfer function model with given inputs.

$$G(z) = \frac{Y(z)}{R(z)} = \frac{2z - 3}{(z - 0.5)(z + 0.3)}$$

$$r(k) = \begin{cases} 1, & k = 1 \\ 0, & k \neq 1 \end{cases}$$

3. a) A unity feedback system is characterized by the open loop transfer function

$$G(z) = \frac{0.2385(z + 0.876)}{(z - 1)(z - 0.2644)}$$ for T = 0.2 sec determine the steady state errors

for unit step, unit ramp and unit acceleration input.   **6**

b) Obtain stability of the system with characteristic polynomial.   **5**

$$\Delta(z) = 2z^4 + 7z^3 + 10z^2 + 4z + 1 = 0$$

SECTION – II

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

a) For the control system given by

$$\dot{x} = Ax + By$$

Where $A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -5 & -6 \end{bmatrix}$, $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ by using state feedback control

y = – Kx, it is desired to have the closed loop poles at s = –1 ± j2, s= –10. Determine the state feedback gain matrix k.

b) Explain state observer and its design.

c) Explain basic MIMO control loop.

Set P

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

   a) Explain conversion of MIMO problem to SISO problem.

   b) Explain main requirements in Robust control system.

   c) The negative feedback control system has the forward path transfer function as

   $\dfrac{Y(s)}{V(s)} = \dfrac{10}{s(s+1)}$, while the feedback path transfer function H (s) is 5. Determine the sensitivity of the closed loop transfer function with respect to G and H at w = 1 rad/sec.

6. a) Explain system with Uncertain parameters.   **6**

   b) Explain Robust stability of the control system.   **5**

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No.

Set P

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

Day and Date : Wednesday, 13-12-2017   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) With suitable sketch, explain the procedure of MS registration and call termination. **7**

   b) List out steps involved in VLR failure restoration. **7**

2. Answer **any two**. **12**

   a) Explain WAP protocol.

   b) Briefly write on Um GPRS interface.

   c) List the steps involved in international call setup procedure.

3. a) With suitable diagram explain GPRS architecture. **5**

   b) Describe usefulness of WAP developer tool kits. **4**

                   OR

   b) With suitable sketch explain how security is addressed in GSM. **4**

SECTION – II

4. a) Explain the types of handover, UMTS supports. **7**

   b) Describe different variants in configuring CDMA2000 network. **7**

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

   a) Explain security protocols.

   b) With diagram explain WCDMA air interface protocol architecture.

   c) Explain radio network with forward and reverse channel.

6. a) Describe the attacks observed in mobile computing.   **5**

   b) Write a note on architecture of UTRAN.   **4**

                    OR

   b) Explain basics of UMTS.   **4**

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SLR-TK – 46

Set **P**

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

Day and Date : Wednesday, 13-12-2017   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) Explain with properties of performance measures of Real Time System.　**6**

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

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

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

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

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

SECTION – II

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

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

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

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

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

　 2) Explain the concept of clock synchronization in hardware.　**5**

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Seat No.	

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

Day and Date : Wednesday, 13-12-2017   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 following :
      i) Loop bound
      ii) Critical Path.

   c) Explain parallel processing with the help of example.

   d) Perform the retiming for the following DFG shown in Fig.
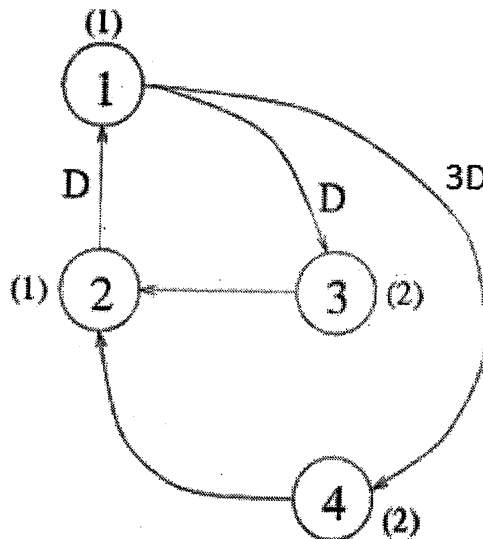
   e) Explain properties of retiming.

2. Solve the following :

   a) For DFG shown below find iteration bound using MCM algorithm. **8**
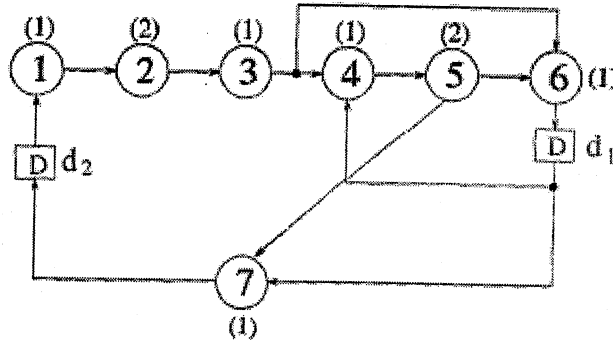
   b) In the SFG shown in fig.(a) the computation time for each node is assumed to be 1u.t.

      i) Calculate critical path computation time.

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

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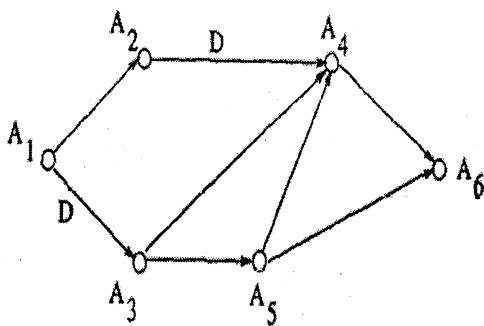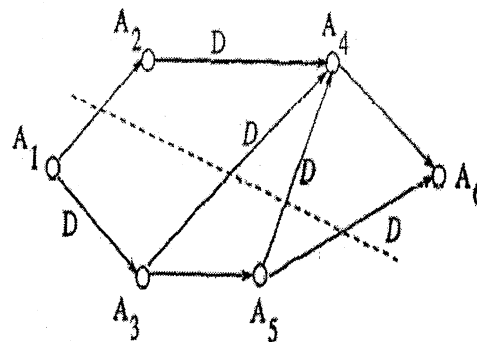
   Fig. a   Fig. b   **7**

   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.
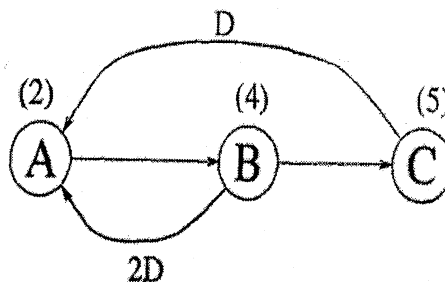
7

SECTION – II

3. Solve **any four** :   **20**
   a) Write a note on systolic design for matrix-matrix multiplication.
   b) Mention the step to minimize register in folding architecture.
   c) Unfold the DFG for program as shown in fig. with unfolding factor 3.
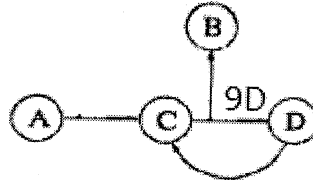
   d) Explain any one application of unfolding.
   e) Explain parallel carry ripple array multipliers.

4. Solve the following :   **8**
   a) Design R1 filter for FIR systolic array.
   b) Draw the constraint graph and use it to determine if the following system inequalities have a solution and find the solution if one exists using Floyd-Warshall algorithm.

   $r_1 - r_2 \leq 0$
   $r_3 - r_1 \leq 5$
   $r_4 - r_1 \leq 4$
   $r_4 - r_3 \leq -1$
   $r_3 - r_2 \leq 2$ **7**

   OR

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

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

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SLR-TK – 50

Seat No.

Set **P**

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

Day and Date : Thursday, 14-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

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

   a) What is proof by induction ? Elaborate with an example.

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

   c) The following terminologies with proper examples.

   Sets, subsets, proper subset, infinite set, operations on sets.

   d) What is Halting Problem ? Prove that A_{TM} is Undecidable.

   e) What are enumerators ? Prove that a language is turing recognizable iff some enumerator enumerates it.

2. Answer the following. **6**

   Give a formal definition of a TM. Design a TM for a language $L = \{X \# X \mid X \in \{a, b\}^*\}$.

3. Answer the following. **5**

   Considering set Q = the set of positive rational numbers and N = the set of natural numbers, prove that both are of same size using diagonalization method.

SECTION – II

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

   a) Elaborate reducibility and prove that E_{TM} is undecidable.

   b) Write a note on tractable and intractable problems.

P.T.O.

c) Define computation history and linear bounded automaton. Prove that A_{LBA} is undecidable.

d) Illustrate time complexity of a Turing Machine.

e) Elaborate growth rate of functions.

5. Answer the following.   **6**

If $EQ_{TM} = \{<M1, M2> | M1 \text{ and } M2 \text{ are TMs and } L(M1) = L(M2)\}$ then prove that EQ_{TM} is undecidable.

6. Answer the following.   **5**

Define mapping reducibility and prove that if $A \leq_m B$ and B is decidable then A is decidable.

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Set **P**

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

Day and Date : Saturday, 16-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

Instructions : 1) **All** questions are **compulsory**.
2) Figures to the **right** indicate **full** marks.

SECTION – I

I. Answer **any two** : 10

1) Explain the difference between workstation model and workstation server model of distributed computing system.

2) What are the common issues with which the designer of a heterogeneous distributed system must deal with ?

3) List the differences between monolithic and microkernel model of operating systems.

4) What is distributed system ? Explain important features of distributed systems.

II. Answer **any two** : 10

1) Explain the structure of IPC message.

2) Explain the following with respect to one-to-many communication
   i) Group management
   ii) Flexible reliability in multicast communication.

3) Explain with diagram the protocols of RPC.

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

b) Suggest whether at-least once or exactly-once semantics should be used for each of the following (give reasons for your answer). 5
   i) For making a request to a file server to read a file.
   ii) For making a request to a file server to append the data to an existing file.

P.T.O.

iii) For making a request to a booking server to cancel an already booked seat.

iv) For making a request to a database server to get the current balance of a bank account.

v) For making a request to a compilation server to compile a file.

SECTION – II

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

a) Most DSM systems in which caching is managed by the operating system use write-invalidate scheme for consistency instead of write-update scheme. Explain why ?

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

C) With diagram explain NRMB strategy used for implementing sequential consistency model. Also list its advantages and disadvantages.

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

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

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) A system consists of three processors p1, p2, p3 and a process having four tasks t1, t2, t3 and t4 is to be executed on this system. Suppose Eij is the cost of executing task ti on processor pj and Cij is the communication cost between task ti and tj when two tasks are assigned to different processors. Let E11=31, E12 = 4, E13=14, E21=1, E22=5, E23=6, E31=2, E32=4, E33=24, E41=3, E42=28, E43=10, C12=35, C13=3, C14=8, C23=6, C24=4, C34-23. Find an optimal assignment of the tasks to the processors and calculate the cost of an optimal assignment.   **10**

b) Explain the structure of RPC call and reply messages.   **5**

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Set **P**

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

Day and Date : Monday, 18-12-2017   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 of remaining questions from **each** Section.*
*3) Figures to **right** indicate marks.*

SECTION – I

1. What is Asymptotic analysis ? Define major three Asymptotic Functions.   **7**

2. A) Explain Amortized Analysis and its methods.   **7**

   B) Explain with example Greedy algorithm for unit time job sequencing with deadline.   **7**

3. A) What is Hamilton Cycle ? Does the following Graph has it ?   **7**
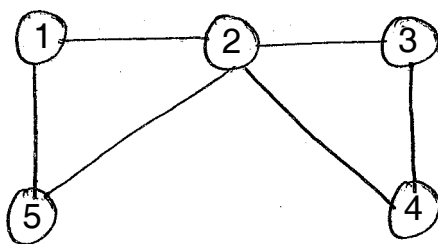
   B) Explain the 8 Queens problem with its solution. Use suitable example.   **7**

4. A) Explain the algorithm for 0/1 knapsack problem using backtracking.   **7**

   B) Explain Travelling Salesman Problem solution using Branch and Bound with suitable example.   **7**

SECTION – II

5. In relation with Nondeterministic algorithm explain following terms.   **7**
   a) Decision Problem
   b) Optimization Problem
   c) P and NP
   d) NP-hard and NP-complete.

6. A) Explain Convex Hull.   **7**

   B) Write a short note on Computational Models of PRAM Algorithms.   **7**

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

   B) Write a short note on Travelling Salesman problem in NP-hard.   **7**

8. A) Explain Prefix Computation.   **7**

   B) Write a short note on Computational Geometry.   **7**

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Seat No.

Set **P**

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

Day and Date : Wednesday, 20-12-2017　　　　　　　　　　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 are the needs and objectives of research ? Explain in detail. **6**

   b) List and explain the concepts in regards to Research Design. **6**

2. a) Explain in brief the techniques involved in defining a problem. **6**

   b) Define Research and explain the types of research with an example. **6**

3. a) Describe the important points to be considered for selecting a research problem. **6**

   b) What are various principles of experimental design and explain each design with an example. **6**

4. a) Explain the guidelines for constructing questionnaire and schedule. **5**

   b) Describe interview method for collection of primary data. **6**

SECTION – II

5. a) Describe the different processing operations in short. **6**

   b) Describe data analysis and explain in details any two types of data analysis. **6**

P.T.O.

6. a) What is the difference between copyright and patent ? **6**

   b) What are the steps to be followed while writing a scientific paper ? **6**

7. a) List and explain different steps involved in report writing. **6**

   b) What are the issues that should be addressed while writing a research report ? **6**

8. a) Define mean and geometric mean. Find the mean and geometric mean of the following data :

   4, 5, 10, 15, 25, 30, 35. **6**

   b) Write a short note on plagiarism. **5**

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Seat No.

Set P

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

Day and Date : Friday, 22-12-2017
Time : 11.00 a.m. to 2.00 p.m.
Max. Marks : 70

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.

Objective Questions. 14

1. Choose the correct alternatives.

   1) The data is stored, retrieved and updated in

      A) OLAP   B) OLTP   C) SMTP   D) FTP

   2) The full form of OLAP is

      A) Online Analytical Processing   B) Online Advanced Processing

      C) Online Advanced Preparation   D) Online Analytical Performance

   3) _____ 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

   4) _____ is a good alternative to the star schema.

      A) Star schema   B) Snowflake schema

      C) Fact constellation   D) Star-snowflake schema

   5) 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

P.T.O.

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

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 is 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 is 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) Data that can extracted from numerous internal and external sources

   D) Near real-time updates

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 Data Mining ?

   b) List the basic elements of Data Warehousing.

   c) What is Visualisation ?

   d) Compare between the different methods of classification.

3. a) What is KDD ? How is it carried out ?   **10**

   b) How is tree based classification carried out ?   **4**

4. a) How is extraction done using Data Mining ?   **10**

   b) State and compare the technologies used for Data Warehousing.   **4**

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

   b) List and compare the various techniques used for Data Mining.   **4**

6. a) How is a GUI developed for a Query Language ?   **8**

   b) List the applications of Data Mining.   **6**

7. a) What is Spatial Mining ? How does it work ?   **8**

   b) Elaborate on the architectures of Data Mining.   **6**

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Set P

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

Day and Date : Friday, 22-12-2017

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 antennas.

   b) Discuss Frequency Division Multiple Access.

   c) Draw and explain functional architecture of GSM system.

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

   a) Discuss main problems of signal propagation.

   b) Define handover. Explain types of handover in GSM.

   c) What is polling ? Explain its types with diagram.

3. Explain cellular system with three and seven cell clusters in wireless communication. Discuss advantages and disadvantages. **6**

   OR

   With neat sketch explain classical aloha and slotted aloha multiple access.

4. How is localisation, location update, roaming, etc. done in GSM and reflected in the data bases ? What are typical roaming scenarios ? **5**

SECTION – II

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

   a) State and explain advantages, disadvantages and design goals of wireless LAN.

   b) How IP packet is delivered to and from the mobile node ? Explain with diagram.

   c) Draw and explain Symbian OS architecture.

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

   a) Explain with diagram snooping TCP. Discuss advantages and disadvantages.

   b) Explain transport layer security in WAP.

   c) Write note on Dalvik Virtual Machines.

7. Write note on ad-hoc networks.   **6**

                  OR

   Explain transaction oriented TCP.

8. Draw and explain architecture of Android OS.   **5**

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Set **P**

ME (Computer Science and Engineering) (Sem – II)
(CBCS/CGPA) Examination, 2017
INTERNET ROUTING ALGORITHM (Paper – VI)

Day and Date : Friday, 8-12-2017　　　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

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

   a) Which IPv4 address blocks are reserved for current usage ? Why is it necessary to reserve some addresses from an address space rather than making all of them available ?

   b) Explain distance vector routing protocol.

   c) Write a short note on network management architecture.

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

   a) Write the Bellman-Ford algorithm that iterates in terms of number of hops.

   b) Consider the following network topology. The number listed next to the links is assumed to be bandwidth. Determine the widest path from node 2 to node 5 using widest path algorithm, computed at node i (Dijkstra based).
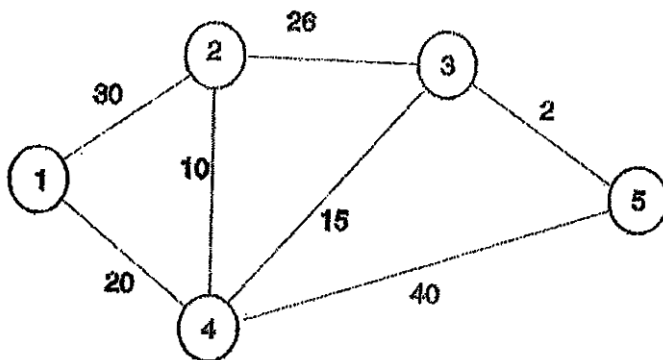
   c) Write a short note on similarities and differences between IS-IS and OSPF.

P.T.O.

III. a) What are the different states in the BGP finite state machine ? **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) List the router bottlenecks and its cause.

c) With diagram explain Point-of-presence (Pop) topological architecture.

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

a) Explain hierarchical tries solution for packet classification.

b) For a given IP address, how would you find out its home AS number ?

c) Illustrate search and update operations in binary tree with example.

VI. a) Explain the grid of tries type of two-dimensional packet classification algorithm and state its advantages. **10**

b) What are the sub-protocols of a link state protocol ? **5**

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

Day and Date : Saturday, 9-12-2017   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) How partitioned parallel hash join is performed ?   **5**

    b) Explain full replication with its advantages and disadvantages.   **5**

    c) Explain interquery and intraquery parallelism.   **5**

2. Explain 3 phase commit protocol.   **10**

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

    b) State the reasons of developing distributed database.   **5**

4. a) Explain any four features of distributed vs. centralized database.   **5**

    b) Explain how distributed deadlock is detected.   **5**

SECTION – II

5. a) Define the given schema with appropriate structured types for each attribute.

    Emp = (ename, ChildrenSet multiset(Children), Skillset multiset (Skills))   **10**

    Children = (name, birthday)

    Skills = (type, ExamSet setoff (Exams))

    Exams = (year, city)

    b) State differences in object oriented and object relational databases.   **5**

6. a) Explain how multimedia data is indexed. **5**

   b) Explain different ways of querying multimedia data. **5**

7. a) How 2D and 3D objects are stored in database ? **5**

   b) Explain different types of spatial queries with example. **5**

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

   a) Grid Files.

   b) Persistent Objects.

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SLR-TK – 60

Set **P**

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

Day and Date : Monday, 11-12-2017   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 the concept of data dependencies.

   b) Draw the chart of implementation of the concept of sequential consistency.

   c) Explain in short basic layout of a pipeline.

   d) What is branch prediction ? Give impact of branches.

2. Draw the following :   **10**

   a) The subtasks of instruction execution for integer register-register operations.

   b) Basic structure of an integer pipeline.

   c) Timing of the execution.

   d) Parallel execution of instructions in a straightforward pipelined processor.

   e) Distinction between VLIW and superscalar processor.

3. Describe in detail design space of issue policies.   **10**

P.T.O.

SECTION – II

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

   a) Explain the main features of R10000.

   b) Draw the layout of the R1000 pipelines.

   c) Describe the main features of PowerPC620.

   d) Illustrate features of IBM Power4.

5. Explain the interpretation of the concept of branch penalty. Discuss the concept of zero-cycle branching in detail. **10**

6. A) Draw and explain core part of the microarchitecture of the PentiumPro. **10**

                    OR

   B) Discuss the interpretation of the concept of sequential consistency of instruction execution. **10**

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Set **P**

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

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

Max. Marks : 70

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 the question.

SECTION – I

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

   A) What are the components of Worldwide LHC Computing Grid ?

   B) Compare Grid Computing and Cloud Computing environments.

   C) Briefly describe an application programmer's view of Grid architecture.

   D) Which are those four primary requirements must be addressed in selecting network protocol bindings within an OGSA context ?

   E) What are the key risk factors and vulnerabilities of Grid Computing ?

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

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

   B) Describe the service oriented architecture for e-Science infrastructure.

3. Briefly describe with figure the three-layered architecture viewed as services. **5**

P.T.O.

SECTION – II

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

   A) Write a short note on data mining and visualization application over GRID.

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

   C) Briefly describe the topology of the Encyclopedia of Life (EOL) GRID application system.

   D) Explain Ontology mapping.

   E) Write a short note on parallel computing technique used for image stretching (resampling) in virtual sky application of Grid computing.

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

   A) Describe the architecture of "MONTAGE" GRID application.

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

6. Write a short note on security provision in GARUDA Grid.   **5**

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Seat
No.

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

Day and Date : Tuesday, 12-12-2017   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. Define RTOS. List and explain any five programming languages used in the development of real-time systems.   **7**

2. A) Describe following language features :
   i) Parameter Passing
   ii) Dynamic Allocation
   iii) Typing   **7**

   B) What is Finite State Automata ? Describe FSA for even and odd parity checker.   **7**

3. A) Explain Warnier-Orr Notation.   **7**

   B) Describe Cooperative Multitasking systems (Co routines) with example.   **7**

4. A) Describe following terms related to semaphores :
   i) Semaphores and mailboxes
   ii) Counting semaphores
   iii) Problems with semaphores.   **7**

   B) Describe following terms :
   i) Swapping   ii) MFT
   iii) MVT   iv) Working sets.   **7**

P.T.O.

SECTION – II

5. Describe Response-Time calculation for Polled Loops, Coroutines and Interrupt Systems. **7**

6. A) Write a note on – Scheduling is NP complete. **7**

   B) Write a note on – Basic Buffer size calculation. **7**

7. A) Describe in detail – Fault Tolerance. **7**

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

8. A) Write a note on – Real time Databases. **7**

   B) Describe Real-Time Applications with Real-Time Programming Languages. **7**

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Seat
No.

Set P

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

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

Max. Marks : 70

Instructions : 1) *Figures to right indicate* **full** *mark.*
2) *Q.No.* **1** *from Section* **I** *and Q. No.* **5** *from Section* **II** *are* **compulsory***.*
3) *Attempt* **any two** *from Q.No.* **2-4** *for Section* **I** *and* **any two** *from Q. No.* **6-8** *for Section* **II***.*

SECTION – I

1. Answer briefly : **15**
   a) Discuss the problems and major goals of NLP.
   b) Describe verbal structure with noun-verb modification and give examples.
   c) Write the algorithm for forming paradigm table and explain in brief.
   d) Discuss different conflicts between verb forms like – sotaa, khaata, diyaa etc.
   e) What is karaka sharing ? Draw the possible parse structures for Hindi sentence "Shikaarii ne bhaagate hue shera ko dekhaa."

2. a) Illustrate Simple transition networks, Recursive transition networks and Augmented transition network. **5**
   b) Translate the following in an Indian language and analyze the same using LWG and morphological analysis. **5**
      I) Boys are garlanding the teacher.
      II) Kids were listening to the news.

3. a) List different kinds of modifier – modified structure and explain any three in detail. **5**
   b) How to speed up morphological analysis by compilation ? **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 possible approaches of Machine Translation system.

   b) Explain following properties of grammar

      i) Lexicalization

      ii) Locality.

   c) Compare between CFG and Indian languages.

   d) Explain X-bar theory and Theta theory from GB.

   e) Give the characteristics of Indian languages. Which representation is most suitable for them ?

6. a) Discuss LFG formalism and Handling Wh-movement in questions. **5**

   b) Describe Anusaraka system in detail. **5**

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

   b) Compare PG with TAG, TSG and LFG. **5**

8. a) With an illustration explain the GB model. **5**

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

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Seat
No.

Set **P**

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

Day and Date : Tuesday, 12-12-2017   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 :   **14**

   Choose the correct alternatives :

   1) 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

   2) Which of the following is not an input device ?
      a) Keyboard
      b) Sensors
      c) Printers
      d) Character recognition
      e) Digital scanner

   3) 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

4) 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

5) 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

6) 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

7) 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

Set P

8) What is the most widely used secondary storage medium ?
   a) Magnetic tape
   b) Magnetic sensor
   c) Network
   d) Optical disc
   e) Magnetic disk

9) Which device is NOT considered an input device ?
   a) Printer
   b) Sensor
   c) Touch screen
   d) Keyboard
   e) Computer mouse

10) Which one of these operating systems are used powerful PCs, workstations, and network servers is called ?
   a) Windows XP
   b) Mac OS X
   c) Linux
   d) UNIX
   e) Windows Vista

11) 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

12) _____ are small software programs that can be added to Web pages or placed on the desktop to provide additional functionality.
   a) Mash-ups
   b) Widgets
   c) Clouds
   d) Ajax
   e) Java

Set P

13) 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

14) 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

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

   a) What is a current business demand ?

   b) List the basic elements of cost estimation.

   c) What is modeling of an IS ?

   d) Compare between storage and security management techniques.

3. a) List the steps in preparing for IM process. Explain each step. **10**

   b) What is Release Management ? How is it carried out ? **4**

4. a) How is configuration management carried out ? **10**

   b) How is extraction done in service desks and incident management ? **4**

5. a) How is knowledge extracted from the IS ? **10**

   b) List and explain the issues of IM. **4**

6. a) Elaborate on the architectures of IS. **8**

   b) How is data retention and disaster recovery managed ? **6**

7. a) What are the environmental policies effecting IM ? **8**

   b) What is a database and application protection policy ? How is it developed ? **6**

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Set P

Seat No.

Set **P**

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Elective – III : WEB TECHNOLOGY (Paper – X)

Day and Date : Wednesday, 13-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

Instructions : 1) Attempt **any five** questions from **each** Section.
2) Figures to **right** indicate **full** marks.
3) Assume suitable data **if** necessary.

SECTION – I   (5×7=35)

1. Explain and compare XML Schemas and DTD.

2. List and explain any three HTTP request methods.

3. Explain online payment gateways and their significance.

4. Explain session tracking methods in ASP.

5. Explain dynamic HTML in detail with example.

6. Write about dynamic positioning in DHTML with example.

SECTION – II   (5×7=35)

7. Explain Web 2.0 and Web 3.0 implement strategies.

8. Explain life cycle of the servlet.

9. Explain various steps required to access database in Servlet program.

10. List in details servers side risks.

11. Explain and compare GET and POST request in details.

12. Explain Mas-hups and RSS and Wiki.

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M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2017
BUSINESS INTELLIGENT SYSTEM (Elective – III) (Paper – X)

Day and Date : Wednesday, 13-12-2017 　　　　　　　　　Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Write answers to **any five** questions. 　　　　　　　　　　　　　**(5×7=35)**

　　1) List and describe components of BI.

　　2) What are some of the major factors in today's business environment ?

　　3) What are some of popular application areas of text mining ?

　　4) What are some of benefits and challenges of NLP ?

　　5) Explain BPM architecture and list its application.

　　6) Explain dashboard and compare with score card.

SECTION – II

2. Write answers to **any five** questions. 　　　　　　　　　　　　　**(5×7=35)**

　　1) What is on demand BI ? Explain its limitations.

　　2) List some legal issues of BI. Describe privacy concerns.

　　3) Describe mobile social networking.

　　4) What is RFID ? What kind of data are used through RFID ?

　　5) Define reality mining. Explain types of data used.

　　6) What is virtual world ?

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Seat No.	

Set **P**

M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2017
OBJECT ORIENTED SOFTWARE ENGINEERING AND DESIGN PATTERNS
(Elective – III) (Paper – X)

Day and Date : Wednesday, 13-12-2017 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Answer briefly : **(5×3=15)**
   1) Explain communication and use of language in domain model engineering.
   2) Describe about the analysis workflow, objects and classes in detail.
   3) Explain about foundation of software architecture.

2. Explain use case and activity diagrams related to a banking system. **10**
   OR
   What is Software Architecture ? Also explain its relationships to other disciplines. **10**

3. Write short notes on (**any two**) : **(5×2=10)**
   a) Binding model and implementation.
   b) UML and unified process.
   c) Architectural styles.

SECTION – II

4. Answer briefly : **(5×3=15)**
   1) Explain module architectural view in detail
   2) Describe Customer Relationship Management (CRM) Archetype Pattern.
   3) Explain access control patterns.

5. Explain conceptual architectural view and execution architectural view in detail. **10**
   OR
   Explain object management patterns and adaptation pattern in detail. **10**

6. Write short notes on (**any two**) : **(5×2=10)**
   a) Building the documentation package.
   b) Literate modelling.
   c) Service variation patterns.

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Set **P**

M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : WIRELESS AD-HOC NETWORK (Elective – III)

Day and Date : Wednesday, 13-12-2017   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 are the features of Ad-hoc network because of which it has become popular ? List and explain in detail the application of Ad-hoc wireless network.   **6**

   B) What is On-Demand Approach ? Explain in detail AODV protocol.   **6**

2. A) Explain Wireless Sensor Networks. Discuss Technical challenges WSN.   **6**

   B) Explain in detail characteristics of the Wireless Channel.   **6**

3. A) Explain in detail IEEE 802.11 DCF and RTS-CTS (medium access) mechanism.   **6**

   B) What are the issues in designing a Routing Protocol for Ad Hoc Wireless Networks ? Discuss them in detail.   **6**

4. A) Explain IEEE 802.11 a Standard in Detail.   **6**

   B) What is Packet Radio Network ? Explain its Technical Challenges.   **5**

SECTION – II

5. A) Explain with neat diagram the architectural framework of an Ad-hoc multicast protocol.   **6**

   B) Give the comparison of various TCP solutions for Ad-hoc wireless networks.   **6**

P.T.O.

6. A) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **6**

   B) List and explain various network layer attacks in Ad-hoc WANs. **6**

7. A) Write a short note on Energy efficient Multicasting in WAN. **6**

   B) What are security issues in wireless sensor networks ? Discuss them in Detail. **6**

8. A) Why does TCP does not perform well in Ad-hoc WANs ? **6**

   B) What are the issues in designing a multicast routing protocol ? Explain with diagram source-initiated multicast protocols. **5**

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Set P

Seat No.

Set **P**

M.E. (Electronics and Telecommunication Engineering) (Semester – I) Examination, 2017
Paper – I : RESEARCH METHODOLOGY (CBCS)

Day and Date : Thursday, 14-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***N.B.** : Answer **all** questions are **compulsory**.*

SECTION – I

1. Solve **any two** :   **(5×2=10)**

   a) State elements of research proposal (Synopsis).

   b) Explain system modeling with the help of example.

   c) Define dependent variable, independent variable, confounded relationship, experimental and control group.

2. Solve **any one** :   **(7×1=7)**

   a) Illustrate the principles involved in the simulation of a discrete system using telephone system example.

   b) Explain informal experimental designs.

3. Solve **any three** :   **(6×3=18)**

   a) Mention criteria for good research.

   b) What are the purposes that being served by literature review in conducting research ?

   c) What is technique involved in defining a problem ? State example.

   d) Explain full corporate model with block diagram.

SECTION – II

4. Solve **any two** :   **(2×5=10)**

   1) Explain in detail Research Design and Experimental design.

   2) Explain in detail probability and statistics in simulation.

   3) Comment on use of digital lab in research.

5. Attempt **any one** :   **(1×7=7)**

   1) Comment about ethical issues related to research.

   2) What do you understand by research report or thesis ? Indicate its need and importance in the research work.

6. Write a short note on **any three** :   **(3×6=18)**

   1) Virtual lab.

   2) Graphs and tables.

   3) Types of errors.

   4) Statistical output analysis.

   5) Define the term 'Experiment'.

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Seat
No.

M.E. (Electronics and Telecommunication Engg.) (Semester – I) (CBCS) Examination, 2017
Paper – II : ANTENNA THEORY AND DESIGN

Day and Date : Saturday, 16-12-2017   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 the radiation mechanism of an antenna.
   b) Explain broadside and end fire array radiation pattern.
   c) Explain about various microstrip antenna configurations.

2. Solve **any one** question :   (7×1=7)
   a) Derive an array factor equation for linear array of n-isotropic point sources.
   b) Design a circular microstrip antenna using a substrate (RT/duroid 5880) with dielectric constant of 2.2, h = 0.1588 cm (0.0625 inches) so as to resonate at 10 GHz.

3. Attempt **any three** questions :   (6×3=18)
   a) Elaborate the advantages of microstrip antenna and comment on its use in Mobile Communication.
   b) Explain pattern multiplication with some examples.
   c) Explain different feeding mechanism of microstrip antenna.
   d) Explain the characteristics of microstrip antenna and also mention its advantages and disadvantages.

SECTION – II

4. Solve **any two** questions :   (5×2=10)
   a) Explain in brief the various composite material substrate require for fabrication of microstrip antenna.
   b) Explain various definitions of Bandwidth.
   c) Compare series feed and parallel feed techniques in microstrip antenna arrays.

5. Solve **any one** question : **(7×1=7)**

   a) Explain parallel feed, one and two dimension excitation methods for microstrip antenna.

   b) Explain broad banding using stacked elements.

6. Attempt **any three** questions : **(6×3=18)**

   a) Write a note on semiconductor and ferimagnetic substrate.

   b) Justify selection of shape of patch affects on bandwidth of microstrip antenna.

   c) Explain Linear array design with microstrip patches using corporate feed arrays.

   d) Explain the choice of substrate for antenna design considering parameters such as dielectric constant, loss tangent, dimension stability, chemical resistance, temperature range, relative cost.

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Seat No.

Set **P**

M.E. (Electronics & Telecommunication Engg.) (Semester – I) Examination, 2017
(CBCS)
Paper – III : PROBABILITY & STOCHASTIC PROCESSES

Day and Date : Monday, 18-12-2017   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) Draw **neat** diagram **wherever** required.

SECTION – I

1. Attempt **any two :**   (6×2=12)
   a) State and brief Bernoulli trails.
   b) Discuss the term expected value, variance and standard deviation.
   c) Explain in detail marginal PDF and joint probability density function.

2. Attempt **any one :**   (7×1=7)
   a) Explain conditional probability with suitable example.
   b) Describe Maximum Likelihood estimation of nonrandom parameters.

3. Attempt **any two :**   (8×2=16)
   a) Prove the central limit theorem.
   b) The density function of a continuous random variable X is given as below. Find the expectation and variance.

   $$F(x) = \begin{cases} \dfrac{x}{2} & \text{if } 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}.$$

   c) Explain linear estimation of random variables from random vectors.

SECTION – II

4. Attempt **any two :** (6×2=12)

   a) Explain in detail Chapman – Kolmogorov equations and classification of states.

   b) State types of Stochastic process.

   c) Explain in detail (M/G/I) system.

5. Attempt **any one :** (7×1=7)

   a) Explain in brief coherence.

   b) What do you mean by Estimation of spectral density and cross spectral density ?

6. Attempt **any two :** (8×2=16)

   a) Telephone exchange receives 100 calls per minute according to Poisson process. What is the probability that no calls are received in 5 sec and 3 sec.

   b) Show that the correlation coefficient lies between – 1 and + 1.

   c) State the properties of power spectral density.

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Set **P**

M.E. (E & TC) (Semester – I) (CBCS) Examination, 2017
Paper – IV : ADVANCED NETWORK SYSTEMS

Day and Date : Wednesday, 20-12-2017　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions :　● **All** questions are **compulsory**.
　　　　　　　　　● Figures to **right** indicate **full** marks.

SECTION – I

1. Attempt **any three** :　　　　　　　　　　　　　　　　　　　　(5×3=15)
   a) Explain UDP protocol and comment on its advantages.
   b) Short note on DNS message format.
   c) Compare recursive and iterative resolution.
   d) Explain how IPsec uses tunneling for the authentication header and the encapsulating security payload.

2. Answer the following :　　　　　　　　　　　　　　　　　　　(5×2=10)
   a) Compared to IPv4, what are the features of IPv6 Protocol ?
   b) What is a firewall ? Explain proxy firewall.

3. Explain the steps involved in FTP for retrieving a file from the server.　　**10**

SECTION – II

4. Attempt **any three** :　　　　　　　　　　　　　　　　　　　　(5×3=15)
   a) Explain the TISPAN-NGN overall architecture.
   b) Explain the label stack process in MPLS.
   c) Explain traffic conditioning and bandwidth broker in differentiated services.
   d) Explain the physical layer architecture of Gigabit Ethernet.

5. Answer the following :　　　　　　　　　　　　　　　　　　　(5×2=10)
   a) What are different ATM service categories ? Explain any two.
   b) Explain the ReSerVation Protocol (RSVP) message format.

6. Explain the functions of ATM Adaptation Layer (AAL) sublayers. Explain the process of generating ATM cells by adding headers to user data stream in AAL1.　　**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 : Friday, 22-12-2017   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) What are the reasons behind the success of SONET/SDH ?
   b) What are the services provided by the optical layer ?
   c) Explain the OTN multiplexing hierarchy.

2. Attempt **any one** :   (7×1=7)
   a) Describe the pointer concept in SONET and functional components of SONET.
   b) Explain the principle of operation of Fabry Perot (FP) filter and Mach Zehnder Interferometer (MZI).

3. Write short notes (**any three**) :   (6×3=18)
   a) Discuss five methods of clock exchange.
   b) Chromatic Dispersion Compensators.
   c) Digital wrapper and control planes in optical transport network.
   d) Types and advantages of WDM.

SECTION – II

4. Attempt **any two** :   (5×2=10)
   a) Explain the nesting between LSPS and OSPS.
   b) What is domain service model and unified service model ?
   c) Explain the migration to IP optical networking.

5. Attempt **any one** : **(7×1=7)**

   a) How the correlating between optical switched path and MPLS path is done ?

   b) Explain the process of label swapping and traffic forwarding.

6. Attempt **any three** : **(6×3=18)**

   a) Explain how granularity of labels is supported by wavelength in optical switching.

   b) Explain the integration of telephone and internet service provided.

   c) Explain IP and optical backbone.

   d) Explain the MPLS control and data planes.

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Set P

Seat
No.

**M.E. (Electronics and Telecommunication Engineering) (Semester – I)
(CBCS) Examination, 2017
SPEECH AND VIDEO PROCESSING (Elective – I) (Paper – V)**

Day and Date : Friday, 22-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any two** :   **(7×2=14)**

   a) Explain in detail digital simulation of speech signal.

   b) Explain in detail pitch estimation.

   c) Explain the various acoustic phonetics.

2. Attempt **any one** :   **(7×1=7)**

   a) Explain in detail Adaptive Noise Cancellation.

   b) Describe briefly NLMS filter.

3. Attempt **any two** :   **(7×2=14)**

   a) Explain speech filtering using Least Mean Square filter.

   b) Describe briefly speech recognition techniques.

   c) Explain Baye's rule.

SECTION – II

4. Attempt **any two** :   **(7×2=14)**

   a) Explain geometric image formation.

   b) Explain filtering operations on video.

   c) Explain sampling structures for analog and digital video.

5. Attempt **any one** :   **(7×1=7)**

    a) Explain in detail multi resolution motion estimation.

    b) Explain in detail Block matching algorithm.

6. Write short note on **any two** :   **(7×2=14)**

    a) Region based motion estimation.

    b) Predictive coding.

    c) 3D motion models.

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SLR-TK – 76

> **Instructions** :   I) Q. **1** is **compulsory**.
>   II) Attempt **any four** questions from Q. **2** to Q. **7**.

1. a) Explain convolution algorithm for two discrete sequences.   **5**

   b) Explain slow down, retiming and pipelining.   **5**

   c) Draw data dependence graph for 3 – tap FIR filter given by
      $y(n) = c_0 \, x(n) + c_1 \, x(n-1) + c_2 \, x(n-2)$.   **4**

2. a) Explain the use of parallel processing for reducing power consumption and increasing speed.   **8**

   b) Construct an efficient realization using Winograd algorithm for 2×3 linear convolution with $m(p) = p(p-1)(p^2+1)$.   **6**

3. a) Explain modified Booth recoding algorithm used for multiplication. State its advantages.   **8**

   b) Explain Baugh Wooley multiplier for 4×4 bit multiplication. Verify its operation with example.   **6**

4. a) Draw state transition diagram for a static CMOS NAND gate.   **8**

   b) What is Horner's rule ? Why its architecture is not implementable ?   **6**

5. a) Explain algorithm for computing CSD format of W – bit number.   **8**

   b) Explain synchronous pipelined system. Also explain two phase clocking strategy.   **6**

6. a) Give the DCVSL implementation of logic function $f = AB + C(A + B)$.   **8**

   b) Explain static and dynamic D-latch.   **6**

7. a) Give the FPGA implementation of c-element with and without clear.   **8**

   b) Draw static CMOS full adder.   **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 : Thursday, 14-12-2017　　　　　　　　Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

1. Attempt **any two** :　　　　　　　　　　　　　　　　　　　　　　**(2×5=10)**

   1) Explain scattering losses in optical fibers.

   2) Explain linear and non-linear scattering losses in optical fibers.

   3) What are different LED structures ? Explain any one used in optical transmission system.

2. Attempt **any one** :　　　　　　　　　　　　　　　　　　　　　　**(1×7=7)**

   1) What is multipath time dispersion ? Deduce a formula based on Ray theory for multipath time dispersion for step index fiber.

   2) Discuss DFA type of optical amplifier and explain why EDFA is more popular in optical communication system.

3. Write short notes (**any three**) :　　　　　　　　　　　　　　　　**(3×6=18)**

   1) Laser diode modes and threshold conditions.

   2) Power budgeting.

   3) Acceptance angle.

   4) Mode coupling.

SECTION – II

4. Attempt **any two** :　　　　　　　　　　　　　　　　　　　　　　**(2×5=10)**

   1) Explain PIN photodiode in detail.

   2) Explain Avalanche multiplication noise.

   3) What are design considerations of optical Mux/Demux ?

5. Attempt **any one** : **(1×7=7)**

   1) Explain in detail WDM optical communication system with the facility of add and drop of wavelengths.

   2) Explain the working of silicon avalanche photodiode. Why guard rings are added to it ?

6. Write short notes (**any three**) : **(3×6=18)**

   1) Dielectric thin film filters.

   2) Soliton system.

   3) Applications of long haul high BW transmission system.

   4) Hybrid and planar waveguide devices.

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Seat
No.

Set **P**

M.E. (E and TC) (Semester – I) (Old – CGPA) Examination, 2017
LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES (Paper – II)

Day and Date : Saturday, 16-12-2017 Max Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

SECTION – I

1. Solve **any four** : (4×5=20)

   a) Let V be the vector space $V_2(C)$, with the standard inner product. Let T be the linear operator defined by $T(1, 0) = (1, -2)$, $T(0, 1) = (i, -1)$. If $\alpha = (a, b)$, find $T^*\alpha$.

   b) Prove Schwarz's inequality $|(\alpha, \beta)| \leq \|\alpha\|.\|\beta\|$. Hence prove that

   $\|\alpha + \beta\| \leq \|\alpha\| + \|\beta\|$.

   c) In $V_3(R)$, where R is the field of real numbers, examine each of the following sets of vectors for linear dependence :

   i) $\{(1, 2, 0), (0, 3, 1), (-1, 0, 1)$

   ii) $\{(-1, 2, 1), (3, 0, -1), (-5, 4, 3)\}$

   d) If W_1 and W_2 are subspaces of a vector space V(F), then prove that $W_1 + W_2$ is subspace of a vector space V(F).

   e) If T is a linear transformation on a vector space V such that $T_2 - T + 1 = \hat{0}$. Then show that T is invertible.

2. Solve **any two** : (2×7.5=15)

   a) Define vector space. Explain general properties of vector space.

   b) Define linear dependence and linear independence of vectors prove that
   i) If the set $\{\alpha_1, \alpha_2, ... \alpha_n\}$ of vectors of V(F) is linearly independent then none of the vectors $\{\alpha_1, \alpha_2, ... \alpha_n\}$ can be a zero vector.
   ii) If two vectors are linearly dependent, then one of them is a scalar multiple of other.

   c) Prove that there exists a basis for each finite dimensional vector space. Show that the vectors $(1, 2, 1), (2, 1, 0), (1, -1, 2)$ form a basis for R^3.

Set P

SECTION – II

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

   a) Construct BCH code for double error correcting and triple error correcting capability. Give primitive polynomial is $X^4 + X + 1$ with $GF(2^4)$.

   b) The received polynomial for R-S code is

   $r(x) = \alpha^0 + \alpha^2 X + \alpha^4 X^2 + \alpha^0 X^3 + \alpha^6 X^4 + \alpha^3 X^5 + \alpha^5 X^6$. Check whether it contains error or not. Use primitive polynomial as $f(x) = 1 + x + x^3$.

   c) For a (6, 3) systematic linear block code, the three parity check digits are P_4, P_5 and P_6 given by :

   $P_4 = m_1 \oplus m_2 \oplus m_3$

   $P_5 = m_1 \oplus m_2$

   $P_6 = m_1 \oplus m_3$

   i) What is the generator matrix for this code ?

   ii) What are the valid code words ?

   d) Generator sequences for a convolutional encoder are described by $g_1 = 110$, $g_2 = 101$, $g_3 = 111$. Output of detector is 101 001 011 110 111 ... using Viterbi algorithm, find the transmitted sequence.

   e) For a cyclic code, generator polynomial is $g(x) = 1 + x + x_3$. If received vector is $r(x) = 1001011$, draw circuit for syndrome calculation and check whether it is valid code word or not.

4. Solve **any two** :   **(2×7.5=15)**

   a) The parity check matrix for (7, 4) block code is given by

   $$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

   Draw the encoder and decoder.

   b) Explain encoding and decoding in Reed-Muller codes.

   c) For a convolutional encoder, rate = ½, generator sequences are $g_1 = 111$ and $g_2 = 110$.

   i) Draw encoder trellis diagram

   ii) Calculate free distance.

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Set P

Seat No.

Set **P**

M.E. (Electronics & Telecommunication Engg.) (Semester – II) (CBCS) Examination, 2017
Paper – VI : RF & MICROWAVE CIRCUIT DESIGN

Day and Date : Friday, 8-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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) Why S parameters are used for analysis of high frequency circuit ? Explain in brief.

   b) Define and Derive expressions for two port power gains.

   c) Explain in brief types of lossless feedback amplifier.

2. Solve **any one** questions. **(7×1=7)**

   a) Explain S parameter analysis method to design a stable unilateral amplifier.

   b) State two design approaches for single balanced mixer. Explain any one in detail.

3. Attempt **any three** questions. **(6×3=18)**

   a) Draw circuit diagram of single gate FET mixer and explain its operation.

   b) Define noise figure of mixer. Derive the relation between noise figure for DSB and SSB input signal.

   c) Explain how low noise figure is achieved in cascode amplifier.

   d) Explain stability analysis and limitations of amplifier.

SECTION – II

4. Solve **any two** questions. **(5×2=10)**

   a) Explain how transistor model is used for producing the negative resistance in the design of two port oscillator.

   b) State different methods are used for filter design. Explain any one in brief.

   c) Explain the properties of substrate used in MMIC.

5. Solve **any one** questions. **(7×1=7)**

   a) Explain how impedance and frequency scaling is performed with respect to filter transformation.

   b) Explain advantages, disadvantages and applications of MMIC.

6. Attempt **any three** questions. **(6×3=18)**

   a) Explain diffusion and ion implantation in MMIC fabrication Techniques.

   b) Explain the process of filter design by insertion loss method.

   c) Define Q factor of oscillator. Explain any one method for measuring Q of oscillator.

   d) Draw oscillator design flowchart and explain in brief.

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Set P

M.E. (Electronics and Telecommunication) (Semester – II) Examination, 2017
Paper – VII : ADVANCED SIGNAL PROCESSING
(CBCS)

Day and Date : Saturday, 9-12-2017   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 adaptive system with suitable example.

    b) Explain in detail maximum likelihood estimation.

    c) Write short note on Cramer Rao bound.

2. Attempt **any two**.   **12**

    a) Describe briefly principle adaptive filters.

    b) State principle of orthogonality and derive necessary and sufficient condition for obtaining minimum value of cost function.

    c) Compare optimum versus adaptive filters.

3. Attempt **any one**.   **8**

    a) Describe briefly Least-Mean-Square (LMS) Algorithm.

    b) Write short note on application of RLS algorithm.

P.T.O.

SECTION – II

4. Attempt **any two**.   15

   a) Explain in detail decision feedback equalizer.

   b) Explain in detail sub band coding with suitable example.

   c) Write short note on Sato algorithm.

5. Attempt **any two**.   12

   a) Explain in detail decimation and interpolation.

   b) Explain in detail Echo cancelation in communications.

   c) Describe briefly single and multistage realization.

6. Attempt **any one**.   8

   a) Describe briefly equalization of Data Communication Channels.

   b) Write short note on Wavelet transform.

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Set P

Seat No.

Set **P**

M.E. (Electronics and Telecommunication Engg.)
(Semester – II) Examination, 2017
(CBCS Pattern)
WIRELESS COMMUNICATION (Paper – VIII)

Day and Date : Monday, 11-12-2017

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** necessary.

1. Solve **any four**. **(4×4=16)**

   1) Explain impulse response model of a multipath fading channel.

   2) Explain the fast fading wireless channel.

   3) Compare 2G, 2.5G and 3G mobile telephone standards.

   4) Explain the maximum delay spread and RMS delay spread.

   5) Explain the concept of frequency reuse in cellular communication.

2. a) Solve **any two**. **(2×6=12)**

   1) Explain the Rayleigh fading distribution and show that the Rayleigh distribution uniformly distributed.

   2) Explain the CDMA technology. What are the advantages of CDMA ?

   3) What is diversity ? Explain how the performance of wireless system improves due to diversity.

   b) Explain PN sequence generator. What are the properties of PN sequence generator. **7**

3. Solve **any four**.   **(4×4=16)**

   1) Explain the RAKE receiver.

   2) Write a note on WCDMA.

   3) Describe the cyclic prefix in OFDM.

   4) Explain the Orthogonal Space Time Block Code.

   5) Explain the BER performance of UWB.

4. a) Solve **any two**.   **(2×6=12)**

   1) Explain the OFDM. Why MIMO-OPDM is a superior technology for cellular communication.

   2) Explain the MIMO transmit diversity scheme (Alamouti).

   3) What is the effect of PAPR (Peak to Average Power Ratio) on OFDM system ?

   b) Define Ultra Wide Band. Explain its features.   **7**

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Seat No.

Set **P**

M.E. (E & TC) (Semester – II) (CBCS) Examination, 2017
Paper – IX : CRYPTOGRAPHY AND NETWORK SECURITY

Day and Date : Tuesday, 12-12-2017 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instruction : All questions are compulsory.

SECTION – I

1. Attempt **any three** : (5×3=15)
   a) Write a note on rotor machines.
   b) Explain the various types of network security attack.
   c) Discuss the details of Fiestal structure.
   d) Explain the Shannon's theory of confusion and diffusion.

2. Attempt **any one** : 10
   a) What are block ciphers ? Explain their modes of operation.
   b) Explain the key management and distribution scenario in case of Symmetric key.

3. Explain in detail RSA algorithm. 10

SECTION – II

4. Attempt **any three** : (5×3=15)
   a) What are the security requirements for cryptographic hash functions ?
   b) Draw neat diagram for X509 certificate. Explain each field of certificate.
   c) Write a note on Kerberos.
   d) Discuss different phases of virus.

5. Attempt **any one** : 10
   a) Explain different types of attacks on MAC.
   b) Explain firewall design principles.

6. Explain Architecture of IPSec with neat diagram. 10

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SLR-TK – 83

Set **P**

M.E. (Electronics and Telecommunication) (Semester – II) (CBCS) Examination, 2017
WIRELESS SENSOR NETWORK AND OPTIMIZATION
(Elective – II) (Paper – X)

Day and Date : Wednesday, 13-12-2017　　　　　　　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) Write a note on Operating Systems for WSN.

   B) State QOS attributes and aspects of energy efficiency in WSN.

   C) What is category 2 WSNs ? Explain with the help of figure. Enlist applications of it.

   D) Draw and explain hardware and software components of the wireless node.

2. A) What is MANET ?　　　　　　　　　　　　　　　　　　**(3×1=3)**

   B) What is need for gateways ? Explain internet to WSN communication.

   　　　　　　　　　　　　　　　　　　　　　　　　　　　　(8×1=8)

   　　　　　　　　　　OR

   B) What are the issues in ad-hoc wireless sensor network ?　　**(8×1=8)**

SECTION – II

3. Solve **any three** :　　　　　　　　　　　　　　　　　　　**(8×3=24)**

   A) Discuss need of energy management in ad hoc wireless networks.

   B) What is busy tone multiple access protocol ? Explain with neat diagram.

   C) Write a note on distributed priority scheduling.

   D) Write a note on WSN applications.

4. A) Explain battery scheduling techniques.　　　　　　　　　**(3×1=3)**

   B) Write a note on Wireless routing protocol.　　　　　　　　**(8×1=8)**

   　　　　　　　　　　OR

   B) Explain distributed packet reservation multiple access protocol in detail.　　**(8×1=8)**

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Seat
No.

Set **P**

M.E. (Electronics and Telecommunication Engg.) (Semester – II) (CBCS) Examination, 2017
Paper – X : WAVELET TRANSFORM AND APPLICATIONS (Elective – II)

Day and Date : Wednesday, 13-12-2017   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) Discuss about necessary and sufficient condition for orthonormality.

    b) With the help of dilation equation, explain MRA and write about discrete time MRA.

2. Attempt **any two** of the following questions :   **(5×2=10)**

    a) Explain Fast wavelet transform.

    b) Explain continuous wavelet transform with necessary conditions.

    c) Write about the significance of wavelet.

3. Write a short note on (**any three**) :   **(6×3=18)**

    a) Wavelet decomposition and reconstruction of functions in $L^2(R)$.

    b) Biorthonogality and biorthogonal basis for construction of wavelets.

    c) Criteria for wavelet selections with example.

    d) Admissibility condition wavelet basis functions.

SECTION – II

4. Attempt **any one** of the following questions : (7×1=7)

   a) Explain feature extraction in digital mammography.

   b) Discuss the properties of wavelet transform.

5. Attempt **any two** of the following questions : (5×2=10)

   a) Explain the use of discrete wavelet sub-band in face recognition.

   b) Write about object isolation.

   c) Explain image compression using wavelet transform.

6. Write a short note on (**any three**) : (6×3=18)

   a) Wavelet denoising.

   b) Edge detection using wavelet transform.

   c) Video compression using multi resolution technique.

   d) Transform coding.

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Seat
No.

Set **P**

M.E. (Electronics and Telecomm. Engg.) (Semester – II) Examination, 2017
(CBCS)
Elective – II : ADVANCED EMBEDDED SYSTEMS (Paper – X)

Day and Date : Wednesday, 13-12-2017   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) *Figure to* *right* indicates *full* marks.

SECTION – I

1. Attempt **any two** :   **(6×2)**

   a) Explain hardware architecture of an embedded system.

   b) Explain the program status registers.

   c) Explain ARM 11 architecture in detail.

2. Attempt **any two** :   **(6×2)**

   a) Explain operating modes in MP 11.

   b) Explain data types supported by MP 11 CPU processor.

   c) Explain MP Core architecture with Jazelle technology.

3. Attempt **any two** :   **(6×2)**

   a) Explain characteristics of embedded systems.

   b) Explain parity checking support ARM 11.

   c) Explain summary of control coprocessor CP 15 registers and operations.

SECTION – II

4. Attempt **any two** :   **(6×2)**

   a) Explain software development process life cycle and its model.

   b) Write different features of RTOS.

   c) Explain mutex management and semaphore management in RTOS.

5. Attempt **any two** :						(6×2)

   a) Explain queues and stacks used in C/C++.

   b) Explain the task scheduling processes.

   c) Explain memory management and porting in μ Cos-II RTOS.

6. Attempt **any two** :						(5×2)

   a) Draw and explain Raspberry Pi Architecture.

   b) Draw LCD interfacing with Raspberry Pi.

   c) Write a program to blink LEDs using Raspberry Pi.

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Set P

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

SECTION – I

1. Solve **any three** :   (8×3=24)

    a) Explain Rotor machine with diagram

    b) What is steganography ?

    c) Explain Electronic Codebook

    d) What are the message authentication requirements ?

2. a) What is Cryptanalysis ?   **3**

    b) Write a note on principles of Public Key cryptosystems.   **8**
                                    OR
    b) Explain Diffie-Hellman algorithm.   **8**

SECTION – II

3. Solve **any three** :   (8×3=24)

    a) What is firewall ? Discuss different types of firewall.

    b) Explain PGP in detail.

    c) What is Kerberos ? Discuss requirements of kerberos.

    d) Explain S/MIME in detail.

4. a) What is Brute-Force Attacks ?   **3**

    b) Write a note on Security Attacks.   **8**
                                    OR
    b) Explain applications of cryptographic hash function.   **8**

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Seat
No.

Set **P**

M.E. Mechanical (CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
ADVANCED MACHINE DESIGN (Paper – I)

Day and Date : Thursday, 14-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Solve **any three** questions from **each** Sections.
                         2) Assume suitable data **if** required.
                         3) Figures to the **right** indicate **full** marks.
                         4) **Use** non programmable calculator is **allowed**.

SECTION – I

1. The state of stress at a point is characterised by the components.

    $\sigma_x = 12.31$ $\sigma_y = 8.96$ $\sigma_z = 4.34$

    $\tau_{xy} = 4.20$ $\tau_{yx} = 5.27$ $\sigma_z = 0.84$

    Find the values of the principal stresses and their directions.   **11**

2. a) Explain the state of strain at a point.   **4**
   b) The strain at a point is given by   **8**

    $\varepsilon_x = 0.001$ $\varepsilon_y = 0.003$ $\varepsilon_z = 0.002$

    $\gamma_{xy} = 0.003$ $\gamma_{yz} = 0.0045$ $\gamma_{zx} = 0.002$

    Determine strain invariants and principal strains.

3. a) Derive the displacement equations of equilibrium.   **6**
   b) Compute Lame's coefficients λ and μ for concrete having $E = 28 \times 10^6$ kPa
      and $\mu = 0.2$.   **6**

4. a) Explain theory of virtual work.   **4**
   b) The displacement field in a body is spectral as

    $u_x = (x^2 + 3) \times 10^{-3}$
    $u_y = 3y^2z \times 10^{-3}$
    $u_z = (x + 3z) \times 10^{-3}$.

   Determine the strain components at a point whose co-ordinates are (1, 2, 3).   **7**

SECTION – II

5. a) Explain the distortion energy theory. **6**

   b) A bar is subjected to torque 3000 N.m. and bending moment of 1050 N.m. determine the diameter of bar using **6**

   1) Max normal stress theory.

   2) Max strain theory

   Take $E = 103 \times 10^6$ kPa, $\mu = 0.3$ factor of safety = 3.

6. a) Define an expression for strain energy due to bending moment. **5**

   b) For the cantilever of total length L as shown in fig. determine the diflection at end A. **6**
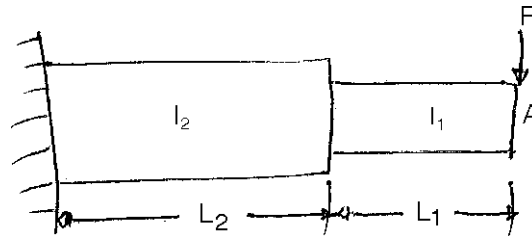
7. A thick-walled tube an internal radius of 10 cm is subjected to an internal pressure of 2000 kgF/cm² (196000 kPa). $E = 2 \times 10^6$ kgF/cm² (196×10^6 kPa) and $\mu = 0.3$.

   Determine the value of the external radius if max shear stress is developed is limited to 3000 kgF/cm² (294×10^6 kPa).

   Calculate the change in internal radius due to the pressure. **11**

8. a) Explain Soderberg and goodman diagram. **5**

   b) A transmission shaft made of steel 20C8 (Snt = 440 mpa) is subjected to reversed torsional moment. The shaft diameter is 30 mm and the expected reliability is 90%. There is step is the shaft, at which the theoretical stress concentration factor is 1.75 while nofch sensitivity factor is 0.80, determine the endurance limit for reversed torsional moment using distortion energy theory. **7**

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Seat No.

Set **P**

M.E. Mechanical (CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
COMPUTER AIDED MANUFACTURING (Paper – II)

Day and Date : Saturday, 16-12-2017 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Explain construction features of CNC machine. **6**

   b) Explain theory of chip formation and types of chips. **6**

2. a) Explain modern cutting tool materials and their application. **6**

   b) Explain working principle, construction and applications of EDM. **6**

3. a) Explain abrasive water jet machining. **6**

   b) Explain modular tools and fixtures. **6**

4. a) Explain types and application of CMM software and utilities. **6**

   b) Explain CMM inspection routines for measuring straightness. **6**

5. a) Explain functional importance of various types of fits. **6**

   b) What are the different types of common CNC controllers ? **6**

6. Write short notes on **any two** : **10**

   1) Generation of tool path

   2) FAPT programming

   3) Optimization of tool path.

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Seat
No.

M.E. Mechanical (CAD/CAM) (Semester – I) (CBCS/CGPA)
Examination, 2017
Paper – III : FINITE ELEMENT ANALYSIS

Day and Date : Monday, 18-12-2017   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) Explain the procedure involved in finite element method.   **6**

   b) Explain HRZ Lumping scheme.   **6**

2. a) Derive an expression for stiffness matrix for truss element.   **6**

   b) Explain factors affecting accuracy of finite element analysis.   **5**

3. a) Explain weighted residual approach applied to finite element analysis.   **6**

   b) Write a short note on principal of minimum potential energy.   **5**

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

   a) Consistent and lumped mass formulation.

   b) Node, element and shape function.

SECTION – II

5. a) Explain finite element analysis of composite material with suitable example. **6**

   b) Write a short note on software used in Finite element analysis. **5**

6. a) Explain formulation for iso-parametric elements. **6**

   b) Describe properties of 1-D, 2-D and 3-D elements. **5**

7. Explain in detail iterative methods in static and dynamic analysis for finite element solution along with examples. **12**

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

   a) One dimensional heat transfer problems in finite element analysis.

   b) Transient analysis.

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Seat No.

Set **P**

M.E. Mechanical (CAD-CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Wednesday, 20-12-2017　　　　　　　　　　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) What are different types of research ? Explain any two with suitable examples. **8**

2. a) What is literature review in research ? Explain its importance and methods. **9**

   b) What is research design ? Explain research design process. **8**

3. Write short notes on (**any three**) : **(3×6=18)**
   1) Error in research
   2) Selection of samples
   3) Creative problem solving method
   4) Types of data.

SECTION – II

4. a) Explain concept of design of experiments with suitable example. **8**

   b) Explain Taguchi method in detail. **9**

5. a) What is analysis of variance ? Give its types with suitable examples. **9**

   b) Give the significance of report writing and explain the layout of research report. **8**

6. Write short note on (**any three**) : **(3×6=18)**
   1) Writing research paper for publication
   2) Parametric and non-parametric tests
   3) Two factor factorial design
   4) Concept of robust design.

Seat
No.

Set **P**

M.E. (Mech. – CAD/CAM) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : ADVANCED MATERIALS AND PROCESSING

Day and Date : Friday, 22-12-2017   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 **wherever** necessary.

SECTION – I

1. A) What is heat treatment ? Explain the objectives of annealing in detail.   **6**

   B) Give the detail classification of Engineering materials.   **5**

2. 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.

3. 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**

4. 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**

SECTION – II

5. 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**

6. A) Explain the significance of MEMS in detail. **5**

   B) What are the advantage, limitations and applications of non conventional machining processes ? **6**

7. 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**

8. Write a short notes on **any three** : **12**

   a) Principle of Theory of MRR.

   b) Wire Drawing

   c) Thermal Metal Spraying

   d) Sheet Metal Processing

   e) Wire EDM.

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SLR-TK – 104

M.E. (Mechanical) (CAD/CAM) (Semester – II) Examination, 2017
MANUFACTURING SYSTEM DESIGN
(CBCS/CGPA) (Paper – VI)

Day and Date : Friday, 8-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

Instructions : 1) Q. No. **3** and Q. No. **6** are **compulsory**.
2) Solve **any one** from remaining questions from **each** Section.
3) Figures to the **right** indicate **full** marks.
4) **Assume** suitable data **if necessary** and mention it **clearly**.

SECTION – I

1. a) Discuss the characteristics and attributes of a system. How will you define a system on the basic of its attributes ? **9**

   b) Discuss the decision making criteria for system design and basic approaches for it. **8**

2. a) What is a line balancing ? State the decisions involved and approaches used in line balancing. **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) Optimization in single stage manufacturing.

   2) Modes of production – Jobbing, intermittent, continuous.

   3) Techniques for system optimization.

   4) Economic scope in diversification.

P.T.O.

SECTION – II

4. a) What is need of database management system in integrated manufacturing ? Explain modules of conceptual database management system. **9**

   b) Discuss the automatic data collection system with its applicability. **8**

5. a) What makes a 'flexible manufacturing system' flexible ? How is the flexibility tested ? **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) General framework of manufacturing system design

   3) Simulation validity

   4) Concept of composite part in group technology

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Set **P**

M.E. (Mech-CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VII : PRODUCT LIFE CYCLE MANAGEMENT

Day and Date : Saturday, 9-12-2017 Total 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) Discuss the comparative analysis of PLM information model with the conventional information model. **7**

   b) What do you understand about product realization in product development process ? **7**

2. a) Elaborate on the concept of design for environment. **7**

   b) Elaborate on the capacity of PLM to handle the change management issues. **7**

3. a) Explain the steps involved in developing the PLM strategy. **7**

   b) With help of block diagram compare PLM with ERP. **7**

4. a) Discuss about the ideal characteristics of a part having good design assembly. **7**

   b) What is product architecture explain with suitable example ? **7**

5. a) Discuss the various reason for implementing product data management. **7**

   b) Brief about product structure explains with help of neat block diagram the product structure of kitchen mixer box pack unit. **7**

6. a) Draw and explain the house of quality chart used for QFD for any suitable product. **7**

   b) Brief about the design of experiment. **7**

7. a) A company is in confusion whether to implement PLM or ERP give your opinion with comparison. **7**

   b) With reference to FMECA elaborate on Risk Priority Number (RPN). **7**

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Set **P**

M.E. Mechanical (CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : INDUSTRIAL AUTOMATION AND ROBOTICS

Day and Date : Monday, 11-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

2) *Answers to both the Sections are to be written in a single answer book.*

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

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

5) *Draw neat sketches/figures* **wherever** *necessary.*

SECTION – I

1. a) Explain different types of assembly system configurations. **6**

   b) Explain fixed, programmable and flexible automation systems. **6**

2. a) Derive the expression for line efficiency of the two stage transfer line with storage buffers. **6**

   b) Explain the types of motion and path control for robot. **6**

3. a) Explain in-line, segmented in-line, rotary configurations of automated production lines in detail. **7**

   b) With a neat sketch explain basic components of an industrial robot. **5**

4. Write short notes on **any two** : **11**

   1) Product design for automated assembly.

   2) Application of robot.

   3) Four common robot configuration.

P.T.O.

SECTION – II

5. a) What is robotic compliance ? Explain active and passive compliance. **6**

   b) Explain the various types of sensors used in robots. **6**

6. a) Explain various types of grippers. **6**

   b) Explain methods of robot programming. **6**

7. a) With the help of neat figures explain the non-servo type and servo type robotic control systems. **6**

   b) Explain various drives used in robots. **6**

8. Write short notes : **11**

   a) Process tools as end effectors of robots.

   b) Robotic actuators.

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Seat No.

Set **P**

M.E. (Mechanical – CAD/CAM) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – IX : OPTIMIZATION TECHNIQUES

Day and Date : Tuesday, 12-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instruction : *All* questions are *compulsory*.

SECTION – I

1. Solve **any two** :   **(6×2=12)**
   a) Golden-section method
   b) Interval-halving method
   c) Secant method.

2. Solve **any two** :   **(6×2=12)**
   a) Newton's method
   b) Conjugate Direction Method
   c) Davidon-Fletcher-Powell Method.

3. Solve **any two** :   **11**
   a) Kuhan-Tucker conditions
   b) Single-Variable Problem
   c) Lagrange Multipliers Method.

SECTION – II

4. Write note on Exterior Penalty Method and Interior Penalty Method.   **12**

5. Write note on the Nine Principles of OPT and Five focusing steps of TOC.   **11**

6. Solve **any two** :   **(6×2=12)**
   a) Neural Networks
   b) Genetic Algorithm
   c) Simulated Annealing.

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SLR-TK – 112

M.E. (Mech.) – CAD/CAM Engg. (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : AUTOMATIC CONTROL ENGG. (Elective – II)

Day and Date : Wednesday, 13-12-2017   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 assumption if required.*

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

SECTION – I

1. a) Explain the advantage and disadvantage of hydraulic system.   **6**

   b) Considering small deviation from steady state operation draw a block diagrams of air heating system as shown in fig. Assume that heat loss to surrounding and heat capacitance of the metal parts of the heater are negligible.   **7**
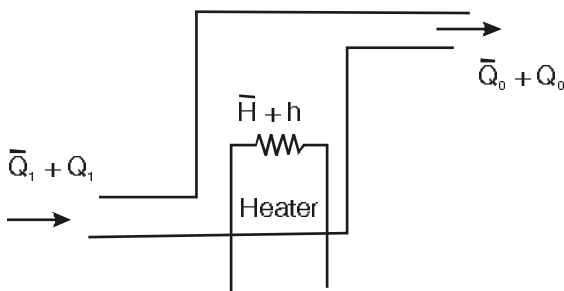
2. a) Explain PID – controller.   **6**

   b) Explain the effect of feedback on distribution.   **6**

3. Write short note on :   **10**

   a) Effect of feedback on stability.

   b) Laplace trans.

P.T.O.

SECTION – II

4. a) For bode plot, define the following terms :   **7**
   a) Gain margin
   b) Phase margin
   c) Gain cross over frequency
   d) Phase cross over frequency

   b) Sketch bode plot for the system having

   $$G(s) \times H(s) = \frac{40s^2}{(s+2)(s+5)}$$ determine Gm, Pm, Wgc, Wpc.   **6**

5. a) Explain lead compensation techniques based on frequency responses approach.   **6**
   b) Explain the characteristics of lag compensator.   **6**

6. a) For a system $\Upsilon(t) = \frac{2(D+5)}{(D+5)(D+3)(D+4)} F(t)$, determine state space

   representations and block diagram by using parallel programming.   **5**
   b) Explain any four theorem of z-transform.   **5**

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| Seat No. | | Set | **P** |

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 : Wednesday, 13-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain finite element method in metal forming.   **5**

   b) Classify metal forming process with their advantages.   **5**

2. a) Explain flow stress of metal in metal forming.   **5**

   b) Explain visco plasticity.   **5**

3. a) Explain upper bound method.   **5**

   b) Explain castability of ferrous and nonferrous metal.   **5**

   c) Explain forging dies.   **5**

SECTION – II

4. a) Explain assemblage and linear matrix solver in finite element method.   **5**

   b) Explain finite element formulation during sheet rolling.   **5**

5. a) Explain shell noising at room temperature.   **5**

   b) Differentiate between extrusion and drawing.   **5**

6. a) Explain plastic anisotropy.   **5**

   b) Explain casting simulation.   **5**

   c) Explain Square-cup drawing process.   **5**

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SLR-TK – 115

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

Day and Date : Thursday, 14-12-2017   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 **right** indicate **full** marks.
          3) Assume suitable data if **necessary** and mention it **clearly**.
          4) **Use** of non-programmable calculator is **allowed**.

SECTION – I

1. a) Using Gauss elimination method, solve

   $5x_1 + x_2 + x_3 + x_4 = 4$, $x_1 + 7x_2 + x_3 + x_4 = 12$, $x_1 + x_2 + 6x_3 + x_4 = -5$, $x_1 + x_2 + x_3 + 4x_4 = -6$.   **8**

   b) The train resistance (R) is measured for the following values of its velocity (V)

V :	20	40	60	80	100
R :	5	9	14	25	36

   10

   If R is related to V by the formula $R = a + bV^n$ find a, b and n.

2. a) Evaluate $\int_0^2 \dfrac{x^2 + 2x + 1}{1 + (x+1)^4} \, dx$ by numerical integration technique

   (Gaussian 3-point formula).   **8**

   b) Using Lagrange's formula, express the function $\dfrac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$ as a

   sum of partial fractions.   **9**

3. a) Find the value of 10g 337.5 by Everett's formula, given the table   **8**

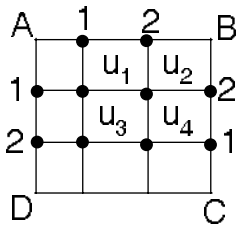 | **x**   : | 310 | 320 | 330 | 340 | 350 | 360 |
   |-----------|---------|---------|---------|---------|---------|---------|
   | **logx** : | 2.49136 | 2.50515 | 2.51851 | 2.53148 | 2.54407 | 2.55630 |

b) Using Romberg's method find $\int_0^1 \dfrac{dx}{1+x^2}$ correct upto 4 decimal places.

(Take n = 0.5, 0.25 and 0.125). **9**

SECTION – II

4. a) Explain with figure types of 1D and 2D elements. **6**

   b) Explain Rayleigh-Ritz method. **6**

   c) Explain importance of mathematical modeling. **5**

5. a) Solve $U_{xx} + U_{yy} = 0$ for the following square mesh, **8**

   b) Using Runge – Kutta method of order 4, find y for x = 0.1, 0.2, 0.3 given that

   $\dfrac{dy}{dx} = xy + y^2$, y(0) =1 continue the solution at x = 0.4 using Mline's method. **10**

6. a) Using Finite difference method, find y (0.25), y (0.5)and y(0.75) satisfying

   $\dfrac{d^2y}{dx^2} + y = x$, subject to the boundary conditions y(0) = 0, y(1) =2. **9**

   b) Using Schmidt method, solve the parabolic equation $U_t = U_{xx}$ under the conditions

   u(0, t) = u(1, t) = 0 and u (x, 0) = sin πx , $0 \le x \le 1$. (Take h = 0.2 and $\alpha = \tfrac{1}{2}$).

   8

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Set P

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No.

M.E. (Mechanical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – II : INDUSTRIAL INSTRUMENTATION

Day and Date : Saturday, 16-12-2017   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** indicates **full** marks.
3) Draw **neat** sketches **wherever** necessary.

SECTION – I

1. a) Describe various types of standards of calibration of the instruments. **6**

   b) Explain linearity, threshold, hysteresis, precision and accuracy of
      instruments. **5**

2. What is meant by zero, first and second order instruments ? Explain dynamic
   characteristics of second order instruments with harmonic inputs by deriving
   appropriate expression. **12**

3. a) Explain Magnetostrictive transducer. **6**

   b) Explain hydraulic load cell. **5**

4. Write short notes on (**any three**) : **12**

   a) Gear dynamometer.

   b) D-A convertor.

   c) Opto-electrical transducers.

   d) Classification of standards of measurements.

P.T.O.

SECTION – II

5. a) Explain with neat sketch working of Rotameter. **5**

   b) Explain the factors affecting selection of thermocouple materials. Give important characteristics of various thermocouple materials. **6**

6. a) Explain with a diagram sound level meter. **6**

   b) What is signal analysis ? Discuss the importance of signal analysis. **5**

7. a) What are the different steps involved in condition monitoring of rotating machines using vibration measurement ? **6**

   b) Explain with the help of suitable example, a data acquisition system. **6**

8. Write short notes on (**any three**) : **12**

   a) Dead weight pressure gauge.

   b) Thermistors.

   c) Condenser type micro phone.

   d) Ferrography, Particle counter.

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SLR-TK – 117

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

Day and Date : Monday, 18-12-2017   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) State and explain the assumptions made in theory of elasticity. **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

$$\phi = \frac{q}{8c^3}\left[x^2(y^3 - 3c^2y - 2c^3) - \frac{1}{5}y^3(y^2 + 2c^2) \right]$$ applied to the region included by

$y = \pm c$ for $x = 0$ to 1. **11**

3. Derive the equation of equilibrium in terms of stress components for a plane stress problem in polar coordinates. **11**

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

   i) Plane stress and plane strain.

   ii) Stresses in solid disc.

   iii) Relation between E, μ and G.

P.T.O.

SECTION – II

5. a) Explain the principles used in finding the shear centre. **4**

   b) Locate the shear centre for a cross section as shown in Fig. 1 of uniform thickness is 5 mm. **7**
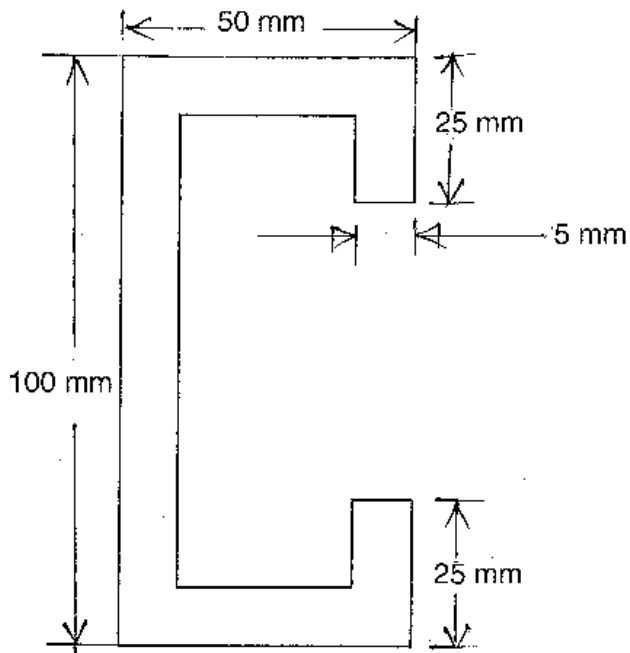
Fig. 1

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 in case of contact between two spheres. **8**

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

   i) Torsion of hollow shaft

   ii) Bending of curved bar

   iii) Contact stresses in ball bearing.

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Set **P**

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

Day and Date : Wednesday, 20-12-2017 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 suitable data **wherever** necessary and state it clearly.

SECTION – I

1. a) Explain descriptive and analytical research. **6**

   b) How to formulate a problem for research ? Explain. **6**

2. a) Explain the significance of modeling in research. **6**

   b) Explain the importance of literature review. **5**

3. a) What is the role of six sigma in design of experiments ? **5**

   b) Explain the methods of simulation. **6**

4. Write a short note on following (**any 3**) : **(3×4=12)**

   a) Data collection methods.

   b) Objectives and motivation of research.

   c) Nuisance factors for Experimental Modeling.

   d) Taguchi method of parameter design.

   e) Statistical process control.

P.T.O.

SECTION – II

5. a) Explain interview method in data collection. **5**

   b) What are different types of report ? **6**

6. a) Explain the factors considered in writing abstract. **6**

   b) Explain principles of thesis writing. **5**

7. a) Comment on readability of report. **6**

   b) Give the importance of citation. **6**

8. Write a short note on the following (**any 3**) : **(3×4=12)**

   a) Convergent Vs divergent thinking

   b) Regression analysis

   c) Error analysis of result

   d) Importance and parameters of review paper

   e) Increasing creativity.

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M.E. (Mechanical Engineering) (Semester – I) (CBCS) (CGPA) Examination, 2017
Elective – I : FINITE ELEMENT METHOD (Paper – V)

Day and Date : Friday, 22-12-2017   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 properties of global stiffness matrix for one dimensional bar element.   **6**

   b) Briefly explain the steps involved in FEA with example.   **6**

2. a) Explain factors affecting accuracy of finite element analysis.   **6**

   b) Explain principle of minimum potential energy.   **5**

3. a) Explain Hermite shape function of beam elements.   **6**

   b) Write a short note on principle of virtual work.   **5**

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

   a) Weighted Residual Method

   b) Formulation of iso-parametric elements.

SECTION – II

5. a) Explain convergence criterion of iso-parametric elements.   **6**

   b) Explain finite element analysis of nonlinear analysis with suitable example.   **5**

P.T.O.

6. Explain with suitable example governing equation of one dimensional heat transfer problem. Discuss various types of boundary conditions used in solving heat transfer problems. **12**

7. a) Discuss in brief dynamic analysis with the help of spring dash pot element in finite element method. **6**

   b) Explain plane stress, plain strain and axis symmetric elements. **5**

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

   a) Software used in FEM

   b) Eigen value Analysis.

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Seat No.

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

Day and Date : Friday, 22-12-2017　　　　　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) *Answer figures to the **right** indicate **full** marks.*
　　　　　　　　 2) *Assume **any three** questions from **each** Section.*
　　　　　　　　 3) *Suitable data **if necessary** and mention **it clearly**.*
　　　　　　　　 4) ***Use** non programmable calculators is **allowed**.*

SECTION – I

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

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

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

   b) Derive Freudensteins equation. **6**

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

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

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

   a) Task of kinematic synthesis

   b) Ball point.

SECTION – II

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

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

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

   $W_2 = 1$ rad/sec $\alpha_2 = 20$ rad/sec^2

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

   Comment on the resulting mechanism. **6**

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

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

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

   b) Explain Pole triangle. **6**

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

   a) Return Circle

   b) Denavit-Herternberg Parameter.

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No.

Set **P**

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

Day and Date : Friday, 8-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Solve **any three** questions from **each** Sections **I** and **II**.
2) Figures to the **right** indicate **full** marks.
3) Assume necessary suitable data if **required**.

SECTION – I

1. a) Compare the kinematics of SHM and Cycloidal motion cam with the help of SVAJ diagrams.   **5**

   b) Plot SVAJ diagram and find maximum values for the 3-4-5 polynomial cam for the following data.   **7**

      Dwell at zero displacement for 90°

      Rise of 15 mm for 90°

      Dwell at 15 mm for 90°

      Fall of 15 mm for 90°

      Rotational speed of cam $= 2\pi \, \text{rad} / \text{sec}$.

2. a) Explain the fracture mechanics approach in design.   **5**

   b) Discuss the various types of variable speed reducers with neat sketches.   **6**

3. a) Explain the significance of thermal stresses in design and derive the expression for thermal stresses in a flat plate subjected to temperature gradient.   **6**

   b) Discuss the important factors considered in form design.   **5**

4. Write short notes on **any three** of the following :   **(3×4)**

   i) Methods for reducing thermal stresses.

   ii) Spring back and shape factor used in plastic bending.

   iii) Selection of electric motors.

   iv) Creep in materials.

P.T.O.

SECTION – II

5. a) Explain the significance of Bath Tub Curve in reliability analysis. **5**

   b) Derive the relation between R(t), f(t) and Z(t) in reliability analysis, with usual notations. **6**

6. a) In a test involving continuous performance of 100 electronic components, under excessive vibration conditions, the following failures are observed during a total period of 8 hours.

Time interval	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
Number of failures	4	14	20	41	10	6	3	2

   i) Draw the frequency polygon showing failure frequency.
   ii) Find the values of reliability, failure density and hazard rate. **6**

   b) Explain the exponential creep law in detail. **5**

7. a) Derive the expression for deflection of an elastic beam subjected to uniform load. **6**

   b) Discuss the discontinuity stresses developed in cylindrical pressure vessel with flat head. **6**

8. Write short notes on **any three** of the following : **(3×4)**

   i) Systems reliability

   ii) Contiguity constraints in bolted joint

   iii) Rayleigh distribution

   iv) Cumulative damage in fatigue analysis.

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Seat
No.

Set | P

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

Day and Date : Saturday, 9-12-2017   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 classification and characteristics of composite materials.   **9**
   b) List out the applications of composite materials with suitable examples.   **8**

2. a) Explain strengths of an orthotropic lamina.   **9**
   b) What is stiffness ? Explain elasticity approach to stiffness.   **8**

3. Write short notes on (**any three**) :   **(3×6=18)**
   1) Basic terminology of fiber-reinforced composite material.
   2) Stress-strain relations for anisotropic materials.
   3) Comparison of approaches to stiffness.
   4) Maximum stress theory.

SECTION – II

4. a) Explain inter-laminar stresses in details.   **9**
   b) Discuss mechanics of materials approach to strength.   **8**

5. a) What is buckling ? Explain governing equations for bulking.   **9**
   b) Explain effect of discontinuity in laminates.   **8**

6. Write short notes on (**any three**) :   **(3×6=18)**
   1) Classical Lamination Theory.
   2) Bending of laminated plates.
   3) Basic principles of fracture mechanics.
   4) Design of composite structures.

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Seat No.

Set **P**

M.E. (Mechanical Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper VIII : MECHATRONICS SYSTEM DESIGN

Day and Date : Monday, 11-12-2017 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) Explain hydraulic actuation systems. **7**

   b) What is PLC ? Describe the basic internal structure of a PLC. **7**

2. Write notes on the following : **14**

   i) Modes of control

   ii) Internal relays in PLC

   iii) Mechatronic system design steps.

3. a) Describe the basic elements of a closed loop control system with appropriate example. **7**

   b) Describe : **7**

   i) Proximity switches ii) Optical encoders.

4. a) What are the factors to be considered while selecting a sensor for a particular application ? Explain. **7**

   b) Write a brief note on Digital Signal Processing. **7**

5. a) Describe the elements of data acquisition and control system. **7**

   b) Describe over-framing. **7**

6. Write notes on the following : **14**

   i) Micro-sensors in Mechatronics

   ii) Fuzzy logic applications in Mechatronics.

   iii) Mechatronic monitoring system for a machine tool.

7. a) Differentiate between a microcontroller and a microprocessor. **7**

   b) Explain sequencing in PLC with a suitable example. **7**

8. Describe, in details, any one diagnostic application of PLC. **14**

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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 prototype design and conceptual design.   **7**

   b) Explain the design and development process of industrial products.   **7**

2. a) Discuss the ergonomic aspect of design of process equipments.   **7**

   b) Discuss the process of setting specifications of a product.   **7**

3. a) Explain interpretation of information in product design.   **7**

   b) Discuss effect of colour with reference to ergonomics of consumer products.   **7**

4. a) Explain the aesthetic expressions of contrast and proportion.   **7**

   b) Explain the psychology of seeing.   **7**

5. a) Explain the concept of design for production.   **7**

   b) Write a note on 'Record Keeping in Design Organisations'.   **7**

6. a) Explain value analysis and cost reduction.   **7**

   b) Discuss modeling techniques in product design.   **7**

7. a) Write a note on house style.   **7**

   b) Write a note on rhythm and radiance with reference to aesthetics of a product.   **7**

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Seat No.	

M.E. (Mechanical Engg.) (Semester – II) (CGPA/CBCS) Examination, 2017
Paper – X : MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II)

Day and Date : Wednesday, 13-12-2017   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) What are the objectives of material handling systems ? Discuss selection of material handling system depending on product ?   **6**

    b) Describe scope and importance of material handling in automobile industry.   **5**

2. Discuss types, design considerations of various cranes and hoists.   **12**

3. Discuss the construction, working and below mentioned parameters for :

    a) Fork lift truck

    b) Bucket conveyor

    Parameters to be covered size, speed, power requirement, capacity, advantages and limitations.   **12**

4. a) Explain material, move and method aspects of material handling equation.   **6**

    b) Write a note on system analysis and economics.   **5**

P.T.O.

SECTION – II

5. Give detailed design steps for following elements of EOT crane. Assume suitable capacity, height, travel on cross beam and other required data :

   a) Hook design

   b) Wire rope design

   c) Pulley design

   d) Design of wheels and rail. **12**

6. a) Discuss the importance of safety in material handling. **6**

   b) Explain the steps in solving material handling problem. **5**

7. a) Discuss the construction and design steps of following component parts of material handling devices. **6**

   I) Sprockets and drums

   II) Block brake.

   b) Describe the screw conveyor with neat sketch. Explain in detail design of any one element. **5**

8. Write note on (**any 3**) : **12**

   a) Roller conveyors

   b) Systematic layout planning

   c) Principles of material handling systems

   d) Lifting Tackles.

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Seat No.

Set **P**

M.E. Mechanical Engg. (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : Elective – II : ROBOTICS

Day and Date : Wednesday, 13-12-2017   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 assumption, **if required** and state them clearly.

1. a) Explain the working of gear operated grippers used in industrial robots. **7**

   b) Explain various software elements of a robot software. Describe motion programming. **7**

2. Write short notes on **any two** of the following : **14**

   a) Magnetic grippers

   b) Hydraulic drives

   c) Robot vision.

3. a) Explain various design considerations of a Gripper. **7**

   b) What is Spatial resolution in case of robots ? Explain. **7**

4. Elaborate on the force control methods used in robot manipulators. **14**

5. a) Describe the robot application for assembly and inspection. **7**

   b) What is precision of movement ? Explain. **7**

P.T.O.

6. Describe various features of mechanical gripper. What are the ways of constraining the part in a gripper ? Explain. **14**

7. a) Describe degrees of freedom associated with the following robots : **7**

   i) GANTRY Robot

   ii) SCARA Robot.

   b) Explain, with merits and demerits, various robot programming languages. **7**

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Set **P**

M.E. Mechanical - Manufacturing Process (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – I : ADVANCED MANUFACTURING TECHNIQUE – I

Day and Date : Thursday, 14-12-2017

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 AFM ? Explain with neat sketch. **10**
   b) Discuss the ECG in detail. **7**

2. a) List the various NDT processes and explain radiographic NDT test in detail. **10**
   b) Explain the atomic emission spectrometer. **7**

3. Write short notes on (**any three**) : **(3×6=18)**
   1) Submerged Arc Welding.
   2) WJM.
   3) Chemical Machining.
   4) HAZ in welding.

SECTION – II

4. a) Explain Sterolithography in detail. **10**
   b) Explain Product development cycle. **7**

5. a) Explain Plasma spraying. **9**
   b) Discuss the LOM process. **8**

6. Write short notes on (**any three**) : **(3×6=18)**
   1) PVD.
   2) Precision Blanking.
   3) Generative manufacturing processes.
   4) Epoxy coating.

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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. Derive the MRR relation in USM as suggested by COOK.   **14**

2. Answer the following :
   a) Develop a theoretical MRR Model in AJM as suggested by Sheldon and
      Finnie for Ductile material.   **8**
   b) What are the functions and characteristics of an electrolyte used in ECM
      process ?   **6**

3. Prove that the maximum power to the spark gap is dissipated when the
   condenser is charged to about $^3/_4$th of source voltage in an EDM using R.C.
   relaxation type generator.   **14**

4. Answer the following :
   a) Give applications advantages and limitations of LBM Process.   **7**
   b) Calculate the machining rate and electrode feed rate when iron is

      electrochemically machined using Cu electrode and NaCl solution. ($r = 7\,\Omega\,cm$)
      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.   **7**

5. Answer the following :
   a) Discuss the process capabilities of EDM.   **6**
   b) Explanation of EBM machining set up and principle of working with neat sketch. **8**

6. Write short notes on :   **14**
   a) Wire EDM
   b) Application of Laser in Micro machining
   c) Stray cutting in EDM.

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M.E. Mechanical (Manufacturing Process) (Semester – I) (CGPA) (CBCS) Examination, 2017
Paper – III : COMPUTER AIDED MANUFACTURING

Day and Date : Monday, 18-12-2017   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) What is Enterprise Resource Planning ? Explain.   **7**

   b) What is Shop Floor Control ? Explain with suitable example.   **7**

2. a) What is QLF ? Explain with suitable example.   **7**

   b) What are different types of CMM ? Explain.   **7**

3. a) Describe MRP with suitable examples.   **7**

   b) Write a note on : Virtual Manufacturing.   **7**

4. a) Describe Rank Order Clustering Method with appropriate example.   **7**

   b) Write a note on : Opitz coding system.   **7**

5. a) Write a note on : Types of electrical drives used for speed and feed control in CNC machine tools.   **7**

   b) What is Computer Aided Process Planning ? Explain Generative CAPP system.   **7**

6. a) Compare Concurrent Engineering and Traditional Engineering approach.   **7**

   b) Explain major benefits of using FMS in industries.   **7**

7. a) Explain Tool Management system in FMS with appropriate examples.   **7**

   b) Write a note on : Constructional features of linear slides of CNC machines.   **7**

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**Seat
No.**

**M.E. Mech. (Mfg. Process) Semester – I (CBCS/CGPA) Examination, 2017
RELIABILITY AND TEROTECHNOLOGY**

Day and Date : Wednesday, 20-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a)	Discuss types of maintenance.	**7**
b)	Explain life cycle cost.	**7**
2. a)	Discuss mean, median and mode by taking example.	**7**
b)	Discuss in brief FMEA.	**7**
3. a)	Explain in brief FMECA.	**7**
b)	Discuss terotechnology in brief.	**7**
4. a)	What do you mean by redundancy ?	**7**
b)	What is conditional probability ?	**7**
5. a)	Discuss vibration signature analysis.	**7**
b)	What is series, parallel and redundant configuration ?	**7**
6. a)	Discuss engineering design reliability.	**7**
b)	Discuss FMEA and FMECA.	**7**

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Seat No.

M.E. Mechanical (Manufacturing Process) (Semester – I) (CBCS/CGPA) Examination, 2017
COMPOSITE MATERIALS (Elective – I) (Paper – V)

Day and Date : Friday, 22-12-2017　　　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Notes : 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) How are composites classified ? Enlist applications of composites.　　**8**

　 b) What are ceramic matrix composites ? Enumerate the advantages of ceramic matrix composites.　　**6**

2. a) What are different constituent materials for composites ? Explain the effect of matrix and fiber factors on mechanical performance of composites.　　**8**

　 b) Give the advantages and drawbacks of metal matrix composites over polymer matrix composites.　　**6**

3. a) Explain with the help of neat sketch, the Preperg manufacturing.　　**6**

　 b) Explain with a schematic diagram, the Hand lay-up techniques.　　**8**

4. a) Write the number of independent elastic constants for three-dimensional orthotropic and isotropic materials.　　**4**

　 b) Find the compliance and stiffness matrix for a graphite/epoxy lamina. The material properties are given as

　　$E_1 = 181$ GPa, $E_2 = 10.3$ GPa, $E_3 = 10.3$ GPa

　　$v_{12} = 0.28$, $v_{23} = 0.60$, $v_{13} = 0.27$

　　$G_{12} = 7.17$ GPa, $G_{23} = 3.0$ GPa, $G_{31} = 7.00$ GPa　　**10**

P.T.O.

5. a) Write stress-strain relations for anisotropic materials.   **4**

   b) Find the elastic moduli of a glass/epoxy unidirectional lamina with 70% fiber volume fraction. For glass/epoxy unidirectional lamina

   $E_f = 85$ GPa, $E_m = 3.4$ GPa, $\vartheta_f = 0.2$, $\vartheta_m = 0.3$, $G_f = 35.42$ GPa and $Gm = 1.308$ GPa.   **10**

6. a) Explain with matrices special cases of laminates.   **8**

   b) Give expressions for the stiffness matrices [A], [B] and [D] for an isotropic material.   **6**

7. a) Explain the measurement of constituent of composite materials.   **6**

   b) Explain the measurement of following basic composite properties :   **8**

   i) Intra-laminar shear testing

   ii) Inter-laminar shear testing.

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Set P

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Set **P**

M.E.-Mechanical (Mfg. Process Engg.) (Sem. – I) (CBCS/CGPA) Examination, 2017
Paper – V (Elective – I) : DESIGN FOR MANUFACTURING

Day and Date : Friday, 22-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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 in detail DFA guidelines by taking a suitable example. **14**

2. What is AHP and ANP ? Explain in detail AHP. **14**

3. Discuss design considerations for casting. **14**

4. Discuss in brief FMEA and its importance. **14**

5. Explain the difference between concurrent engineering and sequential engineering. **14**

6. Write short notes on **any two** : **(2×7=14)**
   a) Life cycle design
   b) DFE
   c) Green design concept.

7. Discuss process selection and factors influencing the process selection. **14**

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Seat No.

M.E. (Mechanical) (Manufacturing Process) (Semester – I) Examination, 2017
(CGPA Pattern) (CBCS)
Elective – I : MANAGEMENT OF TECHNOLOGY (Paper – V)

Day and Date : Friday, 22-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Attempt **any five** questions.

2) Assume suitable data **wherever** necessary and state **it clearly**.

3) Draw appropriate sketches **wherever** required.

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

1. What is the actor-network theory related to technology management ? Explain. **14**

2. Describe the hype cycle with respect to technology management. State its uses with examples. **14**

3. Describe the concept of technology road-mapping in technology forecast with appropriate example. **14**

4. What is MoT ? Describe the factors affecting Management of Technology. **14**

5. Explain Metcalf's law in technology transfer and S-curve in technology adoption. **14**

6. Describe process innovation with models, sources and strategies. **14**

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Seat No.

Set | P

M.E. Mechanical (Manufacturing Process) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VI : ADVANCED MANUFACTURING TECHNIQUES – II

Day and Date : Friday, 8-12-2017

Max. Marks : 70

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

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

1. a) With neat diagram explain principle, working, advantages and disadvantages of full mould casting. **6**

   b) Write in detail solidification process in casting for sound casting manufacturing. **6**

2. a) What is honing ? Draw diagram of honing tool. Write capabilities of honing process. **6**

   b) What is deburring process ? Why it is required ? How it is down ? **6**

3. a) Explain Explosive forming process. **6**

   b) Explain Cold Pressure welding process. **6**

4. a) With neat diagram explain blaw moulding process. **6**

   b) With neat diagram explain transfer moulding process. **6**

5. a) What do you mean by hot pressing in powder metallurgy ? **6**

   b) Explain fiber metal process related with powder metallurgy. **6**

6. Write short notes on **any two** : **10**

   1) Continuous casting process

   2) Super finishing

   3) Transfer moulding in plastic

   4) Sintering.

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Seat
No.

Set **P**

M.E. (Mech. Manufacturing Process Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VII : ROBOTICS AND ROBOT APPLICATIONS

Day and Date : Saturday, 9-12-2017　　　　　　　　　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) Define a robot. With the help of neat sketch describe pitch, yaw and roll motion of a robot wrist. **7**

 b) What are the four main types of motion control used in robot programming ? Which type provides the best control ? Explain briefly. **7**

2. What are the advantages of using pneumatic drives in the robots ? Discuss the different types of pneumatic drives used in the robots with the help of neat sketches. **14**

3. Answer the following.

 a) Classify the robot end effectors from the view point of control. Sketch and explain a cam actuated gripper used for robots. **7**

 b) Explain trajectory planning and obstacle avoidance in robots. **7**

4. Answer the following.

 a) Explain direct kinematic analysis of articulated robot. **7**

 b) Explain robot vision. Describe vision hardware. **7**

5. Answer the following.

   a) Enumerate the non manufacturing areas where robots are expected to be used. Discuss robot application for welding and machine loading. **7**

   b) In which type of production, robots are preferred for loading and unloading function ? Explain. **7**

6. What is inverse kinematics problem ? Explain the solution to the inverse kinematics problem with an example. **14**

7. Write short notes on : **14**

   a) Vacuum cups

   b) Robot control systems

   c) PID control

   d) Raster scan.

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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. Use Dijkstra's algorithm on connected weighted graph shown below to find length of shortest paths from the vertex "f" to each of other vertices. **14**
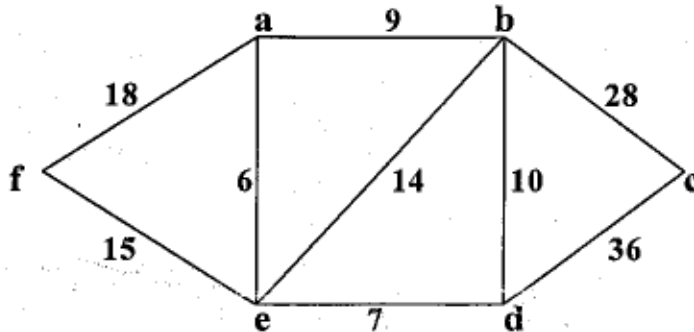
2. Find out regression coefficients bxy and byx, if $\Sigma x = 50$,

$\overline{X} = 5$, $\sum y = 60$, $\overline{Y} = 6$, $\sum xy = 350$, $óx = 5$ $óy = 8$. **14**

3. Discuss performance and automated modeling systems in detail. **14**

4. Explain role of graph theory in manufacturing. **14**

5. Discuss in detail monte carlo simulation. **14**

6. What is correlation ? Explain multiple correlation analysis. **14**

7. What is neural network ? Explain application of neural network. **14**

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M.E. Mechanical (Manufacturing Process Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
MACHINE TOOL ENGINEERING (Paper – IX)

Day and Date : Tuesday, 12-12-2017

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) Explain in brief about trends in the development of machine tools. **7**

   b) Develop a generalized empirical relationship for the thrust and the power consumption in Drilling. **7**

2. a) Starting from the first principle of metal cutting drive an equation for cutting force while machining steel with HSS single point cutting tool. **7**

   b) Discuss briefly the silent features to be considered for selecting and designing a suitable drive system in machine tool. **7**

3. a) What is meant by FMS ? Classify FMS into various categories and explain the advantages of FMS in modern manufacturing industries. **7**

   b) Describe the procedure of designing a machine tool spindle and sketch a typical spindle unit. **7**

4. a) Enumerate the various methods used in practice to reduce the positional displacement error due to stick slip. **7**

   b) Explain in brief about ferromagnetic power clutch and motor type time relay. **7**

5. a) With neat sketches of circuit diagrams show the functioning of a thermal relay and electrical braking system. **7**

   b) Show the circuit diagram for effecting push button control system in machine tool. **7**

6. a) Explain in brief about any method of analyzing the dynamic rigidity of a machine tool based on self-excited forced and damped vibration. **7**

   b) With a neat sketch show the circuit diagram of aerostatic lubrication system explaining the importance of each elements in the circuit diagram. **7**

7. a) Explain in brief about tribological behavior of various materials and their uses in recent machine tool design. **7**

   b) What do you know about self-excited vibration in machine tools ? Explain in brief with one example. **7**

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M.E. Mechanical (Mfg. Process Engg.) (Semester – II) (CBCS/CGPA) Examination, 2017
TOTAL QUALITY CONTROL
(Elective – II) (Paper – X)

Day and Date : Wednesday, 13-12-2017   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) Explain quality assurance. **8**

   b) Discuss Taguchi's recommended design technique. **6**

2. Explain Quality function deployment in brief. **14**

3. a) Discuss Quality Control Tools. **8**

   b) Explain quality circle. **6**

4. a) Discuss different control charts. **8**

   b) Explain Economic model of quality cost. **6**

5. Explain concept of quality control and dimensions of quality. **14**

6. Discuss TQM by taking a case study. **14**

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M.E. (Sem. – II) (Mech.-Mfg. Process Egg.) (CBCS/CGPA) Examination, 2017
COMPUTATIONAL TECHNIQUES (Elective – II) (Paper – X)

Day and Date : Wednesday, 13-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N. B. :   1) Attempt **any 2** questions from **each** Section.
           2) **Use** of scientific calculator is **allowed**.
           3) Assume suitable data **if necessary** and mention **it clearly**.

SECTION – I

1. Write short note on following :   **18**
   1) Secant method
   2) Runge Kutta method
   3) G. S. Method.

2. a) Using numerical differentiation (Bessel's formula), find f′ (7.5) from following table   **10**

   | x : | 7.47 | 7.48 | 7.49 | 7.50 | 7.51 | 7.52 | 7.53 |
   | $f(x)$: | 0.193 | 0.195 | 0.198 | 0.201 | 0.203 | 0.206 | 0.208 |

   b) Using Runge-Kutta method of 4th order solve for y at x = 1.2, 1.4 from

   $\dfrac{dy}{dx} = \dfrac{2xy + e^x}{x^2 + xe^x}$ given $x_0 = 1$, $y_0 = 0$.   **8**

3. a) Fit a curve of the form $y = ae^{bx}$ to the following data :   **9**

   | x : | 0 | 1 | 2 | 3 |
   | y : | 1.05 | 2.10 | 3.85 | 8.30 |

   b) Using $\dfrac{dy}{dx} = \dfrac{y - x}{y + x}$ with initial condition y = 1 at x = 0, find y for x = 0.1 by

   Euler's method.   **8**

P.T.O.

SECTION – II

4. Write short note on following : **18**
   i) Orthographic projection
   ii) Cubic splines
   iii) Parametric representation of circle.

5. a) Explain basic and general 3D transformation. **9**

   b) Explain bilinear surface. **8**

6. a) Explain piecewise surface representation. **8**

   b) Explain concatenated transformation by suitable example. **9**

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M.E. (Mech./Thermal Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
ADVANCED FLUID MECHANICS AND CFD (Paper – I)

Day and Date : Thursday, 14-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm and of length 300 m. The rate of flow of fluid through the pipe is 3.5 liters/sec. Find the pressure drop in a length of 300 mm and also the shear stress at the pipe wall. And explain how Hagen Poisuille equation can be used for determination of pressure drop.   **9**

   b) Explain the property viscosity in detail along with its different units and variation of viscosity as per temperature for gases and liquids. Pertaining to the journal bearing explain how torque of the shaft affects the selection of proper viscosity.   **8**

2. a) Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $\dfrac{u}{U} = \dfrac{y}{\delta}$,

   Where u is the velocity at a distance y from the plate and u = U at y = δ, where δ = boundary layer thickness.   **9**

   b) Define displacement thickness and derive an expression for displacement boundary layer thickness.   **9**

3. Write note on the following :   **18**

   a) Energy distribution in turbulent flows.   **6**

   b) Separation of boundary layer.   **6**

   c) Von Karman velocity distribution.   **6**

P.T.O.

SECTION – II

4. a) Explain the MacCormackl's techniques with its advantages and disadvantages. **9**

   b) What is the significance of Mach number in compressible fluid flow ? Calculate the Mach number at a point on a jet propelled aircraft which is flying at 1100 km/hour at sea-level where air temp. is 20°C. Take R = 287 J/KgK & r = 1.4. **9**

5. a) State the physical principle of momentum equation and derive the Navier-Stokes equations in non-conservation forms space. **9**

   b) What is CFD ? Explain how it can be used as a design tool and research tool. **8**

6. a) Write short note on characteristics of Elliptic equations. **6**

   b) Explain substantial derivative of moving fluid element. **6**

   c) Write short note on alternating direction-implicit technique. **6**

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M.E. (Mech./Thermal Engineering) (Sem. – I) (CBCS/CGPA) Examination, 2017
Paper – II : MEASUREMENT IN THERMAL SYSTEMS

Day and Date : Saturday, 16-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

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

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

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

SECTION – I

1. a) Fit a second degree parabola to the following data :   **6**

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

   b) Explain the method of least squares.   **5**

   c) How temperature scanner and data acquisition systems are used in thermal
   systems ?   **6**

2. a) Explain Thomson, Peltier and Seebeck effect.   **6**

   b) State and explain different laws of Thermoelectric circuits.   **6**

   c) Why platinum wire is used in resistance temperature detector, explain in
   detail.   **5**

3. a) What is interferometry ? Explain temperature measurement using
   interferometer.   **6**

   b) Explain application of spectroscopy in temperature measurement.   **6**

   c) With neat sketch, explain the method of thermal conductivity measurement
   for liquids.   **6**

SECTION – II

4. a) Explain McLeod gauge for pressure measurement. **6**

   b) Explain Pirani gauge. **6**

   c) Draw schematic sketch to measure differential pressure of gas flowing through pipe. **5**

5. a) Explain Hot wire anemometer. **5**

   b) Draw neat sketch of measurement of air velocity with the help of Pitot tube and explain. **6**

   c) Derive the relation to determine discharge of liquid through venturimeter. **6**

6. a) Explain any one method for calibration of pressure measuring instruments. **6**

   b) Explain methods of level measurement. **6**

   c) Why measurement of water level in the boiler is very much needed ? **6**

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M.E. (Mech./Thermal Engineering) (Semester – I) Examination, 2017
(CBCS/CGPA)
Paper – III : ADVANCED HEAT AND MASS TRANSFER

Day and Date : Monday, 18-12-2017

Total Marks : 70

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

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

SECTION – I

1. a) Derive three dimensional heat conduction equation in Cartesian co-ordinates and reduce it to Laplace equation. State significance of thermal conductivity alongwith its variation as per temperature for gases, liquids and solids. **10**

   b) A cylindrical resistor on a circuit board dissipates 0.8 W of power. The amount of heat dissipated in 24 hour, heat flux, and fraction of heat dissipated from top and bottom are to be determined. Assuming heat transfer coefficient to be uniform, heat transfer is proportional to the surface area. Calculate fraction of heat dissipated from to and bottom surface of the resistor. **8**

2. a) Derive the equation of transient heat transfer of lumped heat capacity system. And explain with one example of unsteady state heat transfer. Solve the following :

   A thermocouple junction which may be approximated as a sphere of diameter 0.706 mm is to be used for temperature measurement in gas stream. Assume h = 20 W/m^{2}K, K = 20, W/mK, Cp = 400 J.kgK and density = 8500 kg/m^3. How long will it take for the junction to reach 199°C ? **10**

   b) Consider a cylindrical rod maintained at temperature T generating heat uniformly. Derive the relation for temperature distribution from general heat conduction equation. **7**

P.T.O.

3. a) A steel rod of diameter 2 cm and length 25 cm and K = 50 W/mK is exposed to ambient air at 20°C with a heat transfer coefficient of 64 W/m²K. If one end of the rod is maintained at 120°C. Calculate heat loss from the rod. **9**

   b) How finite difference method can be applied to find temperature distribution in plane two dimensional wall of unit thickness ? **8**

SECTION – II

4. a) Atmospheric air at 275K and free stream velocity 20m/s flow over a plat plate L = 1.5 m long that is maintained at 325K. Assuming 1 m width find average heat transfer coefficient and total heat transfer. Use the correlation

   $Nu = 0.036 \, Pr^{0.43} \, (Re^{0.8} - 9200)$. **8**

   b) Consider a cylinder of diameter 20 cm maintained at 200°C is held vertically in still air at 25°C. Assume height of cylinder 30 cm. Use heat transfer data book select appropriate correlation and find heat transfer coefficient and heat loss from cylinder surface, bottom and top surface. **9**

5. a) Water at the rate of 3.783 kg/s is heated from 37.78 to 54.44°C in a shell and tube heat exchanger. On the shell side one pass is used with water as the heating fluid (1.89 kg/s) entering the exchanger at 93.33°C. The overall heat transfer coefficient is 1419 W/m²K and the average water velocity in the 1.905 cm diameter tubes is 0.366 m/s. Because of space limitations the tube length must not be longer than 2.438. Calculate the number of tube passes, number of tube per pass and the length of the tubes consistent with this restriction. **9**

   b) Three surfaces are forming enclosure, third surface is reradiating surface. If two surfaces are having emissivities 0.6 and 0.5 and maintained at 100 and 300 K temperature, find net heat exchange between two surfaces, derive the relations used to solve the problem. **8**

6. Write a short note on the following : **(6×3=18)**

   a) Filmwise and dropwise condensation

   b) Critical thickness of insulation for cylinder and spherical surfaces

   c) Heat transfer and mass transfer.

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

Day and Date : Wednesday, 20-12-2017　　　　　　　　　　　　Total 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) List the steps involved in research process. Explain each process briefly. **8**

   b) Discuss in detail methods of data collection with merits of each. **9**

2. a) Describe white box, grey box and black box models. Explain with example. **7**

   b) An experiment is conducted to determine stiffness of spring/following is data

X(N)	10	20	30	40	50	60	70	80
Y(cm)	2	4	5	4	5	5.5	6.8	7.9

   Establish the equation for deflection of spring. (Calculator can be used) find the regression coefficient. Plot regression line. Find deflection for 50 N and determine the error. **10**

3. a) What is hypothesis testing ? Explain Z test and t test. **8**

   b) A researcher claims that the average wind speed in a certain city is 8 miles per hour. A sample of 32 days has an average wind speed of 8.2 miles per hour. The standard deviation of the population is 0.6 mile per hour. At a 0.05, is there enough evidence to reject the claim ? Represent graphically distribution with significance level and test statistics. **10**

P.T.O.

SECTION – II

4. a) Explain loss function given by Taguchi and its applications. **7**

   b) A researcher wishes to try three different techniques to lower the blood pressure of individuals diagnosed with high blood pressure. The subjects are randomly assigned to three groups; the first group takes medication, the second group exercises and the third group follows a special diet. After four weeks, the reduction in each person's blood pressure is recorded. At $\alpha = 0.05$, test the claim that there is no difference among the means. The data are shown in table. **10**

Medication	Exercise	Diet
10	6	5
12	8	9
9	3	12
15	0	8
13	2	4

5. a) Experimentor carries an investigation into the effect of the concentration of the reactant and the amount of the catalyst on the conversion (yield) in a chemical process. The reactant concentration be factor A at two levels of interest be 25 and 35 percent. The catalyst is factor B, with the high level denoting the use of 3 kg of the catalyst and the low level denoting the use of only 2 kg. The experiment is replicated three times and the data are listed in table.

Factor		Yield (response) Replication		
		1	2	3
A low	B low	30	24	26
A high	B low	39	30	31
A low	B high	20	18	22
A high	B high	34	28	28

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   i) Determine main effect of A and B. Represent graphically effect of B(low) for A(low and A high) and B(high) for A(low and A high).

   ii) Find interaction effect interpret on basis of graph drawn in i.

   iii) Establish regression equation for the response for coded values (No need to carry of ANOVA). **10**

  b) What is fractional factorial design of experiment ? Discuss limitations and advantages. **7**

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

  a) Dependent and independent variables.

  b) Creativity and madness.

  c) Types of report.

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M.E. (Mechanical) (Thermal Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – V : ADVANCED THERMODYNAMICS (Elective – I)

Day and Date : Friday, 22-12-2017　　　　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) State the third law of thermodynamics. Explain any two corollaries of it. **9**

   b) Derive Maxwell equation. **9**

2. a) State the statements of second law of thermodynamics and explain thermodynamic temperature scale. **9**

   b) Derive $Tds = C_v dT + (T\beta/\alpha)dv$, where β is the coefficient of volume expansion, α is the isothermal compressibility and the other symbol have their usual meaning. **8**

3. a) What is meant by reduced properties explain in detail ? **9**

   b) What is principle of entropy production ? **8**

SECTION – II

4. a) Percentage composition by weight of sample of fuel as C = 90%, H_2 = 3.5%, S = 1%, O_2 = 3%. Find the composition of exhaust gases. **9**

   b) Write a note on standard heat of formation and adiabatic flame temperature. **9**

5. a) Write note on FD, BE and MB statics. **9**

   b) Why energy of fluid at higher temperature more than that at lower temperature ? **8**

6. a) What is transport phenomenon ? **9**

   b) What is meant by partition function and what are the uses of it ? **8**

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M.E. (Mech./Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Friday, 8-12-2017 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) *Question **1** is **compulsory**.*

2) *Solve **any one** questions from **2** and **3**.*

3) *Solve **any two** questions from **4, 5** and **6**.*

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

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

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

SECTION – I

1. Design a air conditioning system for a room of size 10 m × 10 m situated in hot atmosphere having 40°C atmospheric temp and 15% relative humidity. Assume suitable data and enlist the design parameter such as TOR of cooling system, fan specifications, compressor specification and condenser, evaporator specifications. Justify the selection of appropriate refrigerant ? **18**

2. a) A heat exchanger with one shell pass and two tube passes uses sea water at 15°C, Cp = 3.8 kJ/kg.K, to cool a flow rate of fresh water of 1.6 kg/s entering at 40°C. The specific heat of water is 4.19 kJ/kg.K. If UA of heat exchanger is 10 kW/K, what must the flow rate of sea water be in order to cool the fresh water to 22.5°C. **10**

b) Define coefficient of determination and general procedure of fitting a straight line among the data ? **7**

3. a) A function y is expected to be of the form $y = cx^m$ and x, y data develop a straight line on log-log paper. The line passes through the (x, y) points (100, 50) and (1000, 10). What is the value of c and m ?   **10**

   b) Explain any one method of simulation with one example.   **7**

SECTION – II

4. a) Find the value of y, where

   $y = 3x_1 + 2x_2 + 4x_3$ subjected to

   $3x_1 + 4x_2 + 5x_3 \leq 40$

   $x_1 + x_2 + x_3 = 9$

   $7x_1 + 4x_2 + 4x_3 \geq 42$.   **10**

   b) Explain dynamic behavior of mercury filled thermometer.   **8**

5. a) Consider mercury filled thermometer used for measurement of temperature. Model it and find out time constant and draw block diagram indicating transfer function ?   **10**

   b) Write short note on method of optimization.   **7**

6. a) Explain with one example Steepest-Ascent search method of optimization with one example.   **10**

   b) Consider a simple counter flow heat exchanger and analyze its dynamic behavior and draw the block diagram for it.   **7**

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M.E. (Mech.-Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING
(Paper – VII)

Day and Date : Saturday, 9-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Using the False Position method, find a root of the function $f(x) = e^x – 3x^2$ to an accuracy of 5 digits. The root is known to lie between 0.5 and 1.0.   **5**

   b) Find one root of $e^x – 3x = 0$ correct to two decimal places using the method of Bisection.   **5**

   c) Write algorithm of Gauss-elimination method.   **7**

2. a) Explain the Gauss Quadrature integration method in detail.   **8**

   b) Evaluate the integral $\int_0^{12} \dfrac{dx}{1+x^2}$ by using trapezoidal rule, taking n = 6. Also write the algorithm of this method.   **9**

3. a) Use Runge-Kutta method of order four to get solution of $\dfrac{dy}{dx} = 2xy$ at y(1.5), with y(1) = 1 in steps of h = 0.1.   **8**

   b) Fit a second order polynomial for the data given in Table.   **10**

 | x_i | 0 | 1 | 2 | 3 | 4 | 5 |
   |-------|---|---|----|----|----|----|
   | y_i | 2 | 8 | 14 | 27 | 41 | 61 |

P.T.O.

SECTION – II

4. Answer **any two** of the following :   **18**

   a) Using Galerkin methods derive the generalized 1 D finite element equation for heat transfer problem.

   b) Explain Implicit and Explicit FDM solution methods for heat transfer problem in detail.

   c) Figure shows a uniform aluminium fin of diameter 2 cm. The root (left end) of the fin is maintained at a temperature of T0 = 100°C while convection takes place from the lateral (circular) surface and the right (flat) edge of the fin. Assuming k = 200 W/m°C, h = 1000 W/m²°C and T_∞ =20°C, determine the temperature distribution in the fin using a two-element idealization.
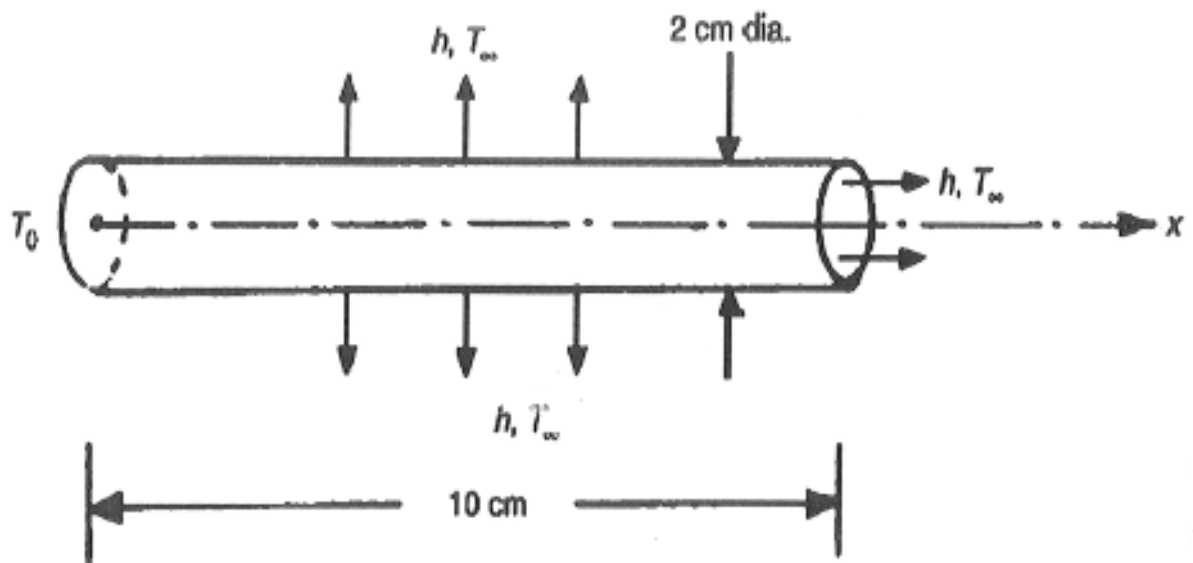
5. a) Differentiate between implicit and explicit method.   **4**

   b) Consider an aluminium alloy fin (k = 180 W/m°C) of triangular cross section with length L = 5 cm, base thickness b = 1 cm, and very large width w, as shown in Figure. The base of the fin is maintained at a temperature of T0 = 200°C. The fin is losing heat to the surrounding medium at T = 25°C with a heat transfer coefficient of h = 15 W/m²°C. Using the finite difference method with six equally spaced nodes along the fin in the x-direction, determine :

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a) the temperatures at the nodes,

b) the rate of heat transfer from the fin for w = 1m, and

c) the fin efficiency.   **13**
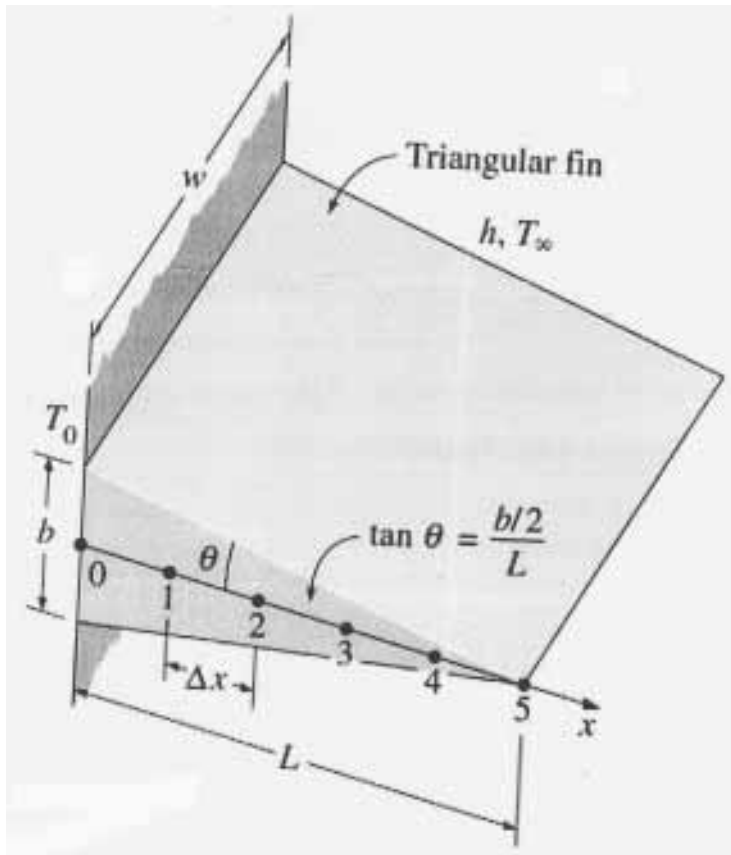
6. a) Explain forward difference method in detail with tables.   **8**

   b) Explain backward difference method in detail with tables.   **9**

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M.E. Mechanical (Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
THEORY AND DESIGN OF I.C. ENGINE (Paper – VIII)

Day and Date : Monday, 11-12-2017   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) Compare internal combustion engine and external combustion engine.   **9**

    b) A single cylinder four stroke cast iron diesel engine has following data :
      Cylinder bore = 200 mm
      Length of stroke = 250 mm
      Speed = 600 rpm
      Brake mean effective pressure = 0.60 MPa
      Maximum gas pressure = 4 MPa
      Fuel consumption = 0.25 kg per BP per hr.
      (l/d) ratio for bush in small end of connecting rod = 1.5
      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**

2. a) Write note on computer aided design of engine component.   **8**

   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 = 150 mm,

   L/r ration = 4.75

   Maximum gas pressure = 4 MPa,

   Length of stroke = 200 mm,

   Weight of flywheel cum belt pulley = 3.5 kN,

   Total belt pull = 1.8 kN,

   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 main bearing is 350 mm apart and the third bearing is 400 mm apart from the main bearing on its side. The Belts are in horizontal direction, assume l/d ratio = 1 for crank pin.   **9**

3. a) Explain recent advances in I.C. Engine for improving efficiency of I.C. Engine.   **8**

   b) The following data is given for the cap and bolt of the big end of connecting rod ;

   Engine speed = 1800 rpm

   Length of connecting rod = 350 mm

   Length of stroke = 175 mm

   Mass of reciprocating parts = 2.5 Kg

   Length of crank pin = 76 mm

   Diameter of crank pin = 58 mm

   Thickness of bearing bush = 3 mm

   Permissible tensile stress for bolts = 60 N/mm^2

   Permissible bending stress for cap = 80 N/mm^2

   Calculate the nominal diameter of blots and thickness of cap for the big end.   **9**

Set P

SECTION – II

4. a) Compare Thermo-syphon cooling with pressure cooling system. **8**

   b) Design exhaust valve for a horizontal diesel engine the following data :
      Cylinder bore = 150 mm,
      Length of stroke = 275 mm,
      Engine speed = 500 rpm,
      Maximum gas pressure = 3.5 MPa,
      Seat angle = 45°
      Allowable bending stress for valve = 50 N/mm^2
      K = 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 the valve. **9**

5. a) Why balancing of IC engine is important ? Explain procedure adopted for balancing of IC engine. **8**

   b) Determine the dimension of small and big end bearings of the connecting rod for a diesel engine with the following data :
      Cylinder bore = 100 mm
      Maximum gas pressure = 4 MPa
      (l/d) ratio for piston pin bearing = 2
      (l/d) ratio for crank pin bearing = 1.3
      Allowable bearing pressure for piston pin bearing = 12 MPa
      Allowable bearing pressure for crank pin bearing = 7.5 MPa. **9**

6. a) Explain need of cooling system in IC Engine. What are various coolant used in IC engine ? Explain "Splash lubrication with oil pump". **8**

   b) What are the recent methods of controlling pollution of I.C. Engine ? Explain any one in detail. **9**

Set P

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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SLR-TK – 160

M.E. (Mech./Thermal Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM
Paper – IX

Day and Date : Tuesday, 12-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Attempt **any two** questions from **each** Section.
2) Figures to the **right** indicate **full** marks.
3) Assume suitable data **if necessary**.
4) Use of steam tables, psychometric chart, refrigeration property charts is **allowed**.
5) Use of non-programmable calculator is allowed solution.

SECTION – I

1. a) In a simple saturated vapour compression cycle using R-22, condenser and evaporator temperature are 40°C and 0°C respectively. For the refrigerant capacity of 15 TR calculate :

   1) mass flow rate (kg/sec).

   2) power consumption of compressor.

   3) discharge temperature of compressor.

   4) condenser capacity.

   Specific heat of R-22 vapour is 0.67 kJ/kg K.   **12**

T	P	V_g	h_f	h_g	S_f	S_g
°C	(bar)	(m³/kg)	(kJ/kg)	(kJ/kg)	(kJ/kg k)	(kJ/kg k)
0	4.976	0.00471	200	405.36	1.000	1.7518
40	15.335	0.151	249.08	415.95	1.1666	1.6995

   b) Explain the effect of sub-cooling and superheating effect on vapour compression cycle.   **6**

2. a) Obtain all Psychrometric properties of moist air at 36°C DBT and 20°C WBT without using Psychrometric chart. **10**

   b) Explain balance point of the vapour compression system. **7**

3. a) Explain Electrolux refrigeration system. **10**

   b) Explain different factor affect the design of pipe line. **7**

SECTION – II

4. a) Following data refers to the summer air conditioning of building :

   Outside design condition – 43°C DBT, 27°C WBT

   Inside design condition – 25°C DBT, 50% RH

   Room sensible heat gain – 84000 KJ/hr

   Room latent heat gain – 21000 KJ/hr

   By-pass factor of cooling coil used – 0.2

   The return air from room is mixed with outside air before entry to cooling coil in the ratio of 4:1 by mass determine :

   a) Apparatus dew point temperature.

   b) Entry and Exit condition of air of cooling coil.

   c) Fresh air mass flow rate.

   d) Refrigeration load on cooling coil. **14**

   b) What is difference between absorption and adsorption refrigeration. Explain in brief. **3**

5. Elaborate following terms : **18**

   a) Thermodynamic wet bulb temperature

   b) ESHF

   c) RSHF

   d) GSHF

   e) Sole air temperature

   f) Altitude angle Zenith angle and Solar Azimuth angle.

6. a) Enlist the different air-conditioning system and explain all water and all air refrigeration system. **10**

   b) What is static regain factor and explain the Static regain method of duct design ? **7**

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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 : Wednesday, 13-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) In a steam turbine, steam at 20 bar, 360°C is expanded to 0.08 bar. It then enters into a condenser, where it is condensed to saturated liquid water and the pump feedback the water into boiler. Assume ideal process find per kg of steam the network and cycle efficiency. **8**

   b) Explain working of pumped storage hydro-electric power plant with neat sketch. **6**

   c) Draw and explain layout of modern steam power plant. **4**

2. a) A penstock supplies water from a reservoir to the Pelton wheel with gross head of 500 M, one third of the gross head is lost in friction in penstock. The rate of flow of water through the nozzle fitted to the end of penstock is 2m^3/s. The angle of deflection of jet is 165°. Determine power given by the water to the runner and also find the hydraulic efficiency of the wheel. Take speed ratio = 0.45 and Cv = 1. **8**

   b) Draw layout of diesel engine power plant and explain essential components of diesel power plant. **5**

   c) Explain different types of nuclear fuels. **4**

3. a) Explain unit pulverized system and bin pulverized system with neat sketch. **6**

   b) Explain mechanical dust collection system also explain working of electrostatic precipitator. **6**

   c) What are electrical and non electrical equipments in hydroelectric power plant ? **5**

SECTION – II

4. a) Explain with neat sketch combined gas turbine-steam turbine power plant with its arrangement and its reorientation on T-S diagram. **8**

   b) Write a short note on economics of load sharing. **4**

   c) Explain electromagnetic transducer with neat sketch. **6**

5. a) The estimate cost of the two power plant station I and II running parallel are Rs. (2500 Kw + 0.550 KWh) and Rs. (2400 Kw + 0.6 KWh) respectively and supply to the system whose maximum load demand is 100 MW and minimum load demand is 10 MW during year. The load varies as straight line find minimum cost of generation. **7**

   b) How the water is polluted by thermal power plant ? Discuss different ways to prevent water Pollution from thermal power plant. **6**

   c) Explain AC and DC excitation system. **4**

6. a) Write a short note on general tariff system and explain Hopkinson demand rate. **6**

   b) Write a short on radioactive pollution. **5**

   c) Write a short note on pollution due to nuclear power station and its control. **6**

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Set **P**

M.E. (Electronics & Telecommunication) – Digital Electronics and Communication System (Semester – I) Examination, 2017
(CBCS)
RESEARCH METHODOLOGY (Paper – I)

Day and Date : Thursday, 14-12-2017　　　　　　　　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.*
　　　　　　　 4) ***Use*** *of nonprogrammable calculator is* ***allowed****.*

SECTION – I

1. A) Briefly describe the different steps involved in a research process. **6**

   B) Explain difference between experiment and research. **6**

2. A) "The task of defining the research problem often follows a sequential pattern". Explain. **6**

   B) Explain the meaning and significance of a research design. **6**

3. A) Explain the meaning of research hypothesis. **5**

   B) Explain the steps in sample design. **6**

SECTION – II

4. A) Explain the significance of a research report and narrate the various steps involved in writing such a report. **6**

   B) Point out possible sources of error in measurement. Describe the tests of sound measurement. **6**

P.T.O.

5. A) What are the guiding considerations in the construction of questionnaire ? **6**

   B) What do you mean by multivariate analysis ? Explain how differs from bivariate analysis. **6**

6. A) Explain the meaning of the following sampling fundamentals : **6**
      1) sampling frame
      2) sampling error
      3) central limit theorem.

   B) Write short note on – bibliography and its importance in context of research report. **5**

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M.E. (E and TC-Digital Electronics and Communication Systems) (Sem. – I) (CBCS) Examination, 2017
Paper – II : COMMUNICATION NETWORKS

Day and Date : Saturday, 16-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

2) ***All** questions are **compulsory**.*

SECTION – I

1. a) What is RARP ? Explain it in brief.   **8**

   b) Draw and explain ICMP.   **10**

                    OR

   b) Draw and explain ATM cell header format.

2. Attempt **any two** :   **12**

   a) Explain IP datagram format.

   b) What is datagram and explain in brief.

   c) What is TCP ? Explain in brief.

3. Attempt **any one** :   **5**

   a) Explain UDP in detail.

   b) Explain Kern's Algorithm.

SECTION – II

4. a) Explain different domain names used in internet and also name space used. **10**

   b) Explain Gigabit Ethernet Architecture. **10**

   OR

   b) Explain TFTP data and error message formats in detail.

5. Attempt **any two** : **15**

   a) Explain name to address resolution.

   b) Explain physical layer of Gigabit Ethernet.

   c) Explain partially qualified domain name.

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SLR-TK – 167

M.E. (E and TC) (Digital Electronics and Communication System) (Semester – I) (CBCS) Examination, 2017
Paper – III : CMOS VLSI DESIGN

Day and Date : Monday, 18-12-2017　　　　　　　　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 MOS device design equations. **6**

   b) Explain technology scaling. **5**

2. a) Draw and explain dynamic behaviour of CMOS inverter. **6**

   b) Explain the procedure of obtaining VTC of static CMOS Inverter. **5**

3. a) Explain ratioed logic with neat diagram. **6**

   b) Give comparison between static and dynamic designs in CMOS. **5**

4. Write notes on **any three** of the following : **(4×3=12)**

   a) Physical structure of NMOS transistor

   b) Power and energy delay in CMOS Inverter

   c) Impact of technology scaling on inverter

   d) Issues in dynamic design.

SECTION – II

5. a) Explain C^2MOS register. **6**

   b) Explain True Single Phase Clocked Register (TSPCR). **5**

6. a) Explain clock synthesis and synchronization using a phase locked loop. **6**

   b) Explain sources of skew and jitter. **5**

7. a) Explain any one method of fast multipliers. **6**

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

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Master-slave edge triggered registers

   b) Timing classification methods

   c) Low voltage static latches

   d) Designing fast adders.

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Set P

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M.E. (E&TC) (DECS) (Semester – I) (CBCS) Examination, 2017
MODERN DIGITAL SIGNAL PROCESSING (Paper – IV)

Day and Date : Wednesday, 20-12-2017

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. a) Express FIR filter by using difference equation. Explain symmetry and antisymmetry conditions for FIR filter. **4**

   b) Determine the coefficients of a linear-phase FIR filter of length M = 15 which has a symmetric unit sample response and a frequency response that satisfies the condition.

   $$H_r\left(\frac{2\pi k}{15}\right) = \begin{cases} 1, & K = 0, 1, 2, 3 \\ 0.4, & K = 4 \\ 0, & K = 5, 6, 7 \end{cases}$$

   8

2. a) Explain wiener filter for filtering and prediction. **6**

   b) Explain with block diagram forward and backward predictors. **6**

3. a) Explain any four identities used in scaling of discrete-time signal. **6**

   b) Draw the timing diagram related to sampling rate conversion. Derive fundamental equation for implementing sampling rate conversion. **5**

SECTION – II

4. a) Using bilinear transform design a high pass filter, monotonic in passband with cut-off frequency of 1000 Hz and down 10 dB at 350 Hz. The sampling frequency is 5000 Hz. **8**

   b) Explain addressing modes used in TMS 320C50. **4**

P.T.O.

5. a) Explain the relationship between autocorrelation and model parameters in detail. **6**

   b) Explain with diagram Barrel shifter. **5**

6. a) Write short note on pipelining used in DSP processor. **4**

   b) Convert the analog filter system function.

   $$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$$

   into digital IIR filter by means of the bilinear transformation. The digital filter is to have a resonant frequency of $\omega_r = \pi/2$. **8**

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Seat No.

M.E. (E and TC – Digital Electronics and Communication Systems) (Semester – I) (CBCS Pattern) Examination, 2017 Paper – V : Elective – I : COLOR IMAGE AND VIDEO PROCESSING

Day and Date : Friday, 22-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : 1) Figures to **right** indicate **full** marks.
2) **All** questions are **compulsory**.

SECTION – I

1. Attempt **any two** :   **20**
   a) Explain image smoothing and sharpening filters in detail.
   b) Explain Pseudo color image processing.
   c) Explain image degradation and also explain in detail different Noises in image.

2. Attempt **any two** :   **15**
   a) Explain image acquisition and sensing.
   b) Explain different distances used in image processing.
   c) Explain Median filter. Also explain Min and Max Filter.

SECTION – II

3. Attempt **any two** :   **20**
   a) Explain color consistency in color image.
   b) Explain block based method for motion detection.
   c) Explain two dimensional motion estimation in details.

4. Attempt **any two** :   **15**
   a) Explain types of videos.
   b) Explain optical flow segmentation.
   c) Explain MAP detection.

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SLR-TK – 170

M.E. (E&TC) Digital Electronics and Communication Systems (Semester – I) (CBCS Patterns) Examination, 2017
Elective – I : FUZZY LOGIC (Paper – V)

Day and Date : Friday, 22-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note : 1) ***All*** questions are ***compulsory.***
2) Figures to the ***right*** indicates maximum marks.
3) Assume the data ***wherever*** necessary.

SECTION – I

1. Attempt **any three** :   **(3×5=15)**
   a) Explain the properties of classical sets.
   b) Explain properties of fuzzy sets.
   c) Explain features of membership function.
   d) Explain rule based fuzzy system.

2. Attempt **any two** :   **(2×10=20)**
   a) Explain Crisp relation in brief.
   b) Explain fuzzy relation.
   c) Suppose we have a universe of integers, Y = {1, 2, 3, 4, 5}. We define the following linguistic terms as a mapping onto Y : "Small" = (1/1) + (0.8/2) + (0.6/3) + (0.4/4) + (0.2/5) and "Large" = (0.2/1) + (0.4/2) + (0.6/3) + (0.8/4) + (1/5), Now modify these two linguistic terms with hedges.

SECTION – II

3. Attempt **any three** :   **(3×5=15)**
   a) Explain simple fuzzy logic system.
   b) Explain Fuzzy logic in aeroplane landing system.
   c) Explain genetic algorithm.
   d) Explain terms related to FCM.

4. Attempt **any two** :   **(2×10=20)**
   a) Explain fuzzy classification by equivalence relations.
   b) What is clustering ? Explain HCM and FCM.
   c) Explain fuzzy logic application in liquid level control.

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SLR-TK – 171

M.E. (E & TC – Digital Electronics and Communication Systems) (Semester – I) Examination, 2017 (CBCS)
Paper – V : SPEECH PROCESSING (Elective – I)

Day and Date : Friday, 22-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

Instructions : 1) *Figures to **right** indicates **full marks**.*
2) ***All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** : **20**

   a) Explain Speech enhancement algorithm in detail.

   b) Explain Discrete Wavelet Transform (DWT). Also enlist different types of DWT.

   c) Explain basic speech processing concept in detail.

2. Attempt **any two** : **15**

   a) Explain different types of speech signals.

   b) Explain speech enhancement techniques.

   c) Explain Format Frequency Estimation.

SECTION – II

3. Attempt **any two** of the following : **20**

   a) Explain the use of ANN in speech recognition technique.

b) Explain HMT algorithm in details.

c) Why dimension reduction is required in speech processing ? Explain the same for speech recognition.

4. Attempt **any two** of the following : **15**

a) Explain sampling and quantization of speech signal.

b) Explain Digital speech coding in detail.

c) Explain concatenation of word and subword.

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SLR-TK – 172

M.E. (E & TC) Digital Electronics and Communication Systems
(Semester – I) (Old CGPA) Examination, 2017
PROBABILITY AND RANDOM PROCESS – (Paper – IV)

Day and Date : Thursday, 14-12-2017 Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

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

SECTION – I

1. Attempt **any three**. (3×5=15)
   a) Explain Laplace Distribution in details.
   b) Explain CDF and PDF of random variable.
   c) Explain Moment generation function using generating function with examples.
   d) Explain probability generation function.

2. Attempt **any two**. (2×10=20)
   a) 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.
   b) A room contains two urns, A and B. A contains nine red balls and one green ball ; B contains four red balls and four green balls. The room is darkened ; a man stumbles into it, gropes about for an urn, draws two balls without replacement and leaves the room.
      i) What is the probability that both balls will be red ?
      ii) Suppose that one ball is red and one is green : What is the probability that urn A now contains only eight balls ?
   c) Explain Gaussian distribution function with examples.

P.T.O.

SECTION – II

3. Attempt **any three**. (3×5=15)
   a) Explain Markov processes in details.
   b) Explain Stationary Random Process.
   c) Explain application of Random variable in telephone network.
   d) Explian application of Random variable in computer network.

4. Attempt **any two** : (2×10=20)
   a) A die is tossed and corresponding to the dots S ¼f1, 2, 3, 4, 5, 6 g.a random process X(t) is formed with the following time functions as shown in Fig below :

   Check whether X(t) is stationary.
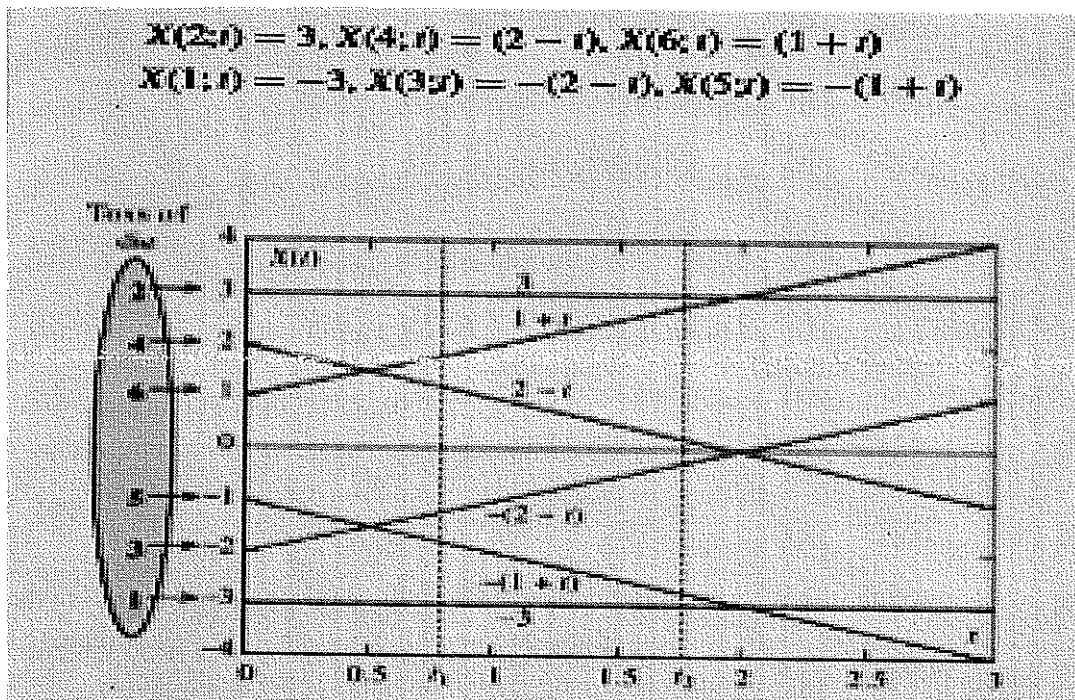
   b) Explain what are Ergodic processes.

   A random process X(t) = A, where A is random variable uniformly distributed over (0, 1]. Since E[A] = ½ and $RA(\tau) = E[A^2] = 1/3$, this process is stationary. Check whether Ergodicity in the mean or not ?

   c) Explain joint CDF and joint PDF of random variable with examples.

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Seat No.

Set **P**

M.E. (E&TC) (Digital Electronics & Communication Systems) (CBCS) (Semester – II) Examination, 2017
MICROWAVE DEVICES & CIRCUITS Paper – VI

Day and Date : Friday, 8-12-2017　　　　　　　　　　Max. Marks : 70

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

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

2) Figure to the **right** indicates **maximum** marks.

3) Assume the data **whenever** necessary.

SECTION – I

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

a) Explain Maxwell's Equation for air.

b) Explain Time harmonic field.

c) Why vacuum tubes are not used at microwave frequency ?

d) Why slow wave structure is used ? Draw Helical TWT.

2. Attempt **any two** :　　　　　　　　　　　　　　　　　　　**(2×10=20)**

a) Explain EM equation for air.

b) Explain waveguide terminators in details.

c) Explain two hole directional coupler with its S parameter.

P.T.O.

SECTION – II

3. Attempt **any three** :   **(3×5=15)**

   a) Explain PIN diode in details.

   b) Draw V-I characteristics of IMPATT diode.

   c) Explain Tunnel diode in details.

   d) Explain PIN diode as limiter.

4. Attempt **any two** :   **(2×10=20)**

   a) Explain parametric amplifier.

   b) Explain Monley-Rowe power relation.

   c) Explain TRAPATT diode in details. Also draw its V-I characteristics.

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Seat
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Set **P**

M.E. (E & TC) Digital Electronics and Communication System
(Semester – II) (CBCS) Examination, 2017
HIGH SPEED DIGITAL DESIGN (Paper – VII)

Day and Date : Saturday, 9-12-2017　　　　　　　　　　　　　　Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. :　1) Attempt **any three** from **each** Section.
　　　　　2) Figures to **right** indicate **full** marks.

SECTION – I

1. a) Explain active power dissipation when driving a capacitive load. **6**

   b) What is transmission line ? Explain infinitesimal and lumped models of a transmission line and derivation of line impedance. **5**

2. a) Explain with neat circuit diagram typical power supply network. **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) Explain the different noise sources in digital system. **6**

   b) What is signaling ? Explain signaling convention and signaling modes for transmission lines. **6**

4. Write short notes on **any three** of the following : **(4×3=12)**

   a) Balanced or symmetric transmission line

   b) On chip bypass capacitors

   c) Intersymbol interference

   d) Driving lossy LC lines.

SECTION – II

5. a) Explain power supply noise reduction and filtering in detail. **6**

   b) Explain simulation tools in high speed electronics. **5**

6. a) Explain grounding in high speed system. **6**

   b) What is RFI ? What is the effect of RFI on analog circuit ? Explain the techniques that can be used to protect analog circuit from RFI. **5**

7. a) Draw and explain ADC model showing noise and distortion sources. **6**

   b) Explain power supply conditioning in power supply. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Prototyping circuits. **4**

   b) Base band antialiasing filter. **4**

   c) AD 9220 12 bit ADC. **4**

   d) Shielding concepts related to power supply. **4**

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Seat No.

Set **P**

M.E. E & TC (DECS) (Semester – II) (CBCS) Examination, 2017
ADVANCED EMBEDDED SYSTEMS (Paper – VIII)

Day and Date : Monday, 11-12-2017   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 **necessary**.

SECTION – I

1. a) Explain 32 bit ARMSOC architecture in detail.   **6**

   b) Explain operations on bits can be performed by using 'C' programming for ARM.   **5**

2. a) Explain the concept of memory management used in embedded system.   **6**

   b) Explain conditional statements used in 'C' with syntax.   **6**

3. a) Explain concept of interrupt latency.   **6**

   b) Explain storage class used in 'C' programming for ARM.   **6**

SECTION – II

4. a) What is use of timers in RTOS ?   **6**

   b) Explain the features of   cos II RTOS.   **6**

5. Write short note on :

   a) Semaphores and its initialization.   **6**

   b) Rate Monotonic algorithm (RM) used in case of task scheduling.   **6**

6. a) Explain shared data problem and use of semaphores.   **5**

   b) Compare function queue scheduling with round Robin with interrupt.   **6**

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Seat
No.

Set **P**

M.E. (E & TC) Digital Electronics and Communication Systems (Semester – II) Examination, 2017 (CBCS Patterns)
Paper – IX : CRYPTOGRAPHY AND NETWORK SECURITY

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

> ***Note*** : 1) ***All*** questions are ***compulsory***.
> 2) Figures to the ***right*** indicate ***maximum*** marks.
> 3) Assume suitable data ***whenever*** necessary.

SECTION – I

1. Attempt **any three** :   (3×5=15)
   a) Explain steganography in details.
   b) Explain principle of ciphers.
   c) Explain triple data encryption with two keys in details.
   d) What is the strength of data encryption standards ?

2. Attempt **any two** :   (2×10=20)
   a) Explain the encryption and authentication of data.
   b) Explain principle of public key.
   c) What are the types of distribution of Public key. Explain any two.

SECTION – II

3. Attempt **any three** :   (3×5=15)
   a) Why authentication is required ?
   b) Explain authentication function.
   c) Explain message authentication code.
   d) Explain hash function.

4. Attempt **any two** :   (2×10=20)
   a) Explain approaches for digital signature technique.
   b) What is public key infrastructure ? Explain it.
   c) Explain IP security. Explain with its scenario.

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SLR-TK – 177

M.E. (E&TC) (Digital Electronics & Communication Systems) (Semester – II) (CBCS) Examination, 2017
Paper – X : Elective – II : ARTIFICIAL NEURAL NETWORK

Day and Date : Wednesday, 13-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

Note : 1) ***All*** questions are ***compulsory***.
2) *Figures to the **right** indicate **maximum** marks.*
3) *Assume data **whenever** necessary.*

SECTION – I

1. Attempt **any three**.   (3×5=15)
   a) What are the requirements of learning laws ?
   b) Define Perceptron. Explain the structure of perceptron.
   c) Explain what error back propagation is.
   d) Explain Outstar learning law of Artificial Neural Network model.

2. Attempt **any two**.   (2×10=20)
   a) Explain Artificial Neural Network Terminologies.
   b) Explain learning and adaptation of Artificial Neural network model.
   c) Explain Habbian learning method for Artificial Neural network model.

SECTION – II

3. Attempt **any three**.   (3×5=15)
   a) Explain Hamming Net.
   b) What are the classifiers for RBF ? Explain any one.
   c) Explain ANN application in medical field.
   d) Explain Gradient type Hopfield network.

4. Attempt **any two**.   (2×10=20)
   a) Explain Hopfield network algorithm.
   b) Explain Boltzman Machine in detail.
   c) Explain Radial basis function.

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M.E. (E & TC-Digital Electronics and Communication Systems) (Semester – II) (CGPA) Examination, 2017
Paper – X : Elective – II IMAGE AND VIDEO PROCESSING AND BROADCASTING (Old)

Day and Date : Friday, 8-12-2017   Total Marks : 70
Time : 3.00 p.m. to 6.00 p.m.

Instructions : 1) *Figures to **right** indicate **full** marks.*
2) ***All** questions are **compulsory**.*

SECTION – I

1. Attempt **any two** :   **20**
   a) Explain Singular Value Decomposition (SVD).
   b) Explain Karhune-Loeve (K-L) Transform.
   c) Explain frequency domain filtering.

2. Attempt **any two** :   **15**
   a) Explain image perception in detail.
   b) Explain image quantization.
   c) Explain image interpolation.

SECTION – II

3. Attempt **any two** :   **20**
   a) Explain Moving Picture Expert Group (MPEG) in detail.
   b) Explain Moment Representation.
   c) Explain image segmentations based on discontinuities.

4. Attempt **any two** :   **15**
   a) Explain region representation using chain code.
   b) Explain inter frame coding used in video processing.
   c) Explain edge detection operators.

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Seat
No.

M.E. (E & TC) Digital Electronics and Communication Systems (Semester – II) (Old CGPA) Examination, 2017
Paper – IX : WIRELESS AND MOBILE NETWORKS

Day and Date : Saturday, 9-12-2017　　　　　　　　　　　Max. Marks : 70
Time :　3.00 p.m. to 6.00 p.m.

Note :　1) **All** questions are **compulsory**.
　　　　　2) Figure to the **right** indicates maximum marks.
　　　　　3) Assume data **whenever** necessary.

SECTION – I

1. Attempt **any three** :　　　　　　　　　　　　　　　　　　**(3×5=15)**
   a) Explain fading.
   b) Explain multipath propagation.
   c) Explain antenna diversity.
   d) Explain coding gain in detail.

2. Attempt **any two** :　　　　　　　　　　　　　　　　　　**(2×10=20)**
   a) Draw and explain Wireless Communication System.
   b) Explain RAKE receiver.
   c) Explain detection in Reyleigh fading channel.

SECTION – II

3. Attempt **any three** :　　　　　　　　　　　　　　　　　　**(3×5=15)**
   a) Explain Advoc Network.
   b) Explain session mobility.
   c) Explain wireless application protocol.
   d) Draw MAC protocol for IEEE 802.11.

4. Attempt **any two** :　　　　　　　　　　　　　　　　　　**(2×10=20)**
   a) Explain Mobile IP in details.
   b) Explain DHCP in mobile networks.
   c) Explain Mobile TCP protocol.

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Seat No.	

Set **P**

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
POWER ELECTRONICS (Paper – I)

Day and Date : Thursday, 14-12-2017

Total Marks : 70

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

SECTION – I

1. How many structures are there for power MOSFETs ? And describe any one of them with their advantages and disadvantages. **10**

OR

Draw and explain typical gate drive circuit for IGBT. List advantages and disadvantages of IGBT over power MOSFET and power BJT.

2. Explain with suitable diagram of motor control with emphasis on traction and industrial process control. **10**

3. a) Explain with waveforms, three phase full bridge diode rectifier with a pure resistive load and derive expressions for load average, r.m.s. voltages and currents. **15**

OR

b) A single phase half-wave uncontrolled rectifier is connected to R-L load. For Vs = 230 V at 50 Hz, R = $10\,\Omega$, L = 5 mH, extinction angle = 210°. Find average values of output voltage and output current. **15**

SECTION – II

4. Explain boost converter in detail with a neat circuit diagram and waveforms. Also derive the expressions for average output voltage and peak-peak ripple current in terms of duty cycle. **10**

5. a) Derive the expression for the following performance factors of single phase
   fully controlled bridge converter.   **15**

      i) Input displacement factor

      ii) Input power factor

      iii) Input distortion factor

      iv) Input harmonic factor

      v) Ripple factor

      vi) Active power input.

                OR

   b) A single phase bridge converter feeds a highly inductive load of RLE,
   where $R = 1\,\Omega$, Eg = 80 V and L is sufficient large for perfect smoothening.
   The source voltage 120 V at 50 Hz. The source inductance is 1 mH. For a
   firing angle of 110°, determine overlap angle.   **15**

6. a) Explain the operation of 1-phase full bridge inverter supplying a resistive
   load. Derive the expression for the output RMS voltage.   **10**

                OR

   b) Draw the relevant circuit diagram and wave diagrams of a 3-phase full
   wave AC voltage regulator feeding an star connected load.   **10**

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Set P

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Set **P**

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
POWER SYSTEM DYNAMICS AND CONTROL
(Paper – II)

Day and Date : Saturday, 16-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain the stability problem faced by power system in detail
   a) Voltage instability
   b) Frequency instability
   c) Loss of synchronisation of synchronous generator
   d) Mechanical-electrical system interaction instability.   **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 where x = 0.   **8**

   b) Explain the concept of equilibrium.   **9**

                    OR

   Analyse power system stability using Eigen value approach.

SECTION – II

3. a) Develop the classical model of multimachine system with relevant equations.   **9**

   b) Discuss about any two excitation systems using block diagram approach.   **9**

4. a) Explain the effect of the excitation system on Transient stability.   **9**

   b) Write the advantage of the unit-exciter scheme over the common exciter bus scheme.   **8**

                    OR

   b) Explain D-Q transformation using $\alpha - \beta$ variables.

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Seat No.

Set P

M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
DC DRIVES (Paper – III)

Day and Date : Monday, 18-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :

   a) Describe classification of dc drive based on quadrant operation.   **8**

   b) Draw and explain speed torque characteristics single phase full wave full control converter fed dc drive in continues and discontinues mode for various value of firing angle.   **9**

   OR

   A 220 V, 1500 rpm, 10 A separately exited dc motor is fed from single phase fully controlled rectifier with an AC source voltage of 230 V, 50 Hz, $R_a = 2$ Ohm, conduction can be assume to be continuous. Calculate firing angle for

   a) Half the rated motor torque and 500 rpm

   b) Rated motor torque and – 1000 rpm.

2. Solve **any two** questions from the following :   **(2×9=18)**

   a) Obtain the equilibrium point and determine their steady state stability when motor and load torque are $T = -1 - 2\omega_m$ and $T_1 = -3\sqrt{\omega_m}$.

   b) How 4 quadrant operation of dc motor is obtained with single unit of full control converter ?

   c) Draw the source current waveform of three phase six pulse converter fed dc drive with continuous conduction for following firing angle

      i) $\alpha = 30°$ ii) $\alpha = 120°$.

P.T.O.

SECTION – II

3. Attempt **all** :

   a) Explain with neat sketch the operation of three phase dual converter fed dc drive. **8**

   b) Explain with neat sketch and waveform the operation of single quadrant chopper fed dc drive. **9**

   OR

   Draw the block diagram torque control drive and state the application of torque control drive.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Compare the chopper fed dc drive with converter fed dc drive in following point.

      i) Supply power factor

      ii) Ripple current frequency

      iii) Motor torque and Armature cu loss.

   b) Draw the waveform of armature voltage and armature current for single quadrant chopper fed dc drive.

   c) Explain with block diagram how starting current of motor is controlled in closed loop speed control drive.

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M.E. Electrical (Semester – I) (CBCS/CGPA) Examination, 2017
Paper – IV : CONTROL ENGINEERING

Day and Date : Wednesday, 20-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I
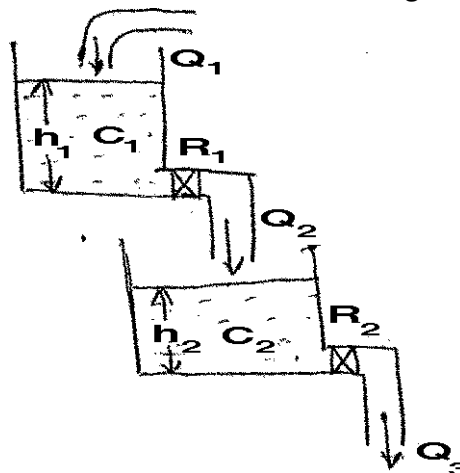
1. Attempt **any four** :   (4×6=24)

   a) Obtain the transfer function $E_0(s)/E_i(s)$.
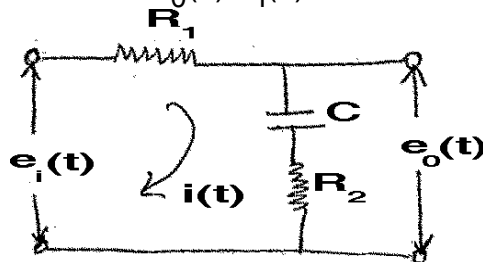
   b) Explain the suitable industrial example for regulator systems.

   c) Derive an expression for the transfer function of an armature controlled dc servo motor.

   d) Explain with neat sketch, the construction and operation of a pneumatic flow control valve.

   e) Explain the effect of feedback on steady-state accuracy.

2. Attempt **any one** :   (1×11=11)

   a) A process plant consists of two tanks of capacitances C_1 and C_2 respectively. If the flow rate into the top tank is Q_1, find the transfer function relating flow with the liquid level in the bottom tank. Each tank has a resistance R in its outlet pipe. Assume tanks to be non-interacting.

   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) A feedback system has a transfer function $\dfrac{Y(s)}{R(s)} = M(s) = \dfrac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}$, $\zeta < 1$.

   Derive the expression for peak overshoot M_p and peak time t_p of the time response of the given system.

b) Write the correlation between time domain and frequency domain.
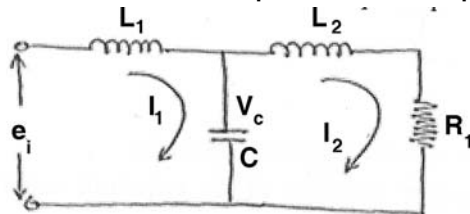
c) Obtain the state-space representation of the systems using controllable canonical form

   i) $\dfrac{2}{s^3 + 2s^2 + 4s + 8}$ ii) $\dfrac{10(s+4)}{s(s+1)(s+3)}$

d) Explain the concept of controllability and observability.

e) Obtain the state equation and output equation of electric network as shown in figure.
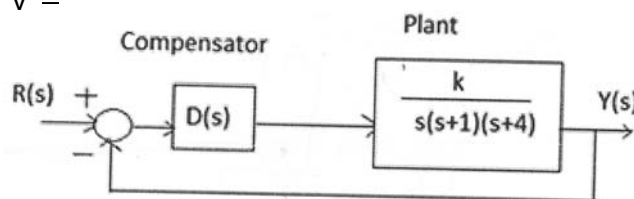

4. Attempt **any one** : **(1×11=11)**

a) The block diagram of figure shown below represents a position control system. The open-loop transfer function of the uncompensated system is

   $G(s) = \dfrac{k}{s(s+1)(s+4)}$

   The specifications of the system are as follows :
   Damping ratio $\xi = 0.5$, undamped natural frequency $\omega_n = 2$ rad/sec, velocity error constant $k_v \geq 5 \text{ sec}^{-1}$.

b) Determine whether the following systems are completely state controllable and observable using

   i) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} X + \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix} U$ $Y = [1 \ 1 \ 0]X$

   ii) $\dot{X} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} X + \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} U$ $Y = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} X$

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M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA) Examination, 2017
Elective – I : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEM (Paper – V)

Day and Date : Friday, 22-12-2017
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. Attempt **all** :

   a) Explain in detail the advantages and disadvantages of high voltages. **8**

   b) What are the different modes of Propagation in EHV-AC lines ? **9**

   OR

   Surface voltage Gradient on conductors under

   i) Single Conductor

   ii) 2 conductor bundle.

2. Solve **any two** questions from the following : **(2×9=18)**

   a) What are the important and useful conclusions can be drawn for preliminary understanding of trends relating to power-handling capacity of a.c. transmission lines and line losses ?

   b) Why the inductance and capacitance transformation required in Sequence Quantities in EHV-AC lines ?

   c) Derive the expression $P_c = \frac{1}{2} KC \left(V^2_m - V^2_o \right)$ for the energy loss from charge-voltage diagram.

P.T.O.

SECTION – II

3. Attempt **all** :

   a) Derive the reflection and refraction coefficients of travelling waves and its significance explain in detail. **8**

   b) What are the general principles of the lightning protection problems. **9**

   OR

   What is the purpose and significance of power circle diagram and its uses and also explain in detail the receiving end circle diagram for calculating reactive compensation for voltage control buses.

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) Explain insulation coordination based on lightning.

   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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Set P

SLR-TK – 192

SECTION – I

1. Attempt **all** :

   a) Explain bi-directional power flow in voltage source inverter with the help of neat sketches. **8**

   b) Derive the expression for active and reactive power flow in a uncompensated lossless transmission line and also draw relevant diagrams. **9**

   OR

   b) Explain various techniques for harmonic elimination. **9**

2. Attempt **any two** :

   a) Write applications of multi-level inverters and explain principle of operation of 3-level diode clamped multi-level inverters. **9**

   b) What is the need of load compensation ? Explain with an example. **9**

   c) The particular of the series compensated transmission line are V = 230 V, f = 50 Hz, X = 1.8 Ω and δ = 70°. The degree of compensation is r = 80%.

   Find :

   a) the line current I

   b) the active power Pp

   c) the reactive power Qp. **9**

SECTION – II

3. Attempt **all** :

   a) Explain operating control schemes of TSSC and TCSC.   **8**

   b) Principle working and characteristics of STATCOM.   **9**

                    OR

   b) Explain the V-I characteristics of rectifier-inverter in HVDC control with relevant sketches.   **9**

4. Attempt **any two** :

   a) Explain the concept of series capacitive compensation with neat circuit diagram. Derive the expressions for active and reactive power. What is the role of degree of series compensation ?   **9**

   b) List out various methods of VAR generation and explain Thyristor controlled reactor (TCR).   **9**

   c) With the help of a neat diagram, explain the operation of a 6 pulse bridge rectifier. Sketch the relevant voltage and current waveforms.   **9**

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Set P

SLR-TK – 193

Set **P**

M.E. (Electrical Engineering) (CBCS/CGPA) (Semester – II) Examination, 2017
POWER QUALITY (Paper – VII)

Day and Date : Saturday, 9-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain the various types of power quality disturbances and impacts power quality. **18**

2. a) What is harmonics ? What is the effect on transformer due to Harmonics ? **8**

   b) Discuss about the Computer Business Equipment Manufacture Associations. (CBEMA). Explain about the events described in the curve. **9**

SECTION – II

1. a) Explain briefly about the phenomena of how current distortion affects the voltage distortion under the presence of harmonics. **9**

   b) How will you find the harmonic sources from point of common coupling ? **9**

2. a) List the advantages of Active Harmonic Filter. List the some dynamic correction of Power quality events. **9**

   b) What is the advantage of three phase converter ? What is the disadvantage of 12 pulse drive ? **8**

                              OR

   Explain schematic and working of Unified power conditioner.

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SLR-TK – 194

Set **P**

M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – VIII : AC DRIVES

Day and Date : Monday, 11-12-2017   Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m

SECTION – I

1. Attempt **all** :
   a) Explain philosophy of speed control of a three phase induction motor using stator voltage control. Comment on T/I ratio under this control strategy.   **8**
   b) With a neat block schematic, explain open loop control scheme for V/f control of a three phase induction motor.   **9**

2. Solve **any two** :   **(2×9=18)**
   a) With a neat block diagram, explain closed loop V/f control scheme for three phase induction motor.
   b) With neat circuit schematic explain static Scherbius drive. State basic philosophy used for operating induction motor in variable speed mode in this drive.
   c) Draw a neat equivalent circuit diagram for current fed induction motor drive . How do we decide the magnitude of current to be fed from source to such a drive ? Why starting torque is much lower in case of current fed drives than that for voltage fed drives ?

SECTION – II

3. Attempt **all** :
   a) Explain V/f control strategy used for speed control of three phase synchronous motor. Draw family of torque-speed characteristics for a three phase synchronous motor drive.   **8**
   b) Explain indirect vector control scheme.   **9**

4. Solve **any two** :   **(2×9=18)**
   a) With neat block diagram explain true synchronous mode of speed control in synchronous motor.
   b) Derive the voltage and torque equation of switched reluctance motor.
   c) Explain implementation of equivalent current control model of induction motor.

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M.E. Electrical Engineering (Semester – II) (CBCS/CGPA) Examination, 2017
ADVANCED CONTROL ENGINEERING (Paper – IX)

Day and Date : Tuesday, 12-12-2017   Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any two** :   **(2×9=18)**

   a) Explain relay control systems for off-line and on-line identification in detail.

   b) What are the limitations of PID controller ? Explain in detail.

   c) What information is obtained from time-domain and frequency-domain measures ?

2. Explain the drawbacks of off-line identification relay test. How to overcome these drawbacks ?   **(1×8=8)**

3. Design the PI controller for SISO process model $G(s) = \dfrac{0.5}{s^2 + 1.595s + 1.62}$ and

   $G_c(s) = K_p + K_i/s$. Given model parameters :

   $k = 0.5$; $\alpha_1 = 1.595$ and $\alpha_0 = 1.62$. Using plot for the optimised coefficients

   $c_1 = 0.5$ ......> $d_2 = 1.595$ and $d_1 = 2.12$.

   Estimate the PI controller parameters from SISO process.   **(1×9=9)**

                    OR

3. Determine the unknown plant dynamics be $G(s) = \dfrac{1}{(s+1)^5}$. A symmetrical relay

   with height $h = 1$ produces a sustained symmetrical process output with
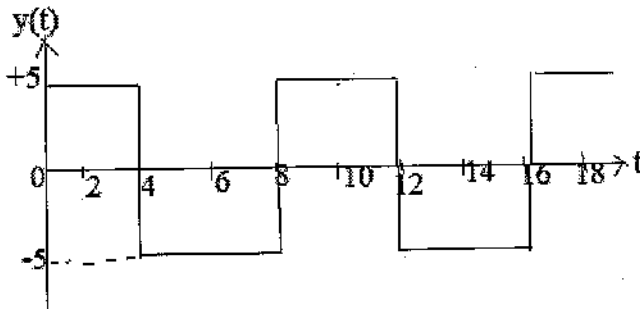 $A = 0.474$ and $P_u = 8.732$. Assuming the steady state gain to be $K = 1$.

P.T.O.

SECTION – II

4. Attempt **any two** : **(2×9=18)**

   a) Find the system model for given the output waveform.

   Given relay height h = 1.

   b) Derive the analytical expressions for the parameters of the transfer function with gain and delay is $G(s) = ke^{-\theta s}$.

   c) How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

5. By using asymmetrical relay test to estimate the steady state gain for SOPDT transfer function model is $G(s) = \dfrac{k(T_0 s + 1)e^{-\theta s}}{(T_1 s \pm 1)(T_2 s + 1)}$. **(1×8=8)**

6. Derive the expression for determining exact conditions for existence of limit cycles. **(1×9=9)**

                    OR

6. What are the conditions for sustained oscillatory output of FOPDT transfer function model ?

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M.E. (Electrical Engineering) (Semester – II) (CBCS/CGPA) Examination, 2017
Paper – X : HIGH VOLTAGE DC TRANSMISSION SYSTEMS
(Elective – II)

Day and Date : Wednesday, 13-12-2017   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 and write applications of HVDC
      system.   **8**

   b) Draw the schematic circuit diagram of a 6-pulse Graetz's circuit and explain
      its principle of operation.   **9**

                              OR

   Write down desired control features of HVDC system and explain system
   control hierarchy.

2. Solve **any two** questions from the following :   **(2×9=18)**

   a) With neat sketches explain the different kinds of D.C. links available.

   b) 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 two pair of conduction values.

   c) Explain Firing angle control in detail.

SECTION – II

3. Attempt **all**.

   a) Explain about over current protection. **8**

   b) Give in detail the different sources of reactive power. **9**

   OR

   What are the types of MTDC systems and explain each in detail.

4. Solve **any two** questions from the following : **(2×9=18)**

   a) Explain the over current protection.

   b) Give a detailed account of design aspects of the following filters
      i) Single tuned filter
      ii) Double tuned filter.

   c) Classify the solution methodology for AC-DC load flow and explain.

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M.E. (Semester - I) (Old) (CGPA) Examination 2017
Electronics & Telecom Engineering – Digital Electronics & Communication System
OPTICAL COMMUNICATION NETWORKS

Day & Date: Friday, 15-12-2017   Max. Marks: 70
Time: 03.00 PM to 06.00 PM

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

Section – I

Q.1	**Attempt any three:**	**15**
	a) Give the advantages and disadvantages of Optical communication.	
	b) Draw and explain Transmitter for optical communication system.	
	c) Explain time division multiplexing in detail.	
	d) Explain principle of optical amplifier.	

Q.2	**Attempt any two:**	**20**
	a) Draw and explain Optical communication system.	
	b) Draw and explain semiconductor LASER amplifier.	
	c) Explain different Modulation method used in optical communication.	

Section – II

Q.3	**Attempt any three:**	**15**
	a) Write a note on SONET.	
	b) Explain FDDI networks.	
	c) Explain optical fiber attenuation measurement technique.	
	d) Write a note on next generation networks.	

Q.4	**Attempt any two:**	**20**
	a) Explain Dispersion measurement technique in optical fiber.	
	b) Explain link power budget.	
	c) Explain Operation principle of WDM.	