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**M.E. (Civil-Structures-Engineering) (Semester – I)**  
**Examination, 2016**  
**(CBCS/CGPA)**  
**THEORY OF ELASTICITY AND PLASTICITY (Paper – I)**

Day and Date : Monday, 9-5-2016  
Time : 11.00 a.m. to 3.00 p.m.

Total Marks : 70

**Instructions:** 1) Solve **any two** questions from **each** Section.  
2) **Use of non-programmable calculators are allowed.**

SECTION – I

1. a) State St. Venant's principle. 3  
b) Explain Hooke's Law of Elasticity. 4  
c) Derive D.E. of equilibrium of 3-D problem of elasticity in rectangular coordinates. 10
  
2. a) For the state of strain given below find the maximum shear stress developed (Take  $E = 2 \times 10^5$  MPa and  $\nu = 0.3$ ). 11  
$$\epsilon_x = 3 \times 10^{-4}, \quad \epsilon_y = 2 \times 10^{-4}, \quad \epsilon_z = 3 \times 10^{-4}$$
$$\gamma_{xy} = 1.2 \times 10^{-4}, \quad \gamma_{yz} = 2 \times 10^{-4}, \quad \gamma_{zx} = 2.5 \times 10^{-4}.$$
  
b) Derive Laplacian form of stress compatibility equation for 2-D problem of elasticity in Cartesian System. 7
  
3. a) Find stress distribution in a thick cylinder subjected to internal bursting pressure 4 MPa. Take inner and outer radii as 125 mm and 225 mm respectively. Hence find the maximum shear stress developed. 11  
b) Find stress distribution in ring  $a \leq r \leq b$  given by proposed stress function  $\phi = C\theta$ . Comment on Results obtained. 6



## SECTION – II

4. a) Write a note on “Membrane Analogy”. **5**  
b) Establish the relation of torsion of a bar with elliptical cross section subjected to end torsion. **12**
5. a) Discuss significant difference in approach of theory of elasticity and plasticity. **5**  
b) Find and compare yield stress in uni-directionally loaded material using Mises and Tresca criteria for the state of stress given below :  
 $\sigma_x = 126 \text{ MPa}$ ,  $\sigma_y = -59 \text{ MPa}$ ,  $\tau_{xy} = 74 \text{ MPa}$ . **13**
6. a) Discuss Deformation Theory and Flow Theory. **5**  
b) A simple beam is subjected to concentrated load “P” at midspan. The section of the beam is rectangular. Explain the behavior of section as load increases from zero to failure. **12**
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M.E. (Civil Structures) (Semester – I) Examination, 2016  
(CBCS/CGPA)  
MECHANICS OF STRUCTURES (Paper – II)

Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 3.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Draw ILD for a BM and SF at 'D' as shown in Fig. 1. 12

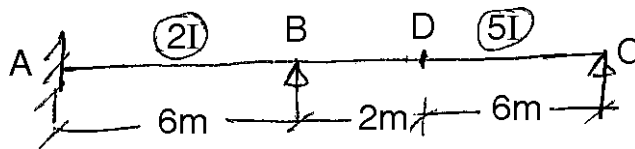


Fig. 1

OR

Draw ILD for normal thrust, radial shear and BM at the crown of two hinged semicircular arch of radius 'R'. Assume moment of inertia 'I' of the arch section as constant throughout. 12

2. Draw BMD and TMD of semicircular beam curved in plan as shown in fig. 2. 12

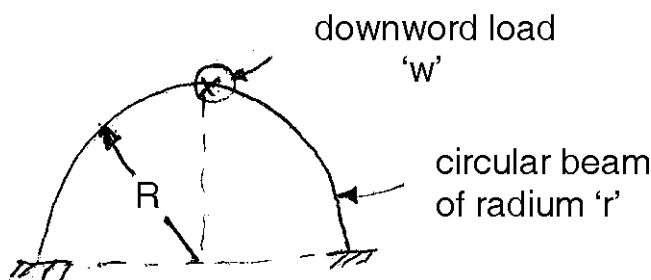


Fig. 2

3. An infinitely long beam supported on elastic foundation is subjected to a concentrated clockwise moment  $M_0$  at its center. Draw SFD, BMD, deflection and formulation pressure diagram. 11



SECTION – II

4. A simply supported beam-column is subjected to an axial compressive force 'P' at both the ends and an UDL of 'W' throughout span. Derive expression for maximum deflection and bending moments. 12

OR

A propped cantilever beam column is subjected to an axial compressive force 'P' at both the ends and clockwise couple 'M' at propped end. Derive expression for rotation at the propped end and fixed end moment at other end. 12

5. Analyse the beam as shown in fig. 3 by stiffness method if support B sinks down by 10 mm. Take  $EI = 75,000 \text{ kNm}^2$ . 12

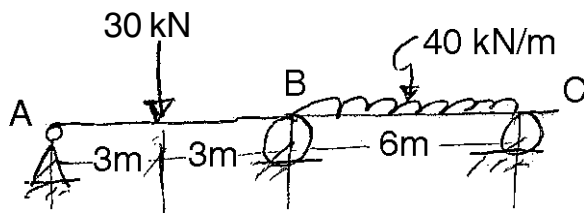


Fig. 3

OR

Analyse the beam shown in fig. 4 by stiffness method. 12

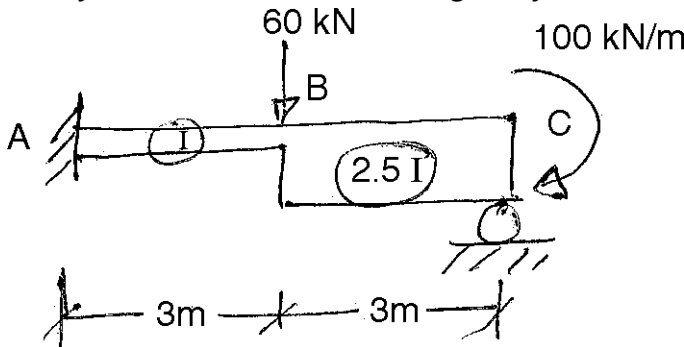


Fig. 4

6. Find forces in all members of the truss shown in Fig. 5 by using member oriented stiffness method. Assume axial rigidity of all members is constant. 11

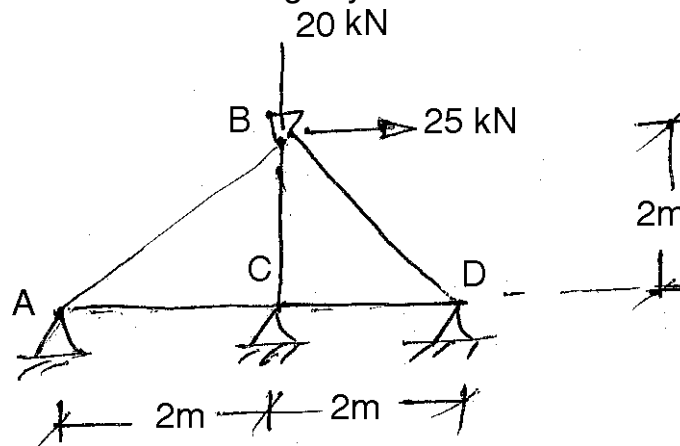


Fig. 5



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**M.E. (Civil-Structures), Semester – I (CBCS/CGPA) Examination, 2016  
Paper – III : ADVANCED DESIGN OF CONCRETE STRUCTURES**

Day and Date : Wednesday, 11-5-2016

Total Marks : 70

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

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

2) Assume suitable data **if necessary**

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

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

**SECTION – I**

1. Design a 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 carries a load of 700 kN. Column C2 is 500 mm × 500 mm in size and carries a load of 850 kN, the safe bearing capacity of the soil is 150 kN/m<sup>2</sup>. Use M20 concrete and Fe 500 steel. **18**
2. a) Design a circular slab and sketch the reinforcement details by using following data : Diameter of slab 5.6 m ; superimposed load 4 kN/m<sup>2</sup> ; support condition partially fixed ; material used – M20 and concrete and Fe 500 steel. **12**  
b) Explain with neat sketch the reinforcement details in case of flat slab for the sections passing through middle and column strips. **5**
3. Design a circular tank of capacity 12 lakh litres. The depth of water tank including free board is restricted to 3.4 m. The joint between floor and wall of the tank is rigid I.S. code method of design. Use M25 concrete and Fe 500 steel. **17**



## SECTION – II

4. a) Explain the advantages and disadvantages of prestressed concrete over reinforce concrete. **6**
- b) A PSC beam provided with parabolic profile tendon has a simply supported span of 6 m. The beam has a rectangular cross section of 250 mm × 550 mm. The total external load on the beam is 40 kN/m on whole span and the tendon carries a prestressing force of 1400 kN. The parabolic tendon has 120 mm eccentricity at mid span. Calculate the extreme fibre stresses for mid span section using stress concept, strength concept and load balancing concept. **11**
5. a) The end block of a port tensioned member is 300 mm wide and 600 mm deep is subjected to an axial prestress force 1250 kN. Design the end block by Guyon's method. **8**
- b) 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<sup>2</sup> and 1100 N/mm<sup>2</sup>, design the beam using 6 mm tendon. **9**
6. a) Explain the partial prestressing. **4**
- b) Design a post tentioned continuous beam consisting of two span each 19 m long. The external loading other dead load of beam is 25 kN/m<sup>2</sup>. **14**
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**M.E. (Civil – Structure) (Semester – I) (CBCS/CGPA) Examination, 2016  
DYNAMICS OF STRUCTURES (Paper – IV)**

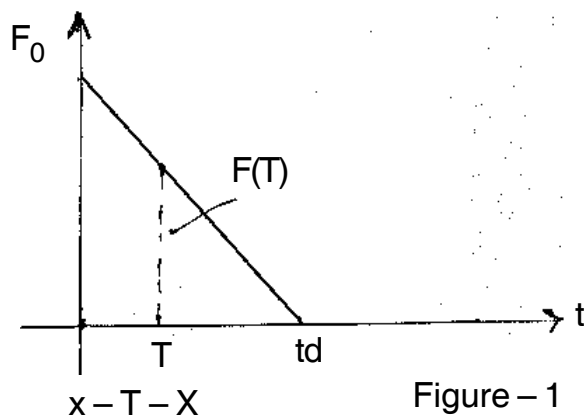
Day and Date : Thursday, 12-5-2016  
Time : 11.00 a.m. to 3.00. p.m.

Max. Marks : 70

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

**SECTION – I**

1. A system is modelled by two freely vibrating masses  $m_1$  and  $m_2$  interconnected by a spring having a constant  $k$ . Determine for this system the differential equation of motion for the relative displacement  $u = y_2 - y_1$  between the two masses. Also determine the corresponding natural frequency of the system. **18**
2. A sensitive instrument of weight 440 N is to be installed at a location where the vertical acceleration of the ground is 0.1 g at a frequency of 10 Hz. The instrument is mounted on a rubber pad of stiffness 15.1 N/mm and damping such that the damping ratio of the system is 10%. Determine.  
a) What acceleration is transmitted to the instrument ?  
b) If the instrument can tolerate only an acceleration of 0.005 g. Suggest a solution assuming that same rubber pad is to be used. Provide numerical results. **17**
3. A SDOF system is subjected to a transient force as shown in the following figure 1. Derive the expression for Magnification factor for the forced as well as free vibration phases. **17**





SECTION – II

- 4. a) Starting from first principles develop the equations of motion for a two -storied shear building subjected to general dynamic loading. 7
- b) Determine the frequencies and mode shapes of the structure shown in Fig. 2. 10

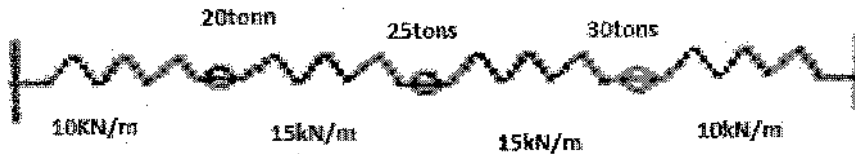


Figure 2

- 5. a) Explain the stodola method of fundamental mode of analysis. 5
- b) What do you mean by modal participation factors ? Discuss the criteria for selecting number of modes to be considered in analysis. 12
- 6. a) Explain the undamped free-vibration analysis of a distributed parameter system. 9
- b) Determine the frequencies and mode shapes for a uniform cantilever beam. 9

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**M.E. (Civil Structures) (Semester – I) Examination, 2016  
(CBCS/CGPA Pattern)  
Elective – I : DESIGN OF FOUNDATIONS (Paper – V)**

Day and Date : Friday, 13-5-2016

Max. Marks : 70

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

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

SECTION – I

1. A) Define following terms : 4  
a) Net safe bearing capacity.  
b) Gross safe bearing capacity.  
B) Discuss the effect of water table on bearing capacity of shallow foundation as per Terzaghi's Analysis and I.S. code method. 8
2. A) Explain various types of shear failure of soil. 4  
B) Design a reinforced concrete rectangular combined footing for two columns each 450 mm × 450 mm located 4 m between centres. Each column carries an Axial load of 1200 kN. The projections of the footing beyond the axis of each column are 1 m. The safe bearing capacity of the soil is 260 kN/m<sup>2</sup>. Use M 20 grade of concrete and Fe 415 steel. 8
3. A) With neat sketches describe various types of raft foundations. 8  
B) Explain various considerations in the design of raft foundations. 3



## SECTION – II

4. A) What do you understand by under-reamed piles ? Discuss with neat sketch. **4**
- B) A column 300 mm × 300 mm in section stands on a pile cap supported on 3 piles. Each pile having 300 mm in diameter. The column is situated at centroid of the pile group. The total load transferred to the column is 600 kN. The piles are 1.2 m centre to centre. Design the pile cap. Use M 20 grade of concrete and Fe 415 steel. **8**
5. A) Explain Gow and Chicago methods of drilled pier construction. **6**
- B) With the help of neat sketch explain the various component parts of well foundation. **6**
6. A) Describe various types of machine foundation. **4**
- B) Discuss the criteria for design of machine foundation. **4**
- C) What do you understand by resonance ? **3**
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**M.E. (Civil) Structures (Semester – II) Examination, 2016**  
**THEORY OF PLATES AND SHELLS (New) (CBCS/CGPA) (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 3.00 p.m.

Max. Marks : 70

- 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. Obtain Governing Differential Equation for bending of simply supported rectangular plates subjected to UDL. 11
2. Using Levy's Solution obtain expression for maximum deflection of a simply supported square plates subjected sinusoidal loading. 12
3. a) Describe Navier's method as applied to rectangular plates. 5  
b) Describe Energy method for solution of rectangular plates with various boundary conditions and loadings. 6
4. Using finite difference method, calculate moments at different points of a square plate of side 'a' subjected to point load P at centre, by dividing the plate using 4 × 4 mesh. 12

SECTION – II

5. Write a note on : 12
  - i) Finsterwalder's theory.
  - ii) Beam theory.
6. Derive D.E. of equilibrium for an arbitrarily loaded shell of revolution. Use Membrane theory. 11
7. a) Describe stress resultants. Write their expressions for thin shells. 6  
b) Differentiate between plate and shell behavior. 5
8. a) A cylindrical pipe carries fluid under pressure of 100 N/mm<sup>2</sup>. Find maximum hoop and circumferential stresses developed in pipe if thickness of pipe is 10 mm and diameter is 1 m. Take modulus of elasticity for pipe material as 2×10<sup>5</sup> N/mm<sup>2</sup>. 6  
b) Explain : Donnel's equation. 6



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**M.E. (Civil-Structures) (Semester – II) Examination, 2016**  
**(New – CBCS/CGPA)**  
**FINITE ELEMENT METHOD (Paper– VII)**

Day and Date : Monday, 16-5-2016

Total Marks : 70

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

- Instructions :**
- 1) Solve **any two** questions from Section – I.
  - 2) Q. No. 4 is **compulsory**, of remaining **two** questions from Section – II solve **any one**.
  - 3) Use of non-programmable calculator is **allowed**.
  - 4) **Assume** suitable data if required and mention **clearly**.

## SECTION – I

1. For the three - bar assemblage, shown in Figure 1.  $A_1 = 100 \text{ mm}^2$ ,  $A_2 = 200 \text{ mm}^2$ ,  $E_1 = 100 \text{ GPa}$  and  $E_2 = 50 \text{ GPa}$ . Determine : **18**
- a) The assembled stiffness matrix
  - b) Displacement of node 2 and 3
  - c) The reaction at node 1 and 4.

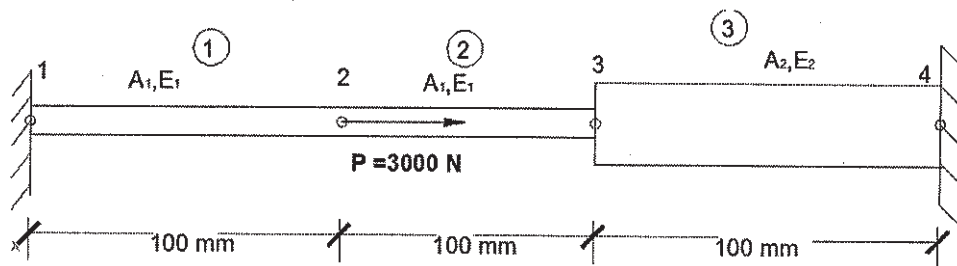


Figure – 1

2. a) Write a note on Rayleigh-Ritz Method. **7**  
b) Develop a shape function for tetrahedral element in natural co-ordinate system. **10**
3. a) What do you understand by h-analysis and p-analysis ? **6**  
b) A rectangular cross-section bar element of length L having area at one end  $b^2$  and at other end  $1.5b^2$ , derive stiffness matrix for which E is constant and A varies linearly. **6**  
c) Explain the terms : Constant Strain Triangle (CST). **5**

P.T.O.



## SECTION – II

4. For the element having nodes 1(150, 400), 2(600, 150), 3(720, 720) and 4(350, 710), evaluate  $K_{25}$ , at sampling point  $\left(\frac{1}{\sqrt{3}}, -\frac{1}{\sqrt{3}}\right)$ , assume plain stress condition. Take  $E = 200$  GPa,  $\nu = 0.25$  and  $t = 10$  mm. **18**
5. a) What are the convergence criteria of the displacement function ? **5**  
b) State and explain three basic laws on which iso-parametric concept is developed. **6**  
c) Discuss about discrete Kirchoff triangle element for plate bending problem. **6**
6. a) Enlist any five shell element. **5**  
b) Write on the use of finite element in dynamics. **5**  
c) Develop a lumped mass matrix and consistent mass matrix for 2-noded bar element whose mass is 'm'. Compare both the matrices and comment about the same. **7**
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**M.E. (Civil-Structure) (Semester-II) (New) (CBCS/CGPA)  
Examination, 2016  
Paper – VIII : EARTHQUAKE ENGINEERING**

Day and Date : Wednesday, 18-5-2016

Max. Marks : 100

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

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

SECTION – I

1. a) What do you understand by soil liquefaction ? What are the factors affecting liquefaction ? Explain various remedial measures to control soil liquefaction. **15**  
b) Write a note Elastic rebound theory. **10**
2. a) State and explain the concept of response spectrum and various types of response spectra. **15**  
b) What is combined spectrum ? What are its characteristics ? **10**
3. From first principle derive the governing differential equation for two storied building subjected to ground acceleration  $\ddot{y} g$ . Idealize and prepare the conceptual model and explain the model analysis method to solve differential equation. **25**

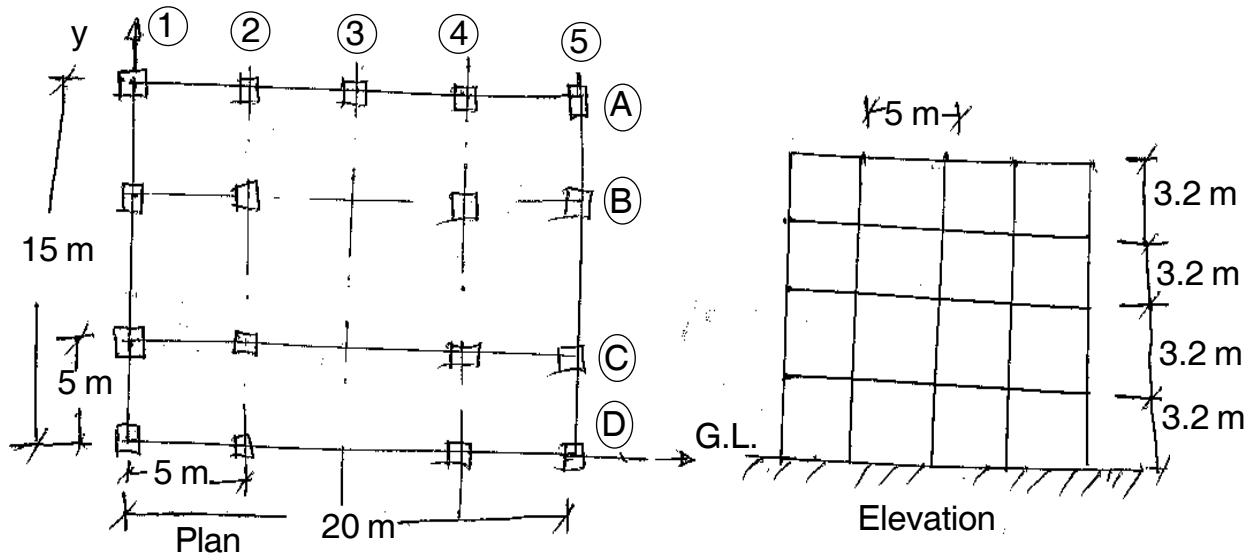
SECTION – II

4. a) Write note on nonlinear properties of materials that are useful for earthquake resistant design. **15**  
b) What are planning aspects for vertical layout of building to make the building earthquake resistant ? **10**



5. A four storey R.C.C. office building as shown in fig. 1. This building with brick infill is located in very severe earthquake zone having medium soil. The building is supported on raft foundation. The lumped weight due to dead load  $12 \text{ kN/m}^2$  on floors and  $10 \text{ kN/m}^2$  on the roof. The live load is  $4 \text{ kN/m}^2$  on floors and  $1.5 \text{ kN/m}^2$  on the roof. Determine the lateral forces and storey shear. Distribute forces in horizontal direction.

25



6. a) What do you understand by ductility of the structure ? Give a mathematical definition of ductility. Explain in detail importance of ductility.
- b) Defines a soft storey. What are the IS provisions for soft storey ?

15

10

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**M.E. (Civil Structures) (Semester – II) Examination, 2016  
(New – CBCS/CGPA)  
ADVANCED DESIGN OF STEEL STRUCTURES (Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 3.00 p.m.

Total Marks : 70

- 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 through type girder railway bridge is 45 m for a single lane B.G. track. The cross girders are spaced at 4.8 m apart. The stringers are spaced at 3 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<sup>3</sup>. The main girders are provided at 6.5 m apart, determine the design forces in top, bottom, vertical and diagonal members of central panel. Design the bottom member and vertical member. The bridge is to carry an equivalent U.D.L. line load of 4100 kN for B.M. and 4500 for shear force. 17

2. Determine the shears and moments in columns and beams of a building frame with moment resisting joints in figure 1, by cantilever method. Assume the area of bottom storey column as 2A and the area of top storey column as A. 18

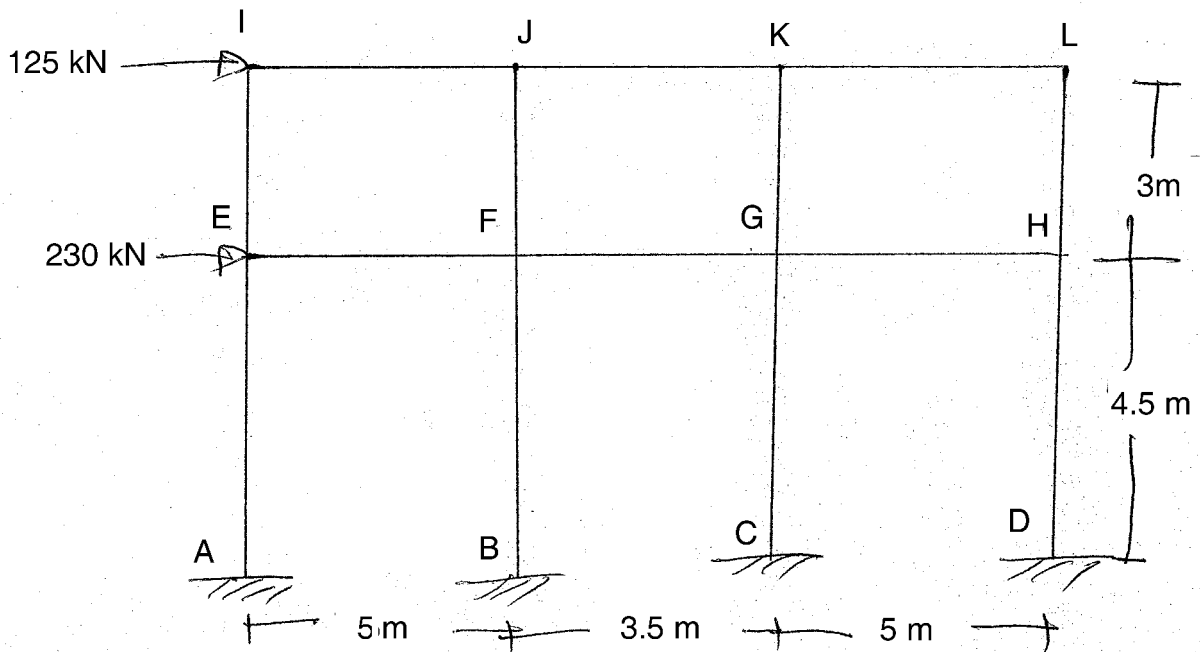


Figure. 1





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|--|----------|
| 3. a) Write on design procedure for light gauge beams.                                 | <b>5</b> |
| b) Write on high rise tabular frames.  | <b>5</b> |
| c) Find moment of resistance of the hot section 100 mm × 150 mm × 6 mm with lip 54 mm. | <b>7</b> |

## SECTION – II

- |  |           |
|--|-----------|
| 4. a) Explain different collapse mechanisms.   | <b>5</b>  |
| b) A fixed beam of span 5 m carries a uniform distributed load 5 kN/m on the right hand 4 m portion of the beam. The load factor is 1.75 and the shape factor is 1.15. The yield stress is 250 MPa. Calculate the section modulus of the beam and locate the position of plastic hinges.   | <b>12</b> |
| 5. a) Write the design procedure of composite beams.   | <b>5</b>  |
| b) Determine the values of fully plastic moment of the frame, when loaded up to portal collapse. The portal frame has vertical layer AB = 2.6 m, CD = 5 m and horizontal portion BC = 6.2 m. The end A is fixed and is also fixed. A horizontal load of 30 kN towards B is acting at B and a vertical load of 40 kN acting downwards is a 2 m from B on BC portion. The plastic moment of the frame is uniform through out. Draw BMD also. | <b>12</b> |
| 6. a) Design a composite foot bridge having clear width of 3.2 m and effective span of 12 m. The bridge is to be designed for live load of 4 kN/m <sup>2</sup> . Assume kerb 45 cm × 35 cm and two steel girders at 1.6 m c/c are provided.  | <b>9</b>  |
| b) Design a cased column to carry a load of 1200 kN. The effective length of column is 4.2 m.  | <b>9</b>  |

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**M.E. (Civil – Structures) (Semester – II) (New-CBCS/CGPA)  
Examination, 2016  
Elective – II : DESIGN OF RCC BRIDGES (Paper – X)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

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

SECTION – I

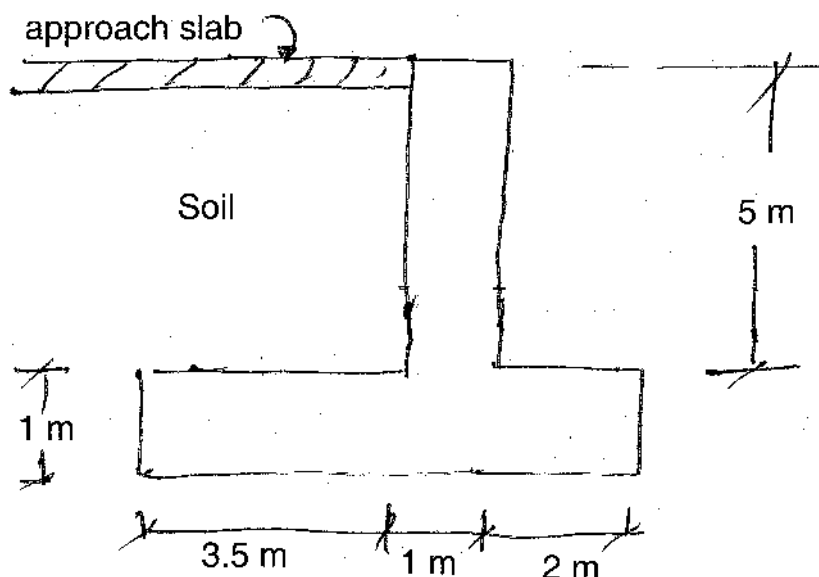
1. Design a solid deck slab for two lane bridge. Use following data : **12**
- a) Effective span – 8 m.
  - b) Carriage way width – 9 m.
  - c) Kerb 600 × 275 on both side.
  - d) Live load – 1RC class A(Two lane).
  - e) Wearing coat – 100 mm thick.
  - f) Use-M-25 cone, Fe – 415 steel.
  - g) Use  $\alpha = 3$ .
- Give details of reinforcement with the help of neat sketch.
2. A RCC beam type bridge having deck slab of 200 mm thick, wearing coat of 85 mm thick, four longitudinal girder and five cross girders. Design the exterior longitudinal girder. Use following data : **11**
- a) Carriage way width – 9.5 m.
  - b) Span and bridge – 16 m.



- c) Live load – 1RC class AA tracked.  
 d) Kerb – 600 mm, wide, 400 mm deep.  
 e) Web thickness for longitudinal and cross girder – 300 mm.  
 f) Longitudinal girder spacing – 3 m.  
 g) Use M-25 concrete, Fe-415 steel.
3. A) Write a note on Pigaud's theory for the analysis of slab panels. What are the limitations of the theory? 6  
 B) What is economic span? How it is calculated? Derive the equation for the same. 5
4. Write a note on : 12  
 1) Components of bridges.  
 2) 1RC bridge code.  
 3) General design considerations for bridges.  
 4) Braking force on bridges.

## SECTION – II

5. Verify the adequacy of abutment as shown below use following data. Material-concrete, Density of soil =  $17 \text{ kN/m}^3$  coeff. of friction = 0.6, soil internal friction angle =  $30^\circ$ . Live load = 1RC class AA tracked. 11





6. A) Write on different types of pier with their suitability. **4**
- B) Explain the 1RC requirements for elastomeric bearings. **4**
- C) Explain various types of expansion joints. **4**
7. Write a note on : **12**
- 1) Erection method of bridges.
- 2) Caisson foundation.
- 3) Reinforced earth abutment.
- 4) Forces on bearings.
8. A) Design a neoprene in reinforced bearing pad for following data : **6**
- 1) Vertical load (sustained) = 196 kN.
- 2) Vertical load (dynamic) = 69 kN.
- 3) Horizontal force = 59 kN.
- 4) Coeff. of friction = 0.3.
- 5) Modulus of rigidity of elastomer = 1 N/mm<sup>2</sup>.
- B) Write about inspection, maintenance of bearings. **5**
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**M.E. (Mech. Design Engg.) (Semester – I) (CBCS/CGPA)**  
**Examination, 2016**  
**COMPUTATIONAL TECHNIQUES IN DESIGN ENGG. (Paper – I)**

Day and Date : Monday, 9-5-2016

Max. Marks : 70

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

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

## SECTION – I

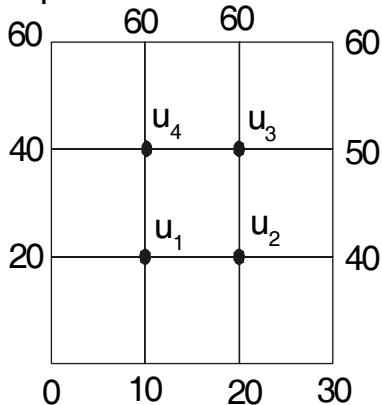
1. a) Fit a straight line to the following data by least square principle : 6
- |                       |      |      |      |      |      |
|-----------------------|------|------|------|------|------|
| <b>Year x :</b>       | 1961 | 1971 | 1981 | 1991 | 2001 |
| <b>Production y :</b> | 8    | 10   | 12   | 10   | 16   |
- (in thousand tons)**  
and find the expected production in 2006.
- b) Using Everett's formula evaluate  $f(30)$  if  $f(20) = 2854$ ,  $f(28) = 3162$ ,  $f(36) = 7088$ ,  $f(44) = 7984$ . 6
- c) Solve the equations  $27x + 6y - z = 85$ ,  $x + y + 54z = 110$ ,  $6x + 15y + 2z = 72$  by Gauss-Seidal method. 6
2. a) A body is in the form of a solid of revolution. The diameter D in cms. of its section at distance x cm from one end are given below. Estimate the volume of the solid. 10
- |            |   |     |     |      |      |      |    |
|------------|---|-----|-----|------|------|------|----|
| <b>x :</b> | 0 | 2.5 | 5.0 | 7.5  | 10   | 12.5 | 15 |
| <b>D :</b> | 5 | 5.5 | 6.0 | 6.75 | 6.25 | 5.5  | 4  |
- b) Fit a second degree curve to the following data : 7
- |            |     |     |     |     |     |     |     |
|------------|-----|-----|-----|-----|-----|-----|-----|
| <b>x :</b> | 1.0 | 1.5 | 2.0 | 2.5 | 3.0 | 3.5 | 4.0 |
| <b>y :</b> | 1.1 | 1.3 | 1.6 | 2.0 | 2.7 | 3.4 | 4.1 |



3. a) Evaluate  $\int_0^{\pi/2} e^{\sin x} dx$ , correct to 4 decimal places, by Simpson's  $\frac{3}{8}$ <sup>th</sup> rule. **7**
- b) A slider in a machine moves along a fixed straight rod. Its distance  $x$  cm along the rod is given below for various values of the time  $t$  seconds. Find the velocity of the slider and its acceleration when  $t = 0.3$  second. **10**
- |            |       |       |       |       |       |       |       |
|------------|-------|-------|-------|-------|-------|-------|-------|
| <b>t :</b> | 0     | 0.1   | 0.2   | 0.3   | 0.4   | 0.5   | 0.6   |
| <b>x :</b> | 30.13 | 31.62 | 32.87 | 33.64 | 33.95 | 33.81 | 33.24 |

SECTION – II

4. a) Given that  $\frac{dy}{dx} = \frac{1}{x^2} - \frac{y}{x}$ ,  $y(1) = 1$ ,  $y(1.1) = 0.996$ ,  $y(1.2) = 0.986$  and  $y(0.3) = 0.972$ , find the values of  $y(1.4)$  and  $y(1.5)$  using Milne's Predictor-Corrector method. **8**
- b) Using the finite difference method, find  $y(0.5)$ ,  $y(1)$  and  $y(1.5)$  satisfying the diff. equation  $\frac{d^2y}{dx^2} = y$ , subject to the boundary conditions  $y(0) = 0$ ,  $y(2) = 3.627$ . **10**
5. a) Using Runge-Kutta method of fourth order solve for  $y$  at  $x = 1.2, 1.4$  from  $\frac{dy}{dx} = \frac{2xy + e^x}{x^2 + xe^x}$ ,  $y(1) = 0$ . **10**
- b) Find the largest eigen value and the corresponding eigen vector of the matrix  $A = \begin{bmatrix} 2 & -1 & 0 \\ -1 & 2 & -1 \\ 0 & -1 & 2 \end{bmatrix}$ , using Power method. **7**
6. a) Solve the Laplace equation  $U_{xx} + U_{yy} = 0$ , for the following Square Mesh with boundary values as shown in fig. Compute a solution correct to two decimals. **10**



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



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**M.E. (Mechanical-Design Engg.) (CBCS/CGPA) (Semester – I) Examination, 2016**  
**Paper – II : MACHINE DYNAMICS**

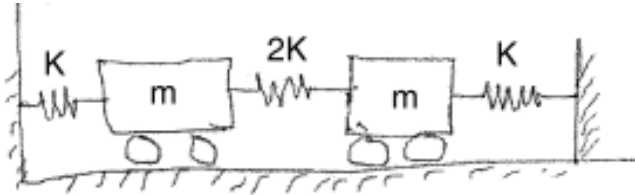
Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions :** 1) Answer **any three** questions from **each** Sections.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data if **necessary** and state it **clearly**.

SECTION – I

1. Derive the equation of motion for free vibration of damped system and solve it for underdamped condition. 11
2. Write the differential equation of motion for two degree of freedom vibrating system shown in figure. Find natural frequencies and mode shapes. 12



3. a) Explain Modal Analysis Procedure in detail. 6  
b) Explain Vibration Isolators. 6
4. Write short note on Rayleigh's Method and Holzer Method. 11

SECTION – II

5. a) Explain torsional vibration rod briefly. 5  
b) Derive Euler's equation of beam subjected to lateral vibrations. 7
6. Write short note on : phase-plane technique and perturbation method. 11
7. Explain following terms related to random vibrations : probability distribution, mean square values and standard deviation, probability density function, wide band and narrow band processes. 12
8. Write note on : Signal analysis, Experimental modal analysis and machine Conditioning and Monitoring. 11



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**M.E. (Mechanical Design Engineering) (Semester – I)  
Examination, 2016  
(CBCS/CGPA)  
SOLID MECHANICS (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time: 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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

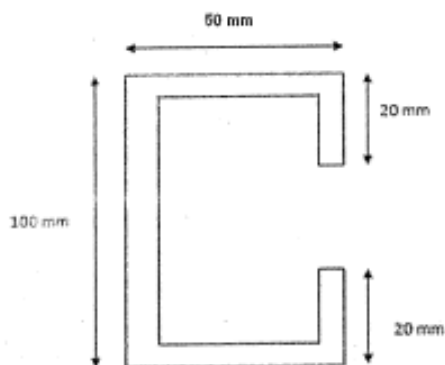
1. a) State six components of strain at a point by using strain displacement relationship. 3  
b) Derive the differential equation of compatibility for plane stress problem in Cartesian coordinates. 8
2. Show that the Airy stress function  $\phi = A[xy^3 - \frac{3}{4}xyh^2]$  represents the stress distribution in a cantilever beam loaded at free end. Find the stress variation for included region  $y = \pm \frac{h}{2}$  and  $0 \leq x \leq 1$ . 11
3. Derive the expression for the stresses induced in the solid rotating disc of uniform thickness. State practical applications. 12
4. a) Explain the membrane analogy. 6  
b) Derive the differential equation of equilibrium for plane stress problem in polar coordinates. 6





## SECTION – II

5. a) State the assumptions made in theory of contact stresses. **3**  
b) Derive the expression for pressure and area of contact in case of two spheres in contact subjected to compressive load. **8**
6. a) Define shear centre and state its practical importance. **3**  
b) Locate the shear centre for the following section having uniform thickness of 4 mm. **9**



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) Shell of uniform strength.
  - 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) Examination, 2016  
(CBCS/CGPA)  
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY  
(Paper – IV)**

Day and Date : Thursday, 12-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

1. a) How to write research objectives, purpose and motivations ? 7  
b) Explain ethical and legal aspects in research. 7
  2. a) Define experiment and explain details of fractional factorial experiments. 7  
b) What is group problem solving ? Explain Delphi method. 7
  3. a) Explain steps involved in developing empirical model. What are the drawbacks of empirical model ? 7  
b) What is interpretation and inference ? Give the significance. 7
  4. a) Define system and environment. Discuss simulation and modelling. 7  
b) How will you select research journal for publication of your research ? Explain procedure of publication in research journal. 7
  5. a) Explain various errors in the experiment. 7  
b) Design an experiment to obtain improved efficiency of a forging shop. 7
  6. a) Explain uni-variate and bi-variate analysis with suitable examples. 7  
b) Explain regression analysis. 7
  7. Write short notes on **any two** : 14
    - a) Testing of hypothesis
    - b) Model based simulation
    - c) Analysis of variance (ANOVA)
    - d) Characteristics of good research report.
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**M.E. Mech. (Design Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
Elective – I : INDUSTRIAL INSTRUMENTATION**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

- |  |              |
|--|--------------|
| 1. a) Describe in detail 'Classification of Instruments'.          | 8            |
| b) Explain general procedure of calibration.                       | 4            |
| 2. a) Explain the following performance parameters.                | 8            |
| 1) Precision   | 2) Threshold |
| 3) Hysteresis  | 4) Drift     |
| b) What do you mean by first order and second order instruments ?  | 4            |
| 3. a) Explain mechanical and pneumatic amplifying element.         | 6            |
| b) Explain electromagnetic transducer and Eddy current transducer. | 5            |
| 4. a) Explain absorption type dynamometer.                         | 6            |
| b) Describe Hot Wire Anemometer.                                   | 5            |



## SECTION – II

5. a) Explain the principal of thermocouple and state laws of thermocouples. **6**  
b) Explain the term 'Sound Intensity Level'. Explain working of electret microphone. **6**
6. a) Explain system analysis by transient testing. **6**  
b) Explain McLeod gauge with neat sketch. **5**
7. a) Explain corrosion monitoring. **6**  
b) Describe the importance of computers in instrumentation system. **5**
8. Write short note on **(any four)** : **12**
- 1) Data acquisition system.
  - 2) Ferrographic analyser.
  - 3) Particle counters.
  - 4) Performance trend monitoring.
  - 5) Manometers.
  - 6) Random force testing.
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**M.E. Mechanical (Design Engineering) (Semester – II) Examination, 2016  
(New – CBCS/CGPA)  
ADVANCED DESIGN ENGINEERING (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicates **full** marks.  
3) **Assume** necessary data if **required** and state it **clearly**.

SECTION – I

1. a) Derive an expression for torque applied by a shaft on the cam in the analysis of a rigid eccentric cam. 6  
b) Prove that a sine acceleration cam generates into a cycloidal displacement cam. 6
2. a) Derive from basic principles the two dimensional Reynold's equation for hydrodynamic lubrication. 6  
b) Explain different properties of lubricants. 5
3. a) Derive an expression for load carrying capacity of idealised full journal bearing. 6  
b) Explain combined motion approach to cam. 5
4. Write short notes on the following : 12
  - a) Hydrostatic and Elasto-hydrodynamic bearing.
  - b) Kinematic Design of 3-4-5 and 4-5-6-7 cam.

SECTION – II

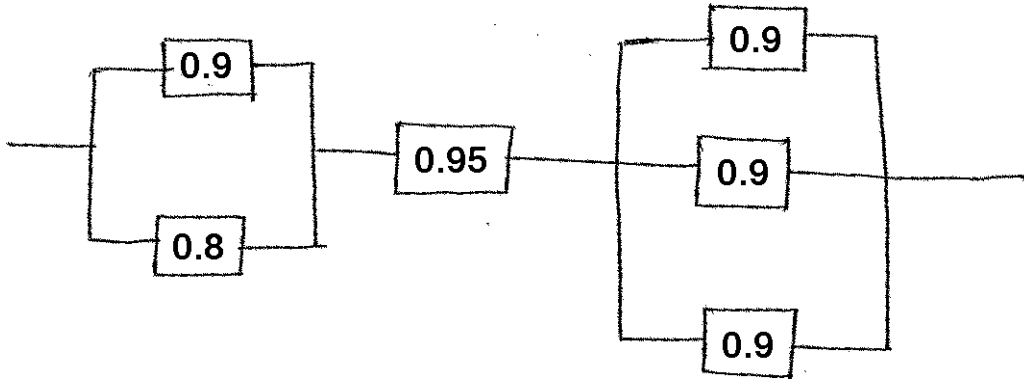
5. a) Define Reliability in different terms. 6  
b) Explain the terms MTTF and MTBF used in Reliability analysis. Derive the relation for MTTF in terms of R(t) for exponential distribution, with usual notations. 6
6. a) Derive the expression for thermal stresses in flat walls. 6  
b) Explain the methods of reducing thermal stresses. 5

P.T.O.



7. a) Determine the system reliability of the following :

7



b) Explain the following :

- i) Failure Density
- ii) Hazard Rate.

4

8. Write short notes on :

12

- i) Design for manufacturing and assembly.
- ii) Combined effect of thermal and working stresses in thin and thick cylinder subjected to internal pressure.

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**M.E. (Mech. Design Engg.) (Semester – II) (New CBCS/CGPA)  
Examination, 2016  
FINITE ELEMENT ANALYSIS (Paper – VII)**

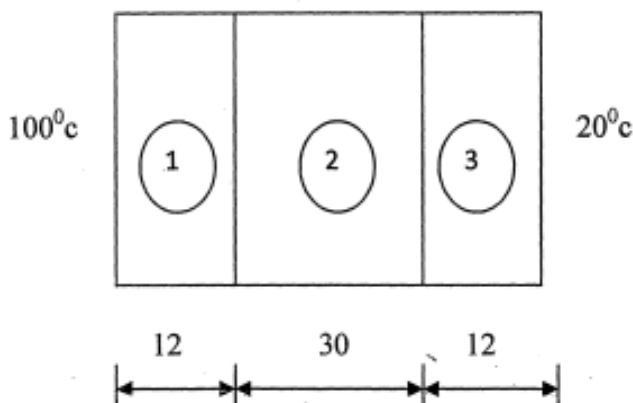
Day and Date : Monday, 16-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) Attempt **any three** questions from **each** Section.  
2) Make suitable assumptions if necessary and state them **clearly**.

SECTION – I

- a) Explain Weighted Residual method. **6**  
b) Derive an expression of stiffness matrix of 2 noded 1D bar element. **6**
- Using potential energy method derive the element stiffness matrix and element equation for a simple bar element. **12**
- a) Using finite element method find temperature distribution and heat flow through composite wall as shown in figure. **8**



$K_1 = K_3 = 80 \cdot 10^{-3} \text{ W/mm}^\circ\text{C}$ ;  $K_2 = 0.8 \cdot 10^{-3} \text{ W/mm}^\circ\text{C}$ ; All dimensions are in mm.

- b) Write a short note on history of FEA along with its application. **4**



4. Write short note on (attempt **any two**) : **12**
- a) FDM and FVM
  - b) Rayleigh Ritz method
  - c) Matrix Algebra.

SECTION – II

5. a) Describe 1-D, 2-D and 3-D elements. **6**
- b) Prove that sum of shape function at any node of an element is unity. **4**
6. a) Explain sub-modeling and sub-structuring methods to improve modeling efficiency. **4**
- b) Explain in brief Isoparametric, Subparametric and Superparametric elements. **6**
7. Explain modeling procedure of conductive thermal analysis using software based FEM along with its application. **12**
8. Write short note on (attempt **any two**) : **12**
- a) Model validity and Model Accuracy
  - b) Concept of Mapping
  - c) Spectrum Analysis.
-





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**M.E. (Mechanical-Design Engineering) (Semester – II) Examination, 2016  
(New-CBCS/CGPA)  
EXPERIMENTAL STRESS ANALYSIS (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Answer **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) Assume suitable data **if necessary** and mention it clearly.  
4) **Use 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 the Babinet Soleil Compensator method. 4
2. a) A 2-D photo elastic model of a connecting rod was loaded in circular polariscope. The isochromatics fringe order at the point of interest was 4.5. A circular disc of the same material of 60 mm diameter was loaded in diametral compression to calculate material fringe value. At a load of 1200 N, the fringe order at centre of disc was observed to be 3. Calculate maximum shear stress at the point of interest if connecting rod has a thickness of 8 mm. 6  
b) Explain in details holography. 5
3. a) Explain oblique incidence method. 6  
b) Explain in brief : 5
  - i) Isoclinic
  - ii) Isochromatic
  - iii) Random light
  - iv) Monochromatic light.
4. Write short note on : 12
  - 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 •  $a = 350$  micro-strain, •  $b = -450$  micro-strain, •  $c = 100$  micro-strain. Determine the principal strains, principal stresses, its directions and maximum shear stress. Take  $E = 210$  GPa and  $\mu = 0.30$ . **8**
- b) Explain selection of strain gauges. **4**
6. a) Explain different configuration of Wheatstone bridge circuit. **7**
- b) Explain temperature compensation for a strain gauge. **4**
7. a) Explain moiré fringe method. **6**
- b) Explain torque measurement by strain gauges. **5**
8. Write short note on : **12**
- a) Dynamics strain measurement
- b) Commercial strain gauge indicators.
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**M.E. (Mechanical Design Engineering) (Sem. – II) Examination, 2016  
(New-CBCS/CGPA)  
INDUSTRIAL PRODUCT DESIGN (Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

1. a) What are the challenges of product development ? Discuss the importance of a product designer in the organization structure of an industry. 7  
b) Discuss the industrial product design approach based on idea generation and inventiveness. 7
  2. a) What is mind criticism ? Explain its role in industrial product design. 7  
b) Discuss aspects of ergonomic design of machine tool. 7
  3. a) How the anthropometric data is expressed in percentiles ? What are the considerations for choosing a particular percentile for specific design application ? Explain with suitable examples. 7  
b) What are the manufacturing aspects of industrial product design ? 7
  4. a) Elaborate use of aesthetic principles in consumer product design. 7  
b) Discuss the effect of psychology of seeing on product design. 7
  5. a) What are the precautions to be considered while choosing colors to be given for a good ergonomic design of an industrial product ? 7  
b) What is the role of “line and form” in improving the aesthetics of an industrial product ? 7
  6. a) Explain the importance of standardization in industrial product design. 7  
b) Visualize any industrial product and draw a neat sketch. Explain how the ergonomic and aesthetic principles are incorporated in the design. 7
  7. a) Explain contrast, continuity, proportion, rhythm and radiance with suitable examples. 7  
b) What are specification requirement and rating ? Discuss the requirements of an industrial product and compare with those of consumer products. 7
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**M.E. (Mechanical Design Engineering) (Semester – II)**  
**(New-CBCS/CGPA) Examination, 2016**  
**INDUSTRIAL TRIBOLOGY (Paper – X) (Elective – II)**

Day and Date : Monday, 23-5-2016

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) Write short note on 1) Fretting wear 2) Percussion wear. 8
- b) Using Stribeck's curve explain range and types of lubrication modes. 5
2. a) Derive Petroff's equation. What are its limitations ? 7
- b) Explain principle of hydrodynamic lubrication in journal bearing. 4
3. a) Derive an expression for flow rate through rectangular slot. What are assumptions made while deriving the equation ? 7
- b) Discuss different types of energy losses in hydrostatic bearings. 4
4. Explain the following : 4
  - 1) Significance of Sommerfeld number. 4
  - 2) Tribological properties of lubricants. 4
  - 3) Piston Pin lubrication. 3

## SECTION – II

5. a) Derive an expression for pressure distribution of squeeze film lubrication between parallel rectangular plates. Also evaluate instantaneous load carrying capacity for given parallel rectangular plates. 8
  - b) Differentiate between squeeze film lubrication and hydrodynamic lubrication. 5
  6. a) Derive Reynolds equation for aerodynamic bearings under steady state. 8
  - b) What are applications of air lubricated bearings ? 3
  7. Using Ertel Grubin theory derive relation  $\frac{h_0}{R} = 1.19 \left[ \frac{\mu_0 U \alpha}{R} \right]^{11} \left[ \frac{ELR}{W} \right]^{11}$ . 11
  8. Briefly discuss : 4
    - 1) Mechanics of tyre road interactions. 4
    - 2) Lubrication of gears. 4
    - 3) State different techniques of wear debris analysis. 3
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Seat No.	
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**M.E. (Mechanical Design Engineering) (New – CBCS/CGPA)  
(Semester – II) Examination, 2016  
ENGINEERING FRACTURE MECHANICS (Elective – II) (Paper – X)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

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

SECTION – I

1. a) Differentiate between ductile and brittle fracture. **5**  
b) Distinguish between the trans-granular and inter-granular fracture. **5**  
c) Explain microscopic and macroscopic failure mode related to fracture mechanics. **8**
2. a) Calculate the fracture toughness and fracture resistance of a material for which a plate test with central crack gives the following information :  
Width (W) = 50 cm, thickness (B) = 1.9 cm, crack length (2a) = 5 cm, failure load P = 1335 KN, the yield strength = 480 MPa, E = 100 GPa. **7**  
b) Explain the plastic zone shape according to Tresca and Von Mises criteria. **10**
3. Write short note on following (**any three**) : **17**
  - i) Clip gauge.
  - ii) Photo elasticity technique for evaluating fracture toughness.
  - iii) Fracture modes.
  - iv) Griffith energy criteria.



## SECTION – II

4. a) A large centre-cracked plate containing an initial crack of length  $2a_0 = 10$  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  $\frac{da}{dN} = 0.44 \times 10^{-11} (\Delta k)^3$  (m/cycle). Calculate crack growth rate when crack length has the following values :  
 $2a = 8$  mm, 10 mm. 10
- b) Explain S-N diagram with suitable figure. 7
5. a) An edge crack detected on a large plate is of 3.1 mm under a constant amplitude cyclic load having  $\sigma_{\max} = 310$  MPa and  $\sigma_{\min} = 1720$  MPa. If the plate is made of a ferrite-pearlite steel and  $K_{IC} = 165$  MPa  $\sqrt{m}$ . Determine  
 i) propagation life up to failure and  
 ii) propagation life if the crack length  $a$  is not allowed to exceed 25 mm. 8
- b) Define J-integral. Discuss the significance and limitations of J-integral as a fracture parameter. 5
- c) Explain types of creeps with suitable figures. 5
6. Write short note on following (**any three**) : 17
- i) Law for calculation of fatigue life under cyclic load
  - ii) J integral
  - iii) Load displacement test to measure CMOD
  - iv) Creep resistant materials.
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**M.E. (Mechanical Design Engineering) (New - CBCS/CGPA) (Semester – II)  
Examination, 2016  
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Elective – II)  
(Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. A) How are composites classified ? Enlist applications of composites. **10**  
B) Explain particulate composites and pre pegs. **7**
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, Poisson's ratio,  $\mu$  . **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. **8**

SECTION – II

4. A) Explain Bag moulding and filament winding related with manufacturing of composites. **10**  
B) What is Kirchoff hypothesis related with macro-mechanical behaviour of laminates ? **7**
  5. A) Explain in detail CLT (Classical Laminate Theory). **11**  
B) Explain maximum strain theory. **6**
  6. Write short note on following : **18**
    - a) Buckling of laminate plates.
    - b) Inter-laminar stresses.
    - c) NDT methods for composites.
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**M.E. Mechanical (Design Engineering) (Semester – II)**  
**(New-CBCS/CGPA) Examination, 2016**  
**Elective – II : ENGINEERING DESIGN OPTIMIZATION (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time: 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. a) Give engineering applications of optimization. 6  
b) Define the following : 6  
    i) Optimal control problem  
    ii) Geometric programming problem  
    iii) Linear programming problem.
2. a) Find the dimensions of a box of largest volume that can be inscribed in a sphere of unit radius. 8  
b) Write the Taylor's series expansion of a function  $f(X)$ . 3
3. Find all the basic solutions corresponding to the system of equations : 12  
 $2x_1 + 3x_2 - 2x_3 - 7x_4 = 1$   
 $x_1 + x_2 + x_3 + 3x_4 = 6$   
 $x_1 - x_2 + x_3 + 5x_4 = 4.$
4. a) Explain exhaustive search method. 6  
b) Explain unrestricted search method. 5

P.T.O.





## SECTION – II

5. a) State the necessary and sufficient conditions for the unconstrained minimum of a function and give the reasons why the study of unconstrained minimization methods is important. **6**
- b) Explain the procedure of scaling of design variables. **5**
6. a) Explain the algorithm of SLP method. **5**
- b) Explain the algorithm of Sequential Quadratic Programming Method. **6**
7. a) What are the characteristics of mechanical systems ? **6**
- b) Explain effect manufacturing errors on optimum design. **6**
8. a) What is the purpose of mutation ? How is it implemented in GAs. **6**
- b) Explain the principle on which Genetic Algorithms are based and how Genetic Algorithms differ from the traditional methods of optimization. **6**
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**M.E. (Electronics) (Semester – I) (CBCS/C.G.P.A.) Examination, 2016  
CMOS VLSI DESIGN (Paper – I)**

Day and Date : Monday, 9-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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) With the help of output characteristics of NMOS transistor explain cut off, non saturation and saturation region. **6**  
b) What are second order effects for MOS transistor ? **5**
2. a) Explain propagation delay of CMOS inverter. **6**  
b) Explain static power dissipation of CMOS inverter. **6**
3. a) What is Ratioed logic ? **4**  
b) Design basic gates using CMOS logic. **8**
4. a) What is dynamic CMOS logic ? Explain power dissipation and speed for dynamic CMOS logic. **8**  
b) Explain leakage in dynamic circuits. **4**

SECTION – II

5. a) Explain the bistability principle for latches. **6**  
b) Explain low voltage static latches. **5**
  6. a) Explain True Single Phase Clocked Register (TSPCR). **6**  
b) Explain latch based clocking. **6**
  7. a) Explain synchronizers and arbiters. **8**  
b) Explain any two methods of timing classification of digital systems. **4**
  8. a) Explain designing of fast multipliers. **6**  
b) Explain designing of DRAMS. **6**
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**M.E. (Electronics) Engg. (Semester – I) Examination, 2016  
(CBCS/CGPA)  
ADVANCED DIGITAL SIGNAL PROCESSING (Paper – II)**

Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

1. 1) Derive the equation and explain in detail the Schur algorithm for prediction coefficient. 6
- 2) Draw the block diagram of forward linear prediction. Derive the equations for coefficient of the linear predictor by using 'P' stage lattice filter. 6
2. 1) For AR model parameter, explain in detail Burg method as an order recursive least squares estimator. 6
- 2) Explain the use of DFT in a power spectrum estimation. 5
3. 1) Explain the design of FIR differentiator. 6
- 2) Design an ideal Hilbert transform with frequency response  
$$H(e^{j\omega}) = -j \quad \pi > \omega \geq 0$$
$$= j \quad 0 > \omega > -\pi$$
using Hamming window for  $N = 9$ . 6

SECTION – II

4. 1) Discuss the properties of discrete wavelet transform. 5
  - 2) Explain in detail multi resolution formulation of wavelet systems. 6
  5. 1) Explain polyphase structures in detail. 6
  - 2) Explain with timing diagram interpolation by a factor  $I$ . Draw the spectrum of  $x(n)$  and  $v(n)$ . 6
  6. 1) Explain with block diagram least squares design method to reduce error. 6
  - 2) Explain the relationship between 'S' variable and 'Z' variable. What is pre warping effect ? Design IIR filter by using BLT method. 6
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**M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
ADVANCED NETWORK ENGINEERING (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Answer following questions : **(3×4=12)**
    - 1) Draw UDP datagram format and describe. How UDP checksum is determined ?
    - 2) Draw TCP state machine and explain.
    - 3) Draw and explain IPv6 packet format.
  
  2. Answer **any two** from following questions : **(2×6=12)**
    - 1) What is ARP operation ? Draw ARP format and discuss.
    - 2) List different types of messages and their meanings in case of ICMP.
    - 3) What is small packet problem and silly window syndrome in case of TCP ? How these issues can be resolved ?
  
  3. Answer following questions :
    - 1) What is SNMP ? Discuss SNMP message format in detail. **5**
    - 2) What are the multiple connections and weakest link in firewall ? Discuss packet level filters. **6**
- OR
- 2) What is the importance of timeout and retransmission in TCP ? How TCP timeout is calculated ? Explain Kern's algorithm to define timeouts. **6**



## SECTION – II

4. Answer following questions : (3×4=12)
- 1) What is digital audio ? Explain audio compression.
  - 2) What are different MPEG-4 requirements ?
  - 3) Draw and explain functional block diagram of DVB-S system.
5. Answer **any two** from following questions : (2×6=12)
- 1) Discuss commonly used video formats. Explain the concept of content based interactivity.
  - 2) Why TCP is not suitable for real time services ? Draw RTP header format and describe each field briefly.
  - 3) Explain end to end multimedia communication system.
6. Answer following questions :
- 1) List various still image encoding methods. Discuss JPEG-2000. 5
  - 2) Explain basic operation of DVMRP. Draw and explain DVMRP datagram. 6
- OR
- 2) What is quality in communication ? Explain RSVP in detail. 6
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**M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
RANDOM SIGNALS AND PROCESSES (Paper – IV)**

Day and Date : Thursday, 12-5-2016  
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.*

SECTION – I

1. Attempt the following :

- a) State and explain Baye's theorem along with total probability. 5
- b) Cards are drawn from a standard 52-card deck until the third club is drawn. After each card is drawn, it is put back in the deck and the cards are reshuffled so that each card drawn is independent of all others.
- i) Find the probability that the 3<sup>rd</sup> club is drawn on the 8<sup>th</sup> selection.
- ii) Find the probability that atleast 8 cards are drawn before the 3<sup>rd</sup> club appears. 6

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

- a) Write a note on transformation of a random variable. Obtain the mean and variance of Y if  $Y = 2X + 3$ , where X is a Gaussian random variable with mean 1 and variance 2.
- b) If X is a continuous random variable with PDF

$$f_X(x) = \begin{cases} x & 0 \leq x \leq 1 \\ \frac{3}{2}(x-1)^2 & 1 \leq x \leq 2 \\ 0 & \text{otherwise} \end{cases}$$

Find the cumulative distribution function  $F_X(x)$  and use it to find  $P\left(\frac{3}{2} < x < \frac{5}{2}\right)$ .



- c) A random variable has a probability density function given by the following equation

$$f(x) = \begin{cases} A & -2 \leq x \leq 6 \\ 0 & \text{Elsewhere} \end{cases}$$

- i) Find the value of A.
- ii) Find the mean value, mean square value and variance.
- iii) Obtain its cumulative distribution function.

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

- a) If X and Y are the random variables with PDF  $f_x(x)$  and  $f_y(y)$ . Obtain the probability density function of  $U = X + Y$  in terms of  $f_x(x)$  and  $f_y(y)$ .
- b) If X is a Gaussian random variable with mean 1 and variance 4. Find the density function of Y, where  $Y = 2X^2 + 1$ .
- c) Let X be a random variable with  $E[X] = 1$  and  $\text{var}[X] = 4$ . Find the following :
  - i)  $E[2X - 4]$
  - ii)  $E[X]^2$
  - iii)  $E[(2X - 4)^2]$ .

### SECTION – II

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

- a) Define :
  - 1) Stationary random process
  - 2) Wide sense stationary random process
  - 3) Ergodic process.

State the characteristics of these processes.

- b) If  $X(t)$  and  $Y(t)$  are two random processes with autocorrelation function  $R_{xx}(\tau)$  and  $R_{yy}(\tau)$  respectively, then prove that  $|R_{xx}(\tau)| \leq \sqrt{R_{xx}(0)R_{yy}(0)}$ . Establish any two properties of autocorrelation function  $R_{xx}(\tau)$ .
- c) Consider the random process  $X(t) = 10 \cos(200t + \phi)$ , where  $\phi$  is uniformly distributed random variable in  $(-\pi, \pi)$ . Show that  $X(t)$  is ergodic process in autocorrelation.

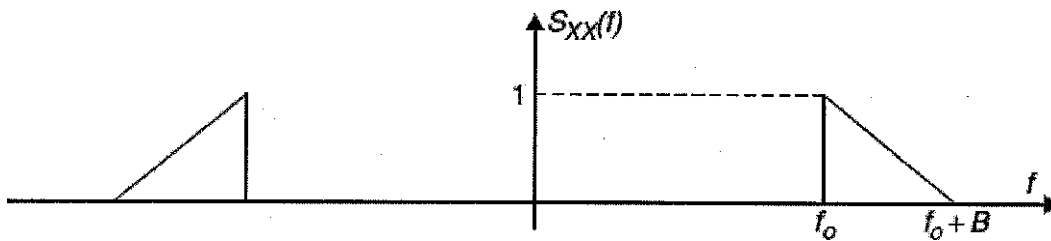


5. Attempt **any two** of the following :

(2×6=12)

- a) Define and explain :
  - a) cross spectral density
  - b) coherence functionWhat is white noise ?

b) Let  $X(t)$  be a random process whose PSD is shown in the accompanying figure. A new process is formed by multiplying  $X(t)$  by a carrier to produce  $Y(t) = X(t) \cos (\omega_0 t + \phi)$ , where  $\phi$  is uniform over  $[0, 2\pi)$  and independent of  $X(t)$ . Find and sketch the PSD of the process  $Y(t)$ .



c) The power spectral density of a WSS process is given by,

$$S(\omega) = \begin{cases} \frac{b}{a}(a - |\omega|), & |\omega| \leq a \\ 0 & |\omega| > a \end{cases}$$

Find the autocorrelation function of the process.

6. Attempt the following :

- a) Derive the relation for cross correlation between input and output of liner system with random process as a input. 6
- b) What is Markov process ? Classify Markov processes. 5

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**M.E. (Electronics Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
Elective I : DESIGN OF WIRELESS SYSTEM (Paper – V)**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. a) Design a six pole lumped filter using image parameter design for a band of 475 to 525 MHz. 7  
b) What are S parameters ? What is its significance ? 6
2. a) What are PLL fractional N synthesizers ? 6  
b) Design a low cost variable bias VGA amplifier with reverse gain control. Assume suitable parameters. 6

OR

- c) Design a discrete crystal BJT oscillator for 22 MHz. Assume suitable parameters. 6
3. a) Design a discrete LC BJT oscillator for 22 MHz. Assume suitable parameters. 5  
b) What are passive mixer distortions. 5

OR

- c) Explain duplexer filters. 5



## SECTION – II

4. a) Draw and explain dual gate single ended narrowband MOSFET mixer for upto 250 MHz. Discuss design steps. **7**
- b) Discuss Linear Congruential and extended Fibonacci methods, for random number generation . **6**
5. a) Design shunt PIN SPST RF switch and small RF signal series PIN SPST switch. **6**
- b) Draw and explain a superheterodyne dual conversion receiver. **6**

OR

- c) Discuss linear FR transmitter. **6**
6. a) Draw a SNAP frequency multiplier and discuss design steps. **5**
- b) Design a passive RF diode single ended mixer for RF of MHz and IF of 40 MHz. Assume suitable parameters. **5**

OR

- c) Draw and explain  $50\ \Omega$  LC power splitter/ combiner with  $0^\circ$ . Also design it for  $f_r = 915\ \text{MHz}$  with  $Z_{IN} = Z_{OUT} = 50\ \Omega$  . **5**
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**M.E. (Electronics Engg.) (Semester – I) (CBCS/CGPA) Examination, 2016**  
**IMAGE AND VIDEO PROCESSING**  
**(Elective – I) (Paper – V)**

Day and Date : Friday, 13-5-2016

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) Question No. **1 & 4** are **compulsory**.

SECTION – I

1. Solve the following questions. **(2×5=10)**
- i) Solve and check whether the DFT matrix is unitary or not.
  - ii) Discuss the properties and applications of
    - 1) Hadamard transform
    - 2) Discrete Cosine transforms.
2. Solve **any two**. **(2×6=12)**
- i) Explain K-L transform in detail.
  - ii) What is histogram ? Explain histogram equalization.
  - iii) What do you mean by basic gray level transformation ? Explain any two with neat sketch.
3. Solve **any two**. **(2×6=12)**
- i) If the entire pixels in an image are shuffled, will there be any change in the histogram ? Justify your answer. Explain with example.
  - ii) What is meant by least mean square filter ? Explain it.
  - iii) Explain different types of noise model



## SECTION – II

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

- i) Explain of Edge Detection using Sobel. Prewwits and Robert Cross Operator.
- ii) Solve the shanon-fano code for given image shown below in purpose of image compression and also find out efficiency ?

2	3	4
4	3	2
5	2	3

Fig. – Image 3 × 3

5. Solve **any two**. (2×6=12)

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

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

- ii) Explain lossless DPCM technique and list three reasons. Why image compression is important ?
- iii) What is coding redundancy ? Explain brief details.



6. Solve **any two**.

**(2×6=12)**

i) Write short note on

- 1) video signal
- 2) analog signal
- 3) digital signal
- 4) color model in video

ii) Explain details MPEG 2, MPEG 4.

iii) Explain video compression technique.

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**M.E. (Electronics Engineering) (Semester – II) (New-CBCS/CGPA)  
Examination, 2016  
RESEARCH METHODOLOGY (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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 different definitions of Research ? Which definition do you feel is more relevant to engineering research ? Why ? 6
- b) With suitable examples in engineering research, explain situations which requires continuous simulation and discrete simulation. 6
2. a) With suitable example explain necessity of 'scope' in proposal/synopsis of engineering research. 5
- b) With suitable example in engineering research, explain dynamic system modeling. 5

OR

- c) With suitable example in engineering research, explain static system modeling. 5
3. a) With suitable engineering example explain Monte Carlo simulation. 7
- b) What are techniques involved in defining problems ? 6

OR

- c) Explain research design in case of descriptive and diagnostic research studies. 6



SECTION – II

4. a) With suitable engineering example, explain normal distributions. **6**  
b) With suitable engineering example, explain Poisson distributions. **6**
5. a) Write a note on Virtual Lab. Explain an engineering situation where it is required. **5**  
b) For a hypothetical engineering Research Project Report – write an ‘Abstract’.  
Explain its salient features. **5**

OR

- c) For a hypothetical engineering Research Project Report – write a ‘Conclusion’.  
Explain its salient features. **5**
6. a) What are the guidelines for design of experiment ? **7**  
b) Explain types of errors in design of experiments. **6**

OR

- c) Discuss role of ICT at different stages of research. **6**
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**M.E. (Electronics Engg.) (Semester – II) (New-CBCS/CGPA)  
Examination, 2016**

**Paper – VII : EMBEDDED SYSTEM DESIGN**

Day and Date : Monday, 16-5-2016

Total Marks : 70

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

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

SECTION – I

1. Explain the following Instruction (**Any Five**) : **(5×3=15 Marks)**
  - 1) CDP p1, 10, c1, c2, c3
  - 2) LDC p1, c2, table ;
  - 3) STCEQL p2, c3, [R5, #24]! ;
  - 4) SWP R0, R1, [R2] ;
  - 5) STR R1, [R2], R4 ;
  - 6) LDR R1, [R2, # 16] ;
2. Interface a relay with on time 30 seconds and off time 10 seconds also give the buzzer indication for on time using ARM 9 and write the programme in C. **10**
3. With the help of diagram explain ARM 9 architecture. **10**

OR

Explain embedded system design process designing hardware and software components.

SECTION – II

4. Explain software development process life cycle and its model in detail. **10**
  5. What is linux kernel configuration ? Explain the steps in Linux kernel Configuration. **10**
  6. Explain system design example of data base application in smart card. **15**
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**M.E. (Electronics Engineering) (Semester – II) (New CBCS/C.G.P.A.)  
Examination, 2016  
PERIPHERAL SYSTEM DESIGN AND INTERFACING (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Answer following questions : **(3×4=12)**
    - 1) Draw USB connection diagram. What is enumeration in USB ?
    - 2) What is multi level analog input in DAQ ? List different sampling methods in multichannel input system and explain.
    - 3) Draw timing diagram for data transfer through parallel port and explain it.
  
  2. Answer **any two** from following questions : **(2×6=12)**
    - 1) What are the shortcomings of ISA bus ? Discuss different functions provided by EISA bus.
    - 2) Draw diagram for two wire configuration in case of RS-485 multi-drop network and explain it in detail.
    - 3) List different features of USB. Discuss USB system and USB data transfer types.
  
  3. Answer following questions :
    - 1) Draw a block diagram showing PCI bus system and explain it in detail. What are master, slave and arbiter in PCI bus system ? **6**
    - 2) What is 20mA current loop for serial communication ? What are different problems with 20mA current loop ? **5**
- OR
- 2) Compare between RS 232, Rs 422 and RS 485 communication standards. **5**



## SECTION – II

4. Answer following questions : **(3×4=12)**
- 1) What is PID Controller ? Explain it neatly.
  - 2) How baud rate is controlled in communication controller PC 16550D ? Explain registers involved in baud rate definition in communication controller.
  - 3) What are the benefits of using PLC for process control ? Which factors are important in PLC programming ? Draw ladder diagram symbols and describe them.
5. Answer **any two** from following questions : **(2×6=12)**
- 1) Compare between P, PI, PD and PID controller action in detail.
  - 2) List classes of field bus. Explain MODBUS protocol in detail.
  - 3) What is difference between interrupt and DMA based data transfer ? Explain basic DMA operation in PC.
6. Answer following questions :
- 1) List the characteristics of physical layer in DeviceNet. Draw and explain DeviceNet message frame format. **6**
  - 2) Discuss HART network, communication modes in HART and telegram structure of HART. **5**
- OR
- 2) Draw system configuration of industrial Ethernet. What is MODBUS TCP/IP ? Explain it neatly. **5**
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**M.E. (Electronics Engg.) (Semester – II) Examination, 2016**  
**(New-CBCS/CGPA)**  
**ADVANCED CONTROL SYSTEMS (Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Attempt **any two** : **(6×2=12)**

- a) Discuss the advantages of state space techniques over the transfer function techniques of analyzing the control systems.
- b) Determine the controllability and observability properties for following system.

$$A = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -9 & -5 \end{bmatrix} \quad B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \quad C = [2 \quad 1 \quad 0]$$

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

2. Attempt **any two** : **(6×2=12)**

- a) Examine the stability of following characteristic equation  
 $P(z) = z^4 - 1.2z^3 + 0.071z^2 - 0.3z + 0.08$
- b) Obtain Eigen values for following matrix

$$A = \begin{bmatrix} 1 & 4 \\ -2 & -5 \end{bmatrix}$$

- c) Explain the methods of testing of absolute stability.

3. a) Explain sampling, quantization effect in detail. **5**  
b) Obtain the state space representation for the system with following transfer

$$\text{function } T(s) = \frac{10(s+4)}{S(s+1)(s+3)}.$$

**6**

P.T.O.



## SECTION – II

4. Attempt **any two** : **(6×2=12)**
- a) Consider the system with transfer function  $\frac{Y(s)}{U(s)} = \frac{s+3}{s^2+3s+2}$ . Find matrices A, B, C in observable canonical form.
- b) With block diagram explain 2-DOF control.
- c) What are the different types of MIMO and explain one in detail.
5. Attempt **any two** : **(6×2=12)**
- a) The negative feedback control system has the forward path transfer function as  $\frac{Y(s)}{U(s)} = \frac{10}{s(s+1)}$ . While the feedback path transfers function H(s) is 5. Determine the sensitivity of the closed loop transfer function with respect to G at  $\omega = 1$  rad/sec.
- b) Explain internal stability by drawing neat block diagram.
- c) Explain servo systems.
6. Answer the following :
- a) Write a note on state observer. **5**
- b) Describe uncertainty and robustness. **6**
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**M.E. (Electronics Engineering) (Semester – II) Examination, 2016  
(New – CBCS/CGPA)  
Elective II : MOBILE TECHNOLOGY (Paper – X)**

Day and Date : Monday, 23-5-2016

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. Answer **any two** : **14**
- a) Explain GSM MAP service model and the MAP protocol machine.
  - b) Describe the various GPRS interfaces.
  - c) Explain different WAP protocols.
2. Answer **any two** : **12**
- a) Discuss about MS and BSS network nodes.
  - b) Explain 'GSM architecture'.
  - c) Describe the functions of mobility management, logical link management and radio resource management, functional groups of GPRS.
3. a) Write a note on EDGE. **5**
- b) What is TMN ? Explain its architecture. **4**



## SECTION – II

4. Answer **any two** : **14**
- a) With the help of packet data network transport flow architecture, explain the Mobile IP and Simple IP.
  - b) Explain forward link and reverse link related to EVDO system.
  - c) Describe different types of attacks observed in mobile computing.
5. Answer **any two** : **12**
- a) Explain uplink modulation using QPSK module in air interface.
  - b) Explain the 3GPP release 5 network architecture of core network evolution.
  - c) Explain different components of information security.
6. a) Explain phases of evolution of CDMA 2000. **5**
- b) Describe the transport channels in brief. **4**
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**M.E. (Electronics Engg.) (Semester – II) (New – CBCS/CGPA)  
Examination, 2016  
Elective – II : REAL TIME SYSTEMS (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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 block diagram a Real Time System. **6**  
2) Discuss in detail classification of task with example. **5**
2. 1) Describe desired language characteristic used for Real Time Systems. **6**  
2) Explain with examples data type used in various programming tools. **6**
3. 1) Explain with properties Run Time error handling during execution of software. **6**  
2) Explain with example programmer defined overloaded function. **6**

SECTION – II

4. 1) Explain the difference between Real Time databases and general purpose databases. **6**  
2) Explain transaction priorities used in Real Time database. **6**
  5. 1) Explain the performance of VTCSMA algorithm. **6**  
2) Explain in detail Timed-Token protocol. **6**
  6. 1) Explain Markov chain for a system with transient and permanent failures. **6**  
2) Explain tolerant synchronization in hardware and software. **5**
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**M.E. (Electronics Engg.) (Semester – II) (New – CBCS/CGPA)  
Examination, 2016  
Elective – II : VLSI IN SIGNAL PROCESSING (Paper – X)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

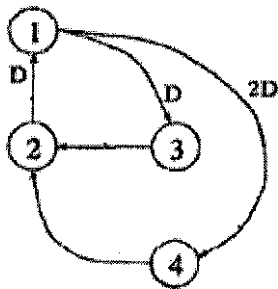
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Solve **any four** :

20

- a) Draw the block diagram, SFG and DFG for  $y(n) = ax(n) + bx(n - 1) + cx(n - 2)$ .
- b) Explain the following :
  - i) Critical path
  - ii) Loop bound
  - iii) Iteration bound.
- c) Define pipelining and parallel processing. Explain their advantages.
- d) Perform the retiming for the following DFG shown in fig.

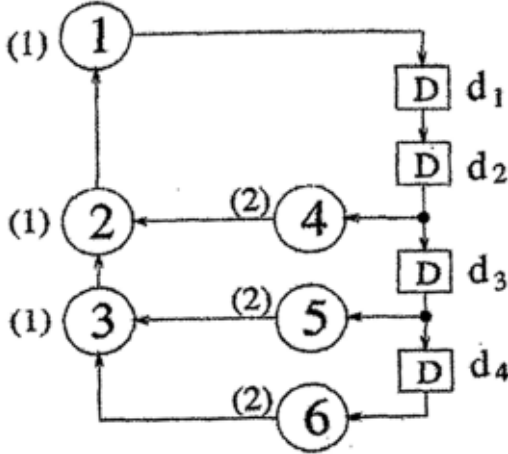


- e) What is retiming of DFG ? Explain properties of retiming.



2. Solve the following :

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



8

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

- i) Calculate critical path computation time.
- ii) The critical path has been reduced to 2 u.t. by inserting 3 extra delay element as shown in fig. (b).
- iii) Is this valid pipelining if not obtaining an appropriate pipelining ckt with critical path of 2 u.t.

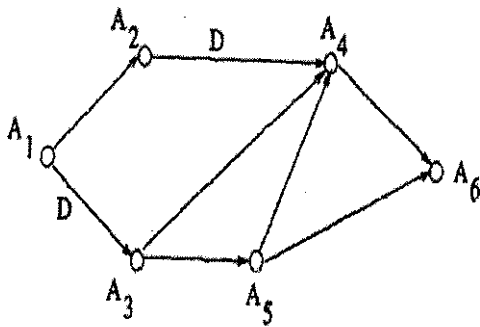


Fig. a

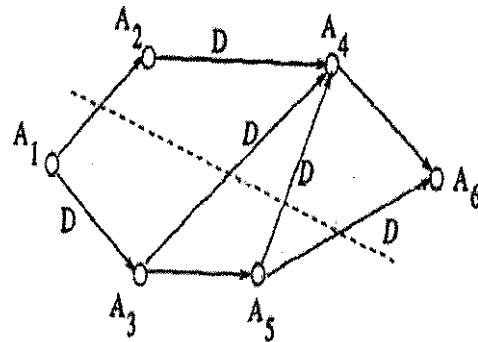
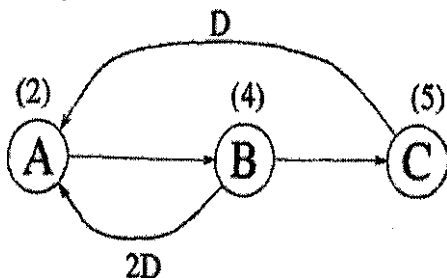


Fig. b

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) Prove the relationship with suitable example that unfolding preserves number of delay.
- d) Explain applications of unfolding.
- e) Explain parallel carry save array multipliers.

4. Solve the following :

- a) Design B1 filter for FIR systolic array. 8
- 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  $N = 8$  :

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

7







Seat No.	
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**M.E. (Electronics Engineering) (Semester – III) Examination, 2016  
SELF LEARNING SUBJECT – NETWORK AND INTERNET SECURITY  
(Paper – I)**

Day and Date : Wednesday, 25-5-2016

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 wireless network threats and security measures. 7  
b) Explain biometric techniques for security and identification. 6
2. Solve **any two** : (6×2=12)
  - a) Discuss remote user authentication principles.
  - b) Explain key management phase of IEEE 802.11i.
  - c) Discuss motivation and requirements for Kerberos.
3. Solve **any two** : (5×2=10)
  - a) Explain IEEE 802.11i pseudorandom function.
  - b) Explain mobile device security.
  - c) Discuss WAP infrastructure.

SECTION – II

4. a) Explain terminology of various malicious programs. 7  
b) Discuss applications of IPsec. 6
  5. Solve **any two** : (6×2=12)
    - a) Explain simple example of DKIM deployment.
    - b) Discuss packet filtering firewall.
    - c) Discuss pretty good privacy steps implemented and reasons for its growth.
  6. Solve **any two** : (5×2=10)
    - a) Explain SSL record protocol.
    - b) Explain secure electronic commerce.
    - c) Explain public key ring used in PGP.
-



**SLR-PL – 49B**

<b>Seat No.</b>	
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**M.E. (Electronics Engineering) (Semester – III) Examination, 2016  
Paper – I : ADVANCED SIGNAL AND IMAGE PROCESSING  
Self-Learning Subject**

Day and Date : Wednesday, 25-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

**SECTION – I**

1. Solve **any four** of the following : **20**
- a) Explain the operation of Iris recognition system.
  - b) What are the various security and privacy related issues in Biometric system ?
  - c) Explain how fuzzy logic is useful in biomedicine.
  - d) Explain the filters used to reduce the noise in medical images.
  - e) Explain the process of medical image restoration.
2. Solve the following :
- a) Explain the design cycle of Biometric system. Also mention the various types of system errors. **8**
  - b) Explain biomedical image segmentation. **7**

**OR**

- b) Explain how fuzzy logic useful in image processing. **7**

**SECTION – II**

3. Solve **any four** of the following : **20**
- a) Explain with the help of equations effect of scaling on power consumption.
  - b) Explain how the power is estimated in sequential circuits.

**P.T.O.**



- c) Mention the various features of DSP processors.
- d) Explain multiplexer based Manchester adder.
- e) Explain the use of DSP processor in multi-media signal processing.

4. Solve the following :

- a) Explain the use of DSP processor in wireless and mobile communications. **8**
- b) Explain simulation and non-simulation based approaches in low power VLSI design. **7**

OR

- b) Explain the Euclidean GCD algorithm for polynomials. **7**

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**M.E. (CSE) (Semester – I) (CBCS/CGPA) Examination, 2016  
THEORY OF COMPUTATION (Paper – I)**

Day and Date : Monday, 9-5-2016

Max. Marks : 70

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

SECTION – I

1. Answer **any four** : **24**
- a) Elaborate types of proofs and explain any one in detail with an example.
  - b) Illustrate  $E_{DFA}$  and  $EQ_{DFA}$  in decidability and prove that they are decidable languages.
  - c) Prove that for any two sets A and B prove that  $\overline{(A \cap B)} = \bar{A} \cup \bar{B}$  with possible method of proof.
  - d) Define and illustrate the following terminologies with proper examples.  
Sets, subsets, proper subset, infinite set, operations on sets.
  - e) Define nondeterministic TM. Prove that every nondeterministic on TM has an equivalent deterministic TM.
2. Answer the following : **6**
- Give a formal definition of a TM. Design a TM for a language  $L = \{S\#S \mid S \in \{0, 1\}^*\}$ .
3. Answer the following : **5**
- What is diagonalization method ? Illustrate with an example.



## SECTION – II

4. Answer **any four** : **24**
- a) Elaborate reducibility and prove that  $E_{TM}$  is undecidable.
  - b) Define computation history and linear bounded automaton. Prove that  $E_{LBA}$  is undecidable.
  - c) Define PCP problem and prove its undecidability.
  - d) Illustrate time complexity of a Turing Machine.
  - e) Elaborate growth rate of functions.
5. Answer the following : **6**
- Elaborate recursion theorem and prove that  $MIN_{TM}$  is not Turing recognizable.
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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**M.E. (Computer Science and Engg.) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
ADVANCED OPERATING SYSTEMS (Paper – II)**

Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

- I. Answer **any two** of the following : **10**
- a) In what respect are distributed computing systems better than parallel processing systems ? Give example of three applications for which distributed computing systems will be more suitable than parallel processing systems.
  - b) Explain call message format and its fields in RPC.
  - c) Write the code for implementing a producer-consumer pair of processes for the following two cases :
    - i) They use a single message buffer
    - ii) They use a buffer that can accommodate up to n messages.
- II. Answer **any two** of the following : **10**
- a) Explain the issue of performance in the distributed operating systems and what design principles should be used for better performance.
  - b) What is flexible reliability ? State different types of degree of reliability used in multicast communication.
  - c) With diagram explain the general architecture of DSM.
- III. a) Differentiate between the monolithic and microkernel approaches for designing a distributed operating system. Discuss their relative advantages and disadvantages. **8**
- b) What is causal ordering ? Illustrate with example the CBCAST protocol for implementing causal ordering. **7**



## SECTION – II

- IV. Answer **any two** of the following : **10**
- a) State the issues in designing Load-Balancing algorithms.
  - b) A distributed system does not support preemptive process migration facility. You are to design a load-sharing algorithm for scheduling processes in this system. Will you use a sender-initiated or a receiver-initiated location policy for your algorithm ? Give reasons for your answer.
  - c) A system consists of three processors  $P_1, P_2, P_3$  and a process having four tasks  $t_1, t_2, t_3$  and  $t_4$  to be executed on this system. Suppose  $E_{ij}$  is the cost of executing task  $t_i$  on processor  $P_j$  and  $C_{ij}$  is the cost of communication between tasks  $t_i$  and  $t_j$  when the two tasks are assigned to different processors. Let  $E_{11} = 31, E_{12} = 4, E_{13} = 14, E_{21} = 1, E_{22} = 5, E_{23} = 6, C_{12} = 35, C_{13} = 3, C_{14} = 8, C_{23} = 6, C_{24} = 4$  and  $C_{34} = 23$ . Find an optimal assignment of the tasks to the processors and calculate the cost of optimal assignment.
- V. Answer **any two** of the following : **10**
- a) Explain message forwarding mechanisms used in process migration.
  - b) List five important advantages of process migration.
  - c) State and explain the models for organizing threads.
- VI. a) Explain memory management in Linux. **7**
- b) Explain process creation, process termination and process scheduling in Linux. **8**
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**M.E. (CSE) (Semester – I) (CBCS/CGPA) Examination, 2016  
ANALYSIS OF ALGORITHMS (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**Instructions :** 1) Assume suitable data if **necessary**.  
2) Solve **any three** questions from **each** Section.

SECTION – I

1. A) Define the asymptotic notations  $O$ ,  $\Omega$  and  $\theta$ . Compute the asymptotic time complexity of following algorithm :  
Algorithm Add (a, b, c, m, n)  
{  
    for i = 1 to m do  
    for j = 1 to n do  
    c[i, j] = a[i, j] + b[i, j];  
}  
6
- B) What is amortized complexity ? How are potential function, amortized complexity and actual complexity related ?  
6
2. A) Solve the following recurrence equation :  
$$t_n = \begin{cases} n & \text{if } n = 0 \text{ or } n = 1 \\ 5t_{n-1} - 6t_{n-2}, & \text{otherwise.} \end{cases}$$
5
- B) Construct an Optimal Binary Search Tree (OBST) using dynamic programming approach for the identifiers set  $(a_1, a_2, a_3, a_4) = (\text{do, if, int, while})$  with  $n = 4$ ,  $p(1 : 4) = (3, 3, 1, 1)$  and  $q(0 : 4) = (2, 3, 1, 1, 1)$ . Compute weight w, cost c and root r of the OBST.  
7
3. A) Explain flow-shop scheduling with suitable example.  
6
- B) Explain the backtrack solution to the 4-Queen problem with tree organization.  
6
4. A) Obtain a set of an optimal Huffman codes for the messages  $(m_1, \dots, m_7)$  with relative frequencies  $(q_1, \dots, q_7) = (4, 5, 7, 8, 10, 12, 30)$ . Draw the decode tree for this set of codes.  
6
- B) Write a short note on branch and bound method.  
5



## SECTION – II

5. A) Prove the theorem CNF-Satisfiability is polynomially transformable to the clique-decision problem. Hence the clique-decision problem is NP-complete. **6**  
B) Explain the arrangement applications in geometric algorithm. **6**
6. A) Explain the node cover decision problem with example. **6**  
B) Explain computation geometry. **6**
7. A) Explain odd-even merge algorithm with example for PRAM. **6**  
B) Explain how to compute the convex hull using geometric algorithm. **6**
8. Write short note on :  
A) Voronoi diagrams.  
B) Fundamental techniques and algorithm with respect to PRAM. **11**
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Seat No.	
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**M.E. (Computer Science and Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
RESEARCH METHODOLOGY (Paper – IV)**

Day and Date : Thursday, 12-5-2016

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) List types of research and explain applied and fundamental research with suitable example. 6  
b) Explain in short the significance of Research. What are the points that need to be remembered for understanding the significance of research ? 6
2. a) Write a short note on experience survey and pilot survey. 6  
b) Explain the meaning of the following in context of Research design : 6
  - Research hypothesis
  - Experimental and Control groups.
3. a) Examine the merits and limitations of the observation method in collecting material. Illustrate your answer with suitable examples. 6  
b) Explain and illustrate the following research designs : 6
  - Random replications design
  - Simple factorial design.
4. Draw Research Process Flow Chart and explain Collect Data Process in detail with suitable example. 11



SECTION – II

- 5. a) Explain the basic concepts concerning hypothesis testing. **6**
  - b) Explain the layout of Research Report. **6**
  - 6. a) Compare between Survey Paper and Review Paper. **6**
  - b) Write a short note on Poster Paper. **6**
  - 7. a) Explain the significance of report writing. Also, mention the different steps involved in report writing. **6**
  - b) Explain the Technical Report in detail. **6**
  - 8. a) Find the mean, geometric mean, harmonic mean and median of the following data : 8, 15, 20. **6**
  - b) What are the different types of reports ? Explain Popular Report in detail. **5**
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**M.E. (Computer Science & Engg.) (Semester – I) Examination, 2016  
(CBCS/CGPA)  
Elective – I : MOBILE COMPUTING (Paper – V)**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

1. Solve **any two** : 12
  - a) Explain basic spread spectrum technique.
  - b) What are advantages and disadvantages of cellular systems with small cells ?
  - c) Draw functional architecture of GSM system and explain radio subsystem.
2. Solve **any two** : 12
  - a) Explain DAMA scheme in wireless medium access.
  - b) Explain GSM handover in detail.
  - c) Draw and explain GPRS architecture reference model.
3. Explain MACA with polling and ISMA. 6

OR

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

4. What is multipath propagation ? Discuss its effects. 5

SECTION – II

5. Solve **any two** : 12
  - a) Explain 802.11b architecture with respect to networking of Bluetooth devices.
  - b) Write a note on WML script.



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

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

a) Explain agent discovery phase in detail.

b) Explain infrastructure based and ad-hoc wireless networks.

c) Explain Mobile TCP.

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

OR

Draw and explain Symbian OS architecture.

8. Explain wireless datagram protocol of WAP. **5**

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**M.E. (CSE) (Semester – II) (CBCS/CGPA) Examination, 2016  
INTERNET ROUTING ALGORITHM (New) (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**Instructions :** 1) *Wherever required draw neat diagrams.*  
2) *If not given assume appropriate essential basic data.*

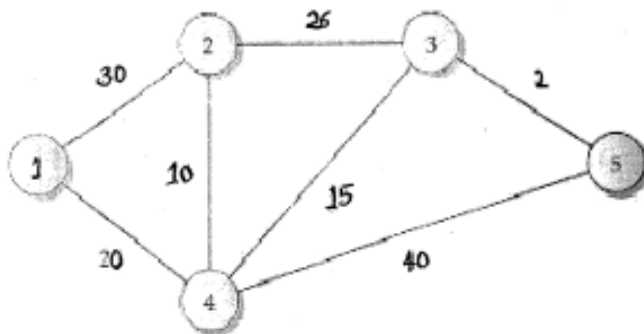
SECTION – I

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

- a) What is a Link State Advertisement ? Why are different types of LSAs defined in OSPF ?
- b) What is CIDR ? Consider IP address 10.21.5.90 that is given to be part of a/17 address block. Determine IP prefix it belongs to in the CIDR notation.
- c) What is the difference between Bellman Ford Algorithm and Distance Vector Algorithm ?

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

- a) Explain K-shortest path algorithm with example.
- 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).



P.T.O.



c) Draw the functional view of router architecture and state three functions of the router.

- III. a) What are the different states in the BGP finite state machine ? **10**  
b) List the main differences between RIPv1 and RIPv2. **5**

### SECTION – II

- IV. Write answer to **any two** questions : **(2×5=10)**  
a) What is Policy Based Routing ? State its three phases.  
b) What is the relation between an AS and an ISP ?  
c) What is packet processing ? Explain fast path versus slow path.

- V. Write answer to **any two** questions : **(2×5=10)**  
a) Explain hierarchical tries solution for packet classification.  
b) What are the basic requirements of Longest Prefix matching algorithm ?  
c) With diagram explain shared forwarding engine architecture of router.

- VI. a) Explain the grid of tries type of two-dimensional packet classification algorithm and state its advantages. **10**  
b) Explain Packet Forwarding in routers. **5**
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**M.E. (CSE) (Semester – II) (New) (CBCS/CGPA) Examination, 2016  
ADVANCED DATABASE CONCEPTS (Paper – VII)**

Day and Date : Monday, 16-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions :** 1) Question No. 4 from Section – I and Question No. 8 from Section – II are **compulsory**.  
2) Attempt **any two** remaining questions from **each** Section.  
3) Figures to the **right** indicate **full** marks.

SECTION – I

1. A) Explain levels of the distribution transparency for database update applications. **6**  
B) Explain Query translation in distributed database systems. **6**
2. A) Explain concurrency control based on locking in distributed transactions. **6**  
B) Explain with examples the problems in designing a reliable distributed database systems. **6**
3. A) Explain the Fragment-and-Replicate join technique in parallel join operation. **6**  
B) Explain the data partitioning techniques in I/O parallelism. Compare these techniques to support three types data access at different level of efficiency. **6**
4. A) Explain the framework for distributed database design. **6**  
B) Explain the goals of transaction management. **5**

SECTION – II

5. A) Explain object identifier and reference types in structured data types. **6**  
B) What are the features of Object-Relational database ? Explain how to implement Object-Relational database system. **6**

P.T.O.



- 6. A) What are the characteristics of MDBMS ? Explain the difficulties involved in the design of multimedia database. **6**
  - B) Explain the Indexing mechanism in multimedia database. **6**
  - 7. A) Explain the types of spatial data and queries. **6**
  - B) Explain spatial data indexing using grid files. **6**
  - 8. Write short note on : **11**
    - A) Temporal Database
    - B) OQL
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Seat No.	
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**M.E. (Computer Sci. and Engg.) (Semester – II) (New – CBCS/CGPA)  
Examination, 2016  
PARALLEL COMPUTER ARCHITECTURE (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
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** data if necessary.

SECTION – I

1. Attempt **any three** of the following : **(5×3=15)**
- a) Describe the principle of operation of pipelined processors.
  - b) Illustrate the concept of data dependencies in straight-line code.
  - c) Draw the structure and pipelined operation of the FX unit of the IBM Power1 (RS/6000).
  - d) Explain in short design space of superscalar instruction issue.
2. Explain in detail design aspects and design choices concerning the handling of issue blockages.
- Draw a diagram of
- A) An issue order of instructions. (A 4-issue in-order superscalar processor is assumed).
  - B) Contrasting aligned and unaligned issue of instructions. (A 4-tissue in-order superscalar processor is assumed). **10**
3. With the help of diagram, compare the decode and issue tasks of a scalar and a superscalar processor. What is predecoding ? Explain the principle of predecoding. **10**



SECTION – II

4. Attempt **any three** of the following : **(5×3=15)**
- a) What are the ISA concepts to implement checking for specified conditions ?
  - b) What are the three aspects which give to the basic approaches in branch handling ?
  - c) What are the four different kinds of annulment can be introduced for conditional branches ?
  - d) Explain features of IBM power4.
5. Explain the main features of R10000. Draw a diagram of core part of the microarchitecture of the R10000. **10**
6. State the main features of the PowerPC 620. Draw the Layout of the pipelines of the PowerPC 620. Explain it in detail. **10**
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**M.E. (CSE) (New) (Semester – II) Examination, 2016  
(CBCS/CGPA)  
Elective – II : GRID COMPUTING (Paper – IX)**

Day and Date : Friday, 20-5-2016

Max. 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**.  
3) **Wherever** required, **draw** diagrams and **assume** data.

SECTION – I

- I. Write answer to **any five** questions : **(5×5=25)**
- A) Compare Cloud Computing and Grid Computing environments.
  - B) What are the real and specific problems that underlie the Grid concept ?
  - C) Write a short note on Globus Toolkit.
  - D) What is the World Wide LHC Computing Grid ? What are its tiers and middlewares ?
  - E) Write a short note on relationship of Grid computing with World Wide Web technologies.
  - F) List and shortly describe abstracted services that collectively address the diverse requirements of e-Business and e-Science applications.
  - G) Briefly describe three-layered architecture (viewed as service) of computing infrastructure for e-Science.
- II. Write answer to **any one** question : **10**
- A) List and briefly describe the research challenges that needed to be addressed to make the Semantic Grid a reality.
  - B) Write a note on Open Grid Services Architecture (OGSA).



## SECTION – II

III. Write answer to **any five** questions :

**(5×5=25)**

- A) Briefly explain “Order by input” and “Order by output” methods of image stretching (resampling) that can be used for image computing in Virtual Sky Grid computing application.
- B) Write a short note on votable standard for database computing in Virtual Sky Grid computing application.
- C) Write a short note on topology of the Encyclopedia of Life (EOL) system.
- D) What are the challenges of the Grid from the perspective of bioinformatics researchers ?
- E) Write a short note on usage of XML wrapper facilitating interaction between two typical chemistry calculation programs.
- F) Write a note on Agent and Web services view of Grid word which encompasses most of the functionality needed for Comb-e-Chem project.
- G) Write a short note on applications of Garuda Grid.

IV. Write answer to **any one** question :

**10**

- A) What is a Garuda Grid computing system ? Describe its architecture with core components.
  - B) Explain the schematic of three layered next generation portal architecture adopted by SDSC for new biology application of Grid computing.
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**M.E. (CSE) (Semester – II) (New) (CBCS/CGPA) Examination, 2016  
Elective – II : REAL TIME OPERATING SYSTEM (Paper – IX)**

Day and Date : Friday, 20-5-2016

Max. Marks : 70

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

- Instructions :** 1) Figures to **right** indicate **full** marks.  
2) Q. 1 from Section – I and Q. 5 from Section – II are **compulsory**.  
3) Attempt **any two** from Q. 2 to Q. 4 for Section – I and **any two** from Q. 6 to Q. 8 for Section – II.

SECTION – I

1. Describe recursion, dynamic allocation and abstract data typing language features. 7
2. A) Explain the spiral software model in detail. 7  
B) Describe statecharts in detail. Give and draw navigation subsystem using statecharts. 7
3. A) Explain interrupt driven system by describing context switching Round-Robin systems and preemptive priority systems. 7  
B) Explain semaphores by describing mailboxes and semaphores problems with semaphores and test and set instructions. 7
4. A) Describe deadlock and deadlock avoidance with respect to inter-task communication. 7  
B) Describe overlays and demand paging of dynamic allocations. 7

SECTION – II

5. Describe interrupt latency in detail. 7
  6. A) Explain the concept of reducing response times and time-loading. 7  
B) Describe continuous real-valued function and discrete real-valued function. 7
  7. A) Describe Little's law and Erlang's formula. 7  
B) Write a note on – Fault Tolerance. 7
  8. A) Describe different methodology or strategies for performing system integration. 7  
B) Write a note on – Real time Databases. 7
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Seat No.	
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**M.E. (Computer Science and Engineering) (Semester – II)  
(New CBCS – CGPA) Examination, 2016  
Elective – II : NATURAL LANGUAGE PROCESSING (Paper – IX)**

Day and Date : Friday, 20-5-2016  
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 **where** necessary.

SECTION – I

1. Answer briefly : 15
- a) Mention the steps in creating a Paradigm table.
  - b) How is a Karaka Chart Drawn ?
  - c) What are Parsargs ? Give examples.
  - d) Illustrate Case grammars.
  - e) Generate a Word form table.
2. Attempt **any two** : 10
- a) What are Karaka relations ? Explain the concerned structures.
  - b) Illustrate the working of a Augmented Transition Network.
  - c) Give the steps involved in morphological analysis using a sorted reverse suffix table.
3. Attempt **any two** : 10
- a) What are the phases involved in the analysis of sentences ? Give illustrations of each.
  - b) Illustrate the formation of Kriya-Rupa charts.
  - c) Illustrate DCG formalism.



## SECTION – II

4. Answer briefly : 15
- a) What are the problems with respect to machine translation ?
  - b) Illustrate the use of TAM labels.
  - c) Compare TAG and TSG.
  - d) Give the language bridges in Hindi.
  - e) List the components of the Anusaraka System.
5. Attempt **any two** : 10
- a) Illustrate the formation of Kriya Rupa charts.
  - b) Define the term locality and illustrate.
  - c) Compare GB with PG.
6. Attempt **any two** : 10
- a) State and explain the basic properties of LFG.
  - b) Compare GB with LFG. Under what situations are each of them used ?
  - c) Explain the structure of Anusaraka system with a neat diagram.
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**M.E. (CSE) (Semester – II) (New-CBCS/CGPA) Examination, 2016  
(Elective – II) INFRASTRUCTURE MANAGEMENT (Paper – IX)**

Day and Date : Friday, 20-5-2016  
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) *Figures to the right indicate full marks.*

SECTION – I

1. Attempt **any four** : **(4×6 = 24)**
- a) Explain different infrastructure management activities.
  - b) Explain the importance of system management for enterprises.
  - c) Explain information technology infrastructure library.
  - d) Explain availability management in detail.
  - e) What are the IT infrastructure design factors ? Explain design factors and considerations.
  - f) Explain the tools and their integration for infrastructure management.
2. Explain in detail patterns for IT Management. **6**
3. Write short note on :
- Financial management and costing. **5**



SECTION – II

4. Attempt **any four** : **(4×6 = 24)**
- a) Explain configuration management in detail.
  - b) What do you mean by identity management ? Explain basics of network security.
  - c) Explain the regularity issues in infrastructure management.
  - d) Explain technology change management in infrastructure sectors.
  - e) Explain release management in detail.
  - f) What is SAN and NAS ? Explain in detail SAN and NAS.
5. What are the different environmental policies ? Explain them in detail. **6**
6. Write short note on : **5**
- i) Service desk
  - ii) Disaster recovery.
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**M.E. (Computer Science and Engineering) (Semester – II) (CBCS/CGPA)  
(New) Examination, 2016  
Elective – III : WEB TECHNOLOGY (Paper – X)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

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

SECTION – I

1. Explain the basic process of event-driven computation in creating JavaScript. 7
2. Define an XML schema. Show how an XML scheme can be created. 7
3. Explain Apache Web Server and its components. 7
4. Explain on-line payment process with suitable diagram. 7
5. List and explain the differences between HTML and XHTML with respect to elements. 7
6. What is IIS ? State its purpose. 7

SECTION – II

7. Describe various steps that are needed for accessing a database from a JSP page. 7
  8. Explain the methods of error handling and debugging routines of JSP applications development environment. 7
  9. What is session and how client state is maintained using session ? Explain session tracking and management. 7
  10. Explain types of vulnerabilities in Web Security with suitable example. 7
  11. Explain difference between web 2.0 and web 3.0 with examples. 7
  12. Explain Mashups and Widgets. 7
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**M.E. (CSE) (Semester – II) (New – CBCS/CGPA) Examination, 2016  
Elective – III : BUSINESS INTELLIGENT SYSTEM (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. Write answer to **any four** questions : **(4×5=20)**
  - 1) List and describe the components of BI.
  - 2) What are some of the major response activities that organizations take ?
  - 3) What are basic task in strategic planning process ?
  - 4) What is text mining ? How does it differ from data mining ?
  - 5) What are some of popular application areas of text mining ?
2. Write answer to **any one** question. **10**
  - 1) What does six sigma refers to ?
  - 2) What are some of benefits and challenges of NLP ?
3. Define and explain BI. **5**

SECTION – II

4. Write answer to **any four** questions. **(4×5=20)**
    - 1) What are the major types of BI implementation influencing factors ?
    - 2) What are some of the critical success factors in BI projects ?
    - 3) What is on-demand BI ?
    - 4) What are the limitations of on demand systems ?
    - 5) Describe the global nature of social networks.
  5. Write answer to **any one** question. **10**
    - 1) What is RFID ?
    - 2) Define reality mining.
  6. Describe mobile social networking. **5**
-



Seat No.	
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**M.E. (Computer Science and Engineering) (Semester – II)  
(New – CBCS/CGPA) Examination, 2016  
OBJECT ORIENTED SOFTWARE ENGINEERING AND DESIGN  
PATTERNS (Paper – X) (Elective – III)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Question No. 1 and 5 are **compulsory**.  
2) Answer **any two** questions in **each** Section.  
3) **Make** suitable assumptions **if necessary** and state them **clearly**.

SECTION – I

1. Answer briefly : 15
  - a) Explain the need of common language.
  - b) Write a short note on analysis workflow.
  - c) Explain software architecture in the context of the overall software life cycle.
2. a) Explain the life cycle of domain object. 5  
b) Write a short note on building blocks of model driven design. 5
3. a) Explain design classes in detail. 5  
b) Draw the use case diagram for saving account banking process. 5
4. Write a short note on architectural styles (**any two**) : 10
  - a) Data abstraction and object orientation
  - b) Pipes and Filters
  - c) Client Server architecture.



SECTION – II

5. Answer briefly : **15**
- a) Explain Module architecture view with example.
  - b) Explain Customer Relationship Management (CRM) Archetype Pattern.
  - c) Compare product and quantity archetype patterns.
6. a) Write a short note on IS2000 : The Advanced Imaging Solution. **5**
- b) What is global analysis ? **5**
7. a) Explain model driven architecture with archetype patterns. **5**
- b) Write a short note on Archetypes and Archetype patterns. **5**
8. Explain creational patterns and access control patterns in detail. **10**
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**M.E. (Computer Science and Engineering) (Semester – II) (New)  
(CBCS/CGPA) Examination, 2016  
WIRELESS AD-HOC NETWORK (Elective – III) (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) Q. No. (4) and Q. No. (8) are **compulsory**.  
2) Attempt **any two** from remaining questions in **each** Section.  
3) **Assume** suitable data **if needed**.  
4) Figures to the **right** indicate **full** marks.

SECTION – I

1. A) List characteristics of the wireless channel. Explain in detail path loss. **6**  
B) What is electromagnetic spectrum ? High frequency X-rays and gamma rays are not normally used for wireless communication. Explain why ? **6**
2. A) Explain in detail AODV protocol. **6**  
B) Draw schematic diagram of ad-hoc wireless internet and discuss its major issues. **6**
3. A) Explain Optimization incorporated in Basic DSR. What are its advantages ? **6**  
B) Describe in detail common method used in alleviation the hidden terminal problem at the MAC layer. **6**
4. A) Discuss various classification criteria for routing protocols in ad-hoc WANs. **6**  
B) Explain heterogeneity in mobile devices. **5**



## SECTION – II

5. A) Explain an architecture reference model for Multicast Routing Protocol. **6**  
B) Explain TCP over Ad-Hoc wireless networks. **6**
6. A) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **6**  
B) Explain in details Dynamic Core-Based Multicast Routing Protocol (Mesh based). **6**
7. A) Explain key management for Cryptography algorithms in ad-hoc wireless networks. **6**  
B) List and explain various network layer attacks in Ad-hoc WANs. **6**
8. A) Explain the design goals of a TCP for ad-hoc wireless networks. **5**  
B) What are the issues in designing a Routing Protocol ad-hoc wireless networks ? Explain in detail. **6**
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**M.E. (CSE) (Semester – III) Examination, 2016  
SELF LEARNING SUBJECT – BIGDATA (Paper – I)**

Day and Date : Wednesday, 25-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**SECTION – I**

1. Answer **any four** : **24**
  - a) Define Bigdata with its characteristics and applications.
  - b) What is Bigdata technology stack ? Explain its Layer 1 and 2 in detail.
  - c) What is Virtualization ? Illustrate its importance in Bigdata.
  - d) Brief out a graph model for map-reduce problems.
  - e) How Pig and Piglatin is usable by non-developers ? Elaborate.
2. Answer the following : **6**

What is non-relational database and key-value pair databases ? Elaborate their characteristics.
3. Answer the following : **5**

Differentiate structured and unstructured datatypes with proper examples.

**SECTION – II**

4. Answer **any four** : **24**
    - a) Elaborate relational algebra operations using map-reduce.
    - b) Brief out wall clocktime and multiway joins in communication cost model.
    - c) What is streaming data ? Explain it with public policy impact.
    - d) How next best action is determined using bigdata analytics ? Elaborate.
    - e) What is alignment methodology framework ? Explain analysis part in it.
  5. Answer the following : **6**

Illustrate Bigdata as a business planning tool.
  6. Answer the following : **5**

What are the ethical decision points ? Explain.
-



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**M.E. (CSE) (Semester – III) Examination, 2016**  
**Self-Learning Subject : COMPUTER NETWORK ADMINISTRATION**  
**(Paper – I)**

Day and Date : Wednesday, 25-5-2016

Max. Marks : 70

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

- N.B. :**
- 1) *Q.No.1 from Section – I and Q. No. 5 from Section – II are compulsory.*
  - 2) *Attempt any two questions from Q. No.2 to Q.No. 4 for Section – I and any two questions from Q. No. 6 to Q. No. 8 for Section – II.*
  - 3) *Figures to right indicate full marks.*

SECTION – I

1. Describe and explain network management functional flow-chart. 7
2. A) Draw a diagram of OSI communication architecture and explain. 7  
B) Write a note on-Network management system platforms. 7
3. A) List and explain Network management standards. 7  
B) What is ASN.1 ? Explain macros of ASN.1. 7
4. A) Describe two-tier and three-tier organisational model of SNMP with diagram. 7  
B) Describe the structure and Macros for managed objects. 7

SECTION – II

5. Explain RMON 2 in detail. 7
6. A) Compare between SNMPv1, SNMPv2 and SNMPv3. 7  
B) Draw and explain functional model of SNMP v1 network management. 7

P.T.O.



- 7. A) Write a note on-ATM Remote monitoring. 7
  - B) Draw a diagram of RMON 1 groups and functions. Explain it in detail. 7
  - 8. A) Write a note on - Network statistics measurement systems. 7
  - B) What are different Network management tools ? Explain any one tool with example. 7
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**SLR-PL – 70**

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**M.E. (Electronics and Telecommunication Engineering) (Semester – I)  
Examination, 2016  
(New CBCS)  
RESEARCH METHODOLOGY (Paper – I)**

Day and Date : Monday, 9-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

***N. B. : All questions are compulsory.***

**SECTION – I**

1. Solve **any two** : **(5×2=10)**
  - a) What are the principles used in modeling ?
  - b) What is research proposal ? What it includes ?
  - c) State purpose of research and enlist broad objectives of research.
  
2. Solve **any one** : **(7×1=7)**
  - a) Explain Monte Carlo method with example.
  - b) With the help of Block diagram explain Research process.
  
3. Solve **any three** : **(6×3=18)**
  - a) State difference between :
    - i) Qualitative and Quantitative Research
    - ii) Applied research and fundamental research.
  - b) What are the objectives of literature review ?
  - c) What are the ways of collection of data ?
  - d) Explain full corporate model with block diagram.

**P.T.O.**



SECTION – II

4. Solve **any two** : **(2×5=10)**
- 1) Describe the basic principles of Experimental Designs. Mention basic types of errors.
  - 2) Describe in brief the layout of research report.
  - 3) What is role of probability and statistics in simulation ?
5. Attempt **any one** : **(1×7=7)**
- 1) Give comment on ethical issues in research.
  - 2) Define the term 'Experiment'. Differentiate between Research Design and Experimental Design.
6. Write a short note on **any three** : **(3×6=18)**
- 1) E-research
  - 2) IEEE Format
  - 3) Need of research report
  - 4) Virtual Lab.
-



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**M.E. (Electronics and Telecommunication Engg.) (Semester – I)**  
**Examination, 2016**  
**(New – CBCS)**

**ANTENNA THEORY AND DESIGN (Paper – II)**

Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. 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) Derive an equation for Array factor for array of two isotropic point source of equal amplitude and spacing.
  - b) Explain pattern multiplication with some examples.
  - c) Explain the characteristics of Microstrip antenna and also mention its advantages and disadvantages.
  
2. Solve **any one** question : **(7×1=07)**
  - a) Derive an array factor equation for linear array of n-isotropic point sources.
  - b) Explain the radiation mechanism of a microstrip antenna.
  
3. Attempt **any three** questions : **(6×3=18)**
  - a) Explain about various microstrip antenna configuration.
  - b) Explain different feeding mechanism of Microstrip antenna.
  - c) Define various definitions of Bandwidth.
  - d) Explain Cavity model for the analysis of Microstrip antenna.

P.T.O.



## SECTION – II

4. Solve **any two** questions : **(5×2=10)**
- a) Explain the effects of substrate parameters on Bandwidth.
  - b) List various substrate Categories and explain any two.
  - c) Explain desirable substrate characteristics for antenna fabrication.
5. Solve **any one** question : **(7×1=7)**
- a) Explain transmission line modeling for aperture coupled microstrip antenna.
  - b) Explain parallel feed, one and two dimension excitation methods for microstrip Antenna.
6. Attempt **any three** questions : **(6×3=18)**
- a) Explain series feed excitation method for microstrip antenna.
  - b) Explain about the aperture coupled microstrip antenna for broad band antennas.
  - c) Explain broad banding using stacked Elements.
  - d) Explain Linear array design with Microstrip patches using Corporate feed Arrays.
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**M.E. (Electronics and Telecommunication Engg.) (Semester – I)**  
**Examination, 2016**  
**(New – CBCS)**

**PROBABILITY AND STOCHASTIC PROCESSES (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) *All questions are compulsory.*  
2) *Figures to right indicate full mark.*  
3) *Draw neat diagram wherever required.*

SECTION – I

1. Attempt **any two** : **(6×2=12)**  
a) Define Baye's theorem and the law of total probability.  
b) State properties of CDF of random variables.  
c) Prove that  $\text{Cov}(X, Y) = E(XY) - E(X)E(Y)$ .

2. Attempt **any one** : **(7×1=7)**  
a) A discrete random variable X has the following probability distribution

Value of X, x	0	1	2	3	4	5	6	7	8
P(X = x)	a	3a	5a	7a	9a	11a	13a	15a	17a

- i) Find the value of 'a'.  
ii) Find  $P(X < 3)$ ,  $P(0 < X < 3)$ ,  $P(X \geq 3)$ .  
iii) Find the distribution function of X.
- b) Consider the following joint probability density function of X and Y
- $$F_{xy}(x, y) = \begin{cases} 9e^{-3x}e^{-3y} & x, y \geq 0 \\ 0 & \text{otherwise} \end{cases}$$
- i) Check whether this is a valid density function.  
ii) Find the probability that the random variable X is between 0 and 1.  
iii) Show that the random variables X and Y are independent of each other.

3. Attempt **any two** : **(8×2=16)**  
a) Prove the central limit theorem.  
b) Explain maximum likelihood estimation of nonrandom parameters.  
c) Define and explain marginal probability density function.

P.T.O.



## SECTION – II

4. Attempt **any two** : **(6×2=12)**
- a) State types of stochastic process.
  - b) Explain stability Markov system.
  - c) Define and discuss white noise with its properties.
5. Attempt **any one** : **(7×1=7)**
- a) Customer arrive at a one man barber shop according to a Poisson process with mean arrival time of 20 min. Customers spend an average time of 15 minutes in barber chair. If an hour is used as a unit of time then :
    - i) What is the probability that a customer need not wait for a haircut ?
    - ii) What is the expected number of customers in the barber shop and in the queue ?
    - iii) How much time can a customer expect to spend in the barber shop ?
    - iv) Find the average time that a customer spends in the queue.
  - b) Explain Chapman-Kolmogrov equation for discrete Markov chain.
6. Attempt **any two** : **(8×2=16)**
- a) State the properties of power spectral density.
  - b) 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 ?
  - c) Define autocorrelation and cross correlation function with respect to stochastic process.
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**M.E. (E and TC) (Semester – I) Examination, 2016  
(New – CBCS)  
ADVANCED NETWORK SYSTEMS (Paper – IV)**

Day and Date : Thursday, 12-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

1. Attempt **any two** : **(5×2=10)**
  - a) What is DNS ? How addresses are mapped from domain name ?
  - b) Explain IP address acquisition using state diagram for DHCP.
  - c) What is routing ? Explain RIP in detail.
  
2. Attempt **any one** : **(7×1=7)**
  - a) What is TFTP ? What are different messages used by TFTP ? Explain each.
  - b) Which errors are handled by ICMP ? Explain any two error reporting.
  
3. Write short notes on **any three** : **(6×3=18)**
  - a) Stub Network.
  - b) Mobile IP.
  - c) Resource records in DNS.
  - d) Firewall Monitoring.

SECTION – II

4. Solve **any two** : **(5×2=10)**
  - a) Explain the transport stratum functions of ITU NGN.
  - b) Explain the ATM Adaptation layer 1 process.
  - c) Compare Next-Hop Reservation Protocol with Classical Internet over IP.



5. Attempt **any one** : **(7×1=7)**

- a) Draw and explain the header format of ATM cell.
- b) Explain the Router model in Integrated Services IP.

6. Solve **any three** : **(6×3=18)**

- a) Explain the overall architecture of TISPAN NGN.
  - b) Write a note on Broadband ISDN reference model.
  - c) Explain Shared-Explicit filter reservation style in RSVP.
  - d) Explain the physical layer architecture of Gigabit ethernet.
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**M.E. (E & TC) (Semester – I) (New CBCS) Examination, 2016  
Elective – I : OPTICAL NETWORKS (Paper – V)**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Solve **any two** : **(5×2=10)**
  - a) Describe major characteristics of three generation of transport network.  
Discuss key nodes in a high capacity optical network.
  - b) Discuss in detail SONET Multiplexing Hierarchy.
  - c) Explain control plane and data plane in detail.
2. Solve **any one** : **(7×1=7)**
  - a) Differentiate between WDM and DWDM. How can DWDM achieve better media utilization ?
  - b) Explain problem detection and virtual tributaries in SONET/SDH.
3. Solve **any three** : **(6×3=18)**
  - a) What is digital multiplexing hierarchy ? How does it help in managing information traffic ? Also describe key performance properties of fiber medium.
  - b) Explain the structure of SONET frame and show that 37152 voice channels (64 Kb/s per voice channel) can be carried by an STS – 48.
  - c) Discuss OTN layered model in detail.
  - d) Discuss five methods of clock exchange.

P.T.O.



SECTION – II

4. Solve **any two** : **(5×2=10)**
- a) Explain concept of MPLS with its advantages.
  - b) Explain MPLS control and data planes.
  - c) How the protection of Optical Switched Path (OSP) is achieved in router ?
5. Solve **any one** : **(7×1=7)**
- a) Explain the process of label swapping and traffic forwarding.
  - b) Explain optical control plane with its requirements.
6. Solve **any three** : **(6×3=18)**
- a) Explain the different types of MPLS nodes.
  - b) What is domain service model and unified service model ?
  - c) What are the key terms considered in optical router ?
  - d) Explain migration to IP optical networking.
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**M.E. (Electronics and Telecommunication Engg.) (Sem. – I)**  
**Examination, 2016**  
**(New – CBCS)**  
**SPEECH AND VIDEO PROCESSING (Elective – I) (Paper – V)**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) *All questions are compulsory.*  
2) *Figures to **right** indicate **full** marks.*  
3) *Draw **neat** diagram **wherever** required.*

SECTION – I

1. Attempt **any two** : **(6×2=12)**
  - a) Explain in detail process of speech production.
  - b) Describe briefly acoustic phonetics like vowels, Diphthongs.
  - c) Explain in detail time dependant analysis of speech.
2. Attempt **any one** : **(7×1=7)**
  - a) Explain in detail pitch period estimation.
  - b) Describe briefly speech recognition techniques.
3. Attempt **any two** : **(8×2=16)**
  - a) Explain in detail basic principle of linear predictive coding.
  - b) Describe in detail adaptive noise cancellation.
  - c)

SECTION – II

4. Attempt **any two** : **(7×2=14)**
    - a) Describe briefly intra frame filtering in video processing.
    - b) Explain in detail motion estimation algorithms.
    - c) What are sampling structures for analog and digital video ?
  5. Attempt **any one** : **(7×1=7)**
    - a) Explain in detail block matching algorithm.
    - b) Explain in detail block based transform coding.
  6. Write short note on **any two** : **(7×2=14)**
    - a) Predictive coding
    - b) Waveform based coding
    - c) Geometric Image formation
    - d) Pixel based motion estimation
-



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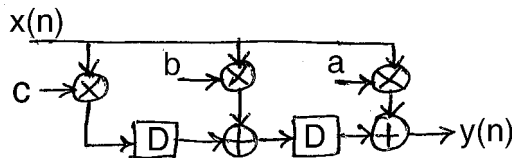
M.E. (E and TC) (Semester – I) (New-CBCS) Examination, 2016  
ADVANCED VLSI DESIGN (Paper – V) (Elective – I)

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** I) Q. 1 is compulsory.  
II) Attempt **any two** questions from Q. 2 to Q. 4.  
III) Attempt **any two** questions from Q. 5 to Q. 7.

- 1. a) Explain wavelet transform. 5
- b) Explain static and dynamic D-latch. 5
- c) Draw signal flow graph representation and data broadcast structure of FIR filter given by  $y(n) = a x(n) + b x(n - 1) + c x(n - 2)$ . 4
- 2. a) Explain the use of pipelining for reducing power consumption and increasing speed. 8
- b) For given structure,  $T_M = 10$  units and  $T_A = 2$  units. If desired clock period is 6 units draw fine grain pipelined structure of given filter. 6



- 3. a) Construct an efficient realization using Winograd algorithm for  $2 \times 3$  linear convolution with  $m(p) = p ( p - 1) ( p^2 + 1)$ . 8
- b) Explain scaling operation used for filter implementation. 6
- 4. a) Explain modified Booth recoding algorithm used for multiplication. State its advantage. 8
- b) Draw and explain two phase clock generator. 6



5. a) For given systolic array representation of carry ripple array multiplication following vectors are defined.

$$d = (0 \ 1)^T \quad p^T = (1 \ 0) \quad S^T = (0 \ 1) :$$

- i) Give the edge mapping
- ii) Draw bit serial carry ripple multiplier.

8

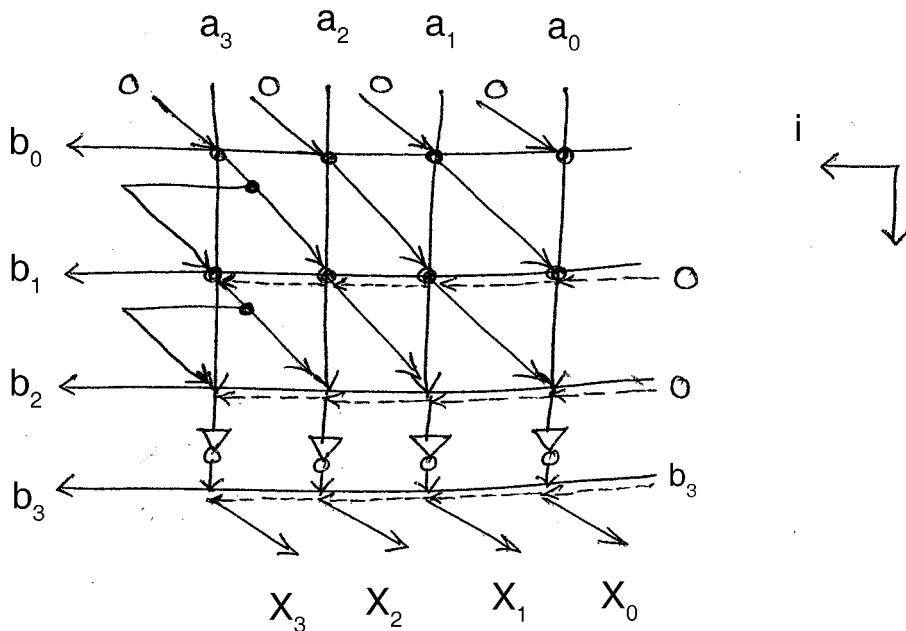


Figure Q. 5. a)

b) Explain algorithm for computing CSD format of W-bit number..

6

6. a) Give the DCVSL implementation of logic function  $f = AB + C(A + B)$ .

8

b) Write a note on clock skew. How clock distribution is done to reduce clock skew ?

6

7. a) Draw state transition diagram for a static CMOS NAND gate.

8

b) Explain switching activity.

6

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Seat No.	
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**M.E. (Electronics and Telecommunication Engg.) (Semester – I)  
Examination, 2016  
ADVANCED LIGHT WAVE COMMUNICATION (Paper – I)  
(CGPA) (Old)**

Day and Date : Monday, 9-5-2016  
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. Attempt **any one** of the following questions : **(7×1=7)**
  - a) Explain injection laser characteristics.
  - b) Discuss the operation of Silicon RAPD. Discuss the advantages and drawbacks of it.
  
2. Attempt **any two** of the following questions : **(5×2=10)**
  - a) Discuss absorption losses in optical fiber.
  - b) Discuss design considerations of digital drive circuit for an LED source.
  - c) When  $3 \times 10^{11}$  photons, each with a wavelength of  $0.85 \mu\text{m}$  are incident on a photodiode, on average  $1.2 \times 10^{11}$  electrons are collected at the terminals of the device. Determine quantum efficiency and responsivity of the photodiode at  $0.85 \mu\text{m}$  quantum effi = 0.4,  $R = 0.274 \text{ A/Watt}$ .
  
3. Write a short note on (**any three**) : **(6×3=18)**
  - a) Multimode graded index fiber
  - b) Edge emitter LED
  - c) Soliton Systems
  - d) Link power budget.



SECTION – II

4. Attempt **any one** of the following questions : **(7×1=7)**
- a) Explain WDM optical communication system in detail.
  - b) Explain design considerations for long haul high bandwidth system.
5. Attempt **any two** of the following questions : **(5×2=10)**
- a) Explain Active WDM devices.
  - b) Explain the Design consideration of receiver for LAN.
  - c) Explain working principle of LASER.
6. Write a short note on (**any three**) : **(6×3=18)**
- a) Optical LAN
  - b) Nonlinear scattering losses
  - c) EDFA
  - d) Numerical Aperture.
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**M.E. (Electronics and Telecommunication) (Semester – I)  
(Old – CGPA) Examination, 2016**

**LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES (Paper – II)**

Day and Date : Tuesday, 10-5-2016

Max. Marks : 70

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

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

**SECTION – I**

1. Attempt **any two** : **15**

a) Define a vector space. Prove the theorem “The necessary and sufficient conditions for a non-empty subset  $W$  of a vector space  $V(F)$  to be a subspace of  $V$  are

i)  $\alpha \in W, \beta \in W \Rightarrow \alpha - \beta \in W$

ii)  $a \in F, \alpha \in W \Rightarrow a\alpha \in W$

b) i) Show that the set  $\{1, x, 1 + x + x^2\}$  is a linearly independent set of vectors in vector-space of all polynomials over the real number field.

ii) Is the vector  $(3, -1, 0, -1)$  in the subspace of  $R^4$  spanned by vectors  $(2, -1, 3, 2)$ ,  $(-1, 1, 1, -3)$  and  $(1, 1, 9, -5)$  ?

c) Prove the linear span  $L(S)$  of any subset  $S$  of a vector space  $V(F)$  is a subspace of  $V$  generated by  $S$  i.e.  $L(S) = \{S\}$ .

2. Attempt **any two** : **10**

a) Describe explicitly linear transformation  $T : R^2 \rightarrow R^2$  such that  $T(2, 3) = (4, 5)$  and  $T(1, 0) = (0, 0)$ .

b) Let  $T$  be an invertible linear transformation on a vector space  $V(F)$ . Then show that  $T^{-1}T = I = T T^{-1}$ .

c) If  $A, B, C$  are linear transformation on a vector space  $V(F)$  such that  $AB = CA = I$ . Then show that  $A$  is invertible and  $A^{-1} = B = C$ .

3. Attempt **any two** : **10**

a) Define norm or length of a vector in an inner product space. In an inner product space  $V(F)$ , prove that

i)  $(a\alpha - b\beta, \gamma) = a(\alpha, \gamma) - b(\beta, \gamma)$

ii)  $(\alpha, a\beta + b\gamma) = \bar{a}(\alpha, \beta) + \bar{b}(\alpha, \gamma)$

**P.T.O.**





- b) In an inner product space  $V(F)$ , prove that
- $\|\alpha\| \geq 0$  and  $\|\alpha\| = 0$  if and only if  $\alpha$  is a zero vector.
  - $\|a\alpha\| = |a| \|\alpha\|$
- c) Define orthogonality of vectors in an inner product space. Show that any orthogonal set of non-zero vectors in an inner product space  $V$  is linearly independent.

## SECTION – II

4. Attempt **any two** : 15

- a) For a convolutional encoder, rate =  $\frac{1}{2}$ , generator sequences are  $g_1 = 111$  and  $g_2 = 101$ . If the received sequence is 11 01 01 10 01 ... using viterbi decoding algorithm find input message.
- b) Design a feedback shift register encoder for an (8, 5) cyclic code with a generator  $g(x) = 1 + x + x^2 + x^3$ . Use the encoder to find codeword for message 10101 in systematic form. Also draw syndrome calculator.
- c) The generator matrix of (6, 3) systematic block code is given by

$$G = \begin{bmatrix} 1 & 0 & 0 & 0 & 1 & 1 \\ 0 & 1 & 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 1 & 1 & 0 \end{bmatrix}. \text{ Draw encoder. Find decoding table.}$$

5. Attempt **any two** : 10

- a) Check the given polynomial  $f(x) = 1 + x + x^4$  is primitive or not.
- b) Draw the encoder for (7, 3) R-S code. Encode the three symbol message  $(\alpha^1 \alpha^3 \alpha^5)$ .
- c) Write a note on Reed Muller code.

6. Attempt **any two** : 10

- a) The primitive polynomial of  $GF(2^4)$  is  $f(x) = 1 + x + x^4$ . Find minimal polynomials of  $\alpha$  and  $\alpha^3$  for BCH code.
- b) For a convolutional encoder with generator sequences,  $g_1 = 111$  and  $g_2 = 110$   
Draw :  
  - Encoder trellis diagram
  - Decoder trellis diagram for received sequence 11 10 10 11 01 .....
- c) Compare cyclic codes and R-S codes.
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**M.E. (E and TC) (Semester – I) Examination, 2016  
(Old – CGPA)  
ADVANCED NETWORK SYSTEMS (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

1. Attempt **any two** : **10**
  - a) Which errors are handled by ICMP ? Explain any two ICMP error reports.
  - b) What is DHCP ? Draw and explain message format used by DHCP.
  - c) What is DNS ? Explain how addresses are mapped from domain names.
2. Attempt **any two** : **10**
  - a) What is role of SMTP ? Explain with neat schematic.
  - b) Explain the three basic IPV6 address types.
  - c) What is routing ? What are different methods used ? Explain RIP.
3. Write short notes on (**any three**) : **15**
  - a) FTP
  - b) MIME
  - c) NFS
  - d) Multicast routing.
4. Attempt **any two** : **10**
  - a) Draw ATM cell structure and ATM cell header format.
  - b) What is the need of AAL ? Explain SAR and CS sub layer in detail.
  - c) What are four general techniques to improve Quality of Service ?



5. Attempt **any two** : **10**
- a) With respect to Internet security explain :
    - i) Benefits of IP security
    - ii) IP security applications.
  - b) Draw physical layer architecture of Gigabit Ethernet.
  - c) What is RSVP ? Explain working with neat schematic.
6. Write short notes on (**any three**). **15**
- a) Firewall
  - b) IEEE 802.3z
  - c) Label switching
  - d) B-ISDN model.
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**M.E. (E and TC) (Semester – I) Examination, 2016  
RANDOM PROCESSES (Paper – IV) (Old – CGPA)**

Day and Date : Thursday, 12-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- Instructions:** 1) *Q. 1 is compulsory.*  
2) *Solve any four questions out of Q. 2 to Q. 6.*  
3) *Figures to right indicate full marks.*  
4) **Assume** suitable data **wherever** necessary.  
5) **Normal** probability density function table **allowed**.

1. Attempt the following :

a) A traffic control system directs car at random into one of three alternate routes leading to the same destination. For cars on route A the probability of having an accident is 0.1, for route B the probability is 0.15, while for route C it is 0.6.

i) If one half of the cars are directed into route A, one third into route B and one sixth into route C. What is the total probability of an accident ?

ii) If an accident occurs, what is the probability that it is on route B ? **5**

b) For any three events  $A_1$ ,  $A_2$  and  $A_3$  show that

$$P(A_1 \cup A_2 \cup A_3) = P(A_1) + P(A_2) + P(A_3) - P(A_1 \cap A_2) - P(A_2 \cap A_3) - P(A_1 \cap A_3) + P(A_1 \cap A_2 \cap A_3). \quad \mathbf{5}$$

c) Explain the Bernoulli Trails and derive the expression for binomial distribution. **4**

2. a) A pair of six-sided dice is rolled and the following events are defined :

$A = \{\text{rolling an odd number}\}$

$B = \{\text{rolling a number that is an integer multiple of 3}\}.$

i) Are events A and B are statistically independent ? Prove your answer.

ii) What is the probability of the event  $(A \cup B)$  ? **7**



b) The continuous random variable X has the PDF

$$f_X(x) = \begin{cases} k(2x - x^2) & 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

where k is constant.

Find the value of k and  $P(X > 1)$ .

7

3. a) The joint pdf of a bivariate random variable (X, Y) is given by

$$f_{XY}(x, y) = \begin{cases} kxy & 0 < x < 1, 0 < y < 1 \\ 0 & \text{otherwise} \end{cases}$$

where k is constant.

- i) Find the value of k.
- ii) Are X and Y independent ?
- iii) Find  $P(X + Y < 1)$ .

7

b) Let  $Y = aX + b$ .

- i) Find the covariance of X and Y.
- ii) Find the correlation coefficient of X and Y.

7

4. a) Define auto correlation function of random process. Explain the properties of auto correlation function.

7

b) A random process  $X(t)$  defined by

$$X(t) = U \cos t + V \sin t \quad -\infty < t < +\infty$$

where U and V are independent random variables, each of which assumes the values  $-2$  and  $1$  with the probabilities  $1/3$  and  $2/3$  respectively. Show that  $X(t)$  is WSS but not strict-sense stationary.

7

5. a) Let  $X(t) = A \cos(\omega_0 t + \theta)$  where A and  $\omega_0$ , are constants,  $\theta$  is a uniform r.v. over  $(-\pi, \pi)$ . Find the power spectral density of  $X(t)$ .

7

b) Suppose that whether or not rains today depends on previous weather conditions through the last three days. Show how this system may be analyzed by using a Markov chain. How many states are needed. Suppose that if it has rained for the past three days, then it will rain today with probability 0.8; if it did not rain for any of the past three days, then it will rain today with probability 0.2; and in any other case the weather today will, with probability 0.6, be the same as the weather yesterday. Determine P for this Markov chain.

7



6. a) Customers arrive at a watch repair shop according to a Poisson process at a rate of one per every 10 minutes and the service time is an exponential r.v. with mean 8 minutes.
- i) Find the average number of customers  $L$ , the average time a customer spends in the shop  $W$  and the average time a customer spends in waiting for service  $W_q$ .
  - ii) Suppose that the arrival rate of the customers increases 10%. Find the corresponding changes in  $L$ ,  $W$  and  $W_q$ . 7
- b) People arrive at a telephone booth according to a Poisson process at an average rate of 12 per hour and the average time for each call is an exponential r.v. with mean 2 minutes.
- i) What is the probability that an arriving customer will find the telephone booth occupied ?
  - ii) It is the policy of the telephone company to install additional booths if customers wait an average of 3 or more minutes for the phone. Find the average arrival rate needed to justify a second booth. 7
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**M.E. (Electronics and Telecommunication Engg.) (Sem. – I)**  
**Examination, 2016**  
**(Old-CGPA)**

**Elective – I : DIGITAL DATA COMPRESSION (Paper – V)**

Day and Date : Friday, 13-5-2016

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.*

SECTION – I

1. Attempt **any one** : 8
  - a) Write short note on performance measures.
  - b) Compare Huffman coding with arithmetic coding.
2. Attempt **any one** : 9
  - a) Explain update procedure in adaptive Huffman coding with one example.
  - b) What is entropy ? State Shanon's first theorem. State Shanon Fano algorithm.
3. Attempt **any two** : 18
  - a) Give count array for zero order, first order and second order context for a particular example in prediction with partial match algorithm of context based compression.
  - b) Explain different types of data redundancies.
  - c) State approaches of modeling. Explain probability model and composite source model.

SECTION – II

4. Attempt **any one** : 8
    - a) With reference to compression of sound, explain companding.
    - b) Explain basic algorithm of differential encoding in case of lossy compression.
  5. Attempt **any one** : 9
    - a) Explain lossless JPEG compression.
    - b) Explain Discrete Cosine transform. Explain how the image compression is achieved by coding DCT co-efficients.
  6. Attempt **any two** : 18
    - a) With the help of block diagram explain MPEG audio coding algorithm. Also explain layer I coding.
    - b) Explain sliding window compression with reference to LZ77.
    - c) Explain sub-band decomposition of an image in Wavelet based compression.
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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)  
Examination, 2016  
RF AND MICROWAVE CIRCUIT DESIGN (New-CBCS) (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
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) Explain how low noise figure is achieved in cascode amplifier.
  - c) Draw circuit diagram of single gate FET mixer and explain its operation.
  
2. Solve **any one** question : **(7×1=7)**
  - a) Derive expression for transducer power gain.
  - b) State two design approaches for single balanced mixer. Explain any one in detail.
  
3. Attempt **any three** questions : **(6×3=18)**
  - a) Explain stability analysis and limitations of amplifier.
  - b) Derive the expression for current gain in terms of S parameters for two port network.
  - c) Explain in brief types of lossless feedback amplifier.
  - d) Derive the expression for voltage gain for two port network.





## SECTION – II

4. Solve **any two** questions : **(5×2=10)**
- a) Draw oscillator design flow chart and explain in brief.
  - b) State the image parameters for T and  $\pi$  network of filter design.
  - c) Explain the properties of substrate used in MMIC.
5. Solve **any one** question : **(7×1=7)**
- a) State different methods are used for filter design. Explain any one in brief.
  - b) Explain in brief analytical approach to optimum oscillator design using S parameters.
6. Attempt **any three** questions : **(6×3=18)**
- a) Explain how impedance and frequency scaling is performed with respect to filter transformation.
  - b) What is role of Richard transformation in implementation of filter ? Explain in brief.
  - c) State different fabrication technique used for MMIC. Explain any one in detail.
  - d) Explain advantages, disadvantages and applications of MMIC.
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**M.E. (Electronics & Telecommunication Engineering) (Semester – II)**  
**Examination, 2016**  
**(New–CBCS)**  
**ADVANCED SIGNAL PROCESSING (Paper – VII)**

Day and Date : Monday, 16-5-2016

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** : **(2×6=12)**
  - a) Define adaptive systems and its applications.
  - b) Explain in detail Cramer raobound.
  - c) Explain in detail Maximum Likelihood Estimate (MLE)
  
2. Attempt **any one** : **(1×7=7)**
  - a) Describe in brief principle of adaptive filter.
  - b) Explain in detail Kalman filter algorithm.
  
3. Attempt **any two** : **(2×8=16)**
  - a) Explain in detail Levinson-Durbin algorithm with suitable example.
  - b) Describe in brief least-mean-square algorithm.
  - c) Compare the Optimum verses adaptive filter.



## SECTION – II

4. Attempt **any two** : **(2×6=12)**
- a) Explain in detail echo cancellation in communication.
  - b) Explain in detail adaptive blind equalizer.
  - c) Describe in brief Sato algorithm.
5. Attempt **any one** : **(1×7=7)**
- a) Explain in detail Noise cancellation in adaptive filter.
  - b) Explain in detail linear predictive coding.
6. Attempt **any two** : **(2×8=16)**
- a) Find the sub band decomposition and reconstruction with Haar filter for given sequence.  $x(n) = \{1, 2, 3, 4\}$ .
  - b) Explain in detail sub band coding with suitable example.
  - c) Describe in detail Interpolation and Decimation with suitable example.
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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)  
Examination, 2016  
(New – CBCS)**

**WIRELESS COMMUNICATION (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016

Total Marks : 70

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

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

SECTION – I

1. Solve **any four** : **(4×4=16)**
- 1) Explain statistical models for multipath fading channel.
  - 2) Discuss the ground reflection (two ray) model.
  - 3) Describe with neat diagram WSSUS channel modeling.
  - 4) Write a note on handover mechanism in cellular communication.
  - 5) Explain variable tree OVSA in CDMA.
2. A) Solve **any two** : **(2×6=12)**
- 1) Explain indoor propagation model in detail.
  - 2) Discuss the multiple access techniques for wireless communication.
  - 3) Write a note on Walsh codes.
- B) Explain the Rayleigh and Ricean Fading Distribution. **7**

SECTION – II

3. Solve **any four** : **(4×4=16)**
- 1) What is Diversity ? Explain any two MIMO diversities.
  - 2) Compare 3G and 4G wireless networks.
  - 3) What is UWB ? Write its features and applications.
  - 4) Explain MIMO channel capacity.
  - 5) Discuss the frequency and timing offset issues in OFDM.
4. A) Solve **any two** : **(2×6=12)**
- 1) Explain the system model for MIMO system with diagram.
  - 2) Explain UWB data modulation.
  - 3) Write a note on WCDMA and WIMAX.
- B) Discuss the principle of OFDM modulation scheme. **7**



**SLR-PL – 86**

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**M.E. (E & TC) (Semester – II) Examination, 2016  
(New – CBCS)  
CRYPTOGRAPHY AND NETWORK SECURITY (Paper – IX)**

Day and Date : Friday, 20-5-2016

Total Marks : 70

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

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

**SECTION – I**

1. Attempt **any two** : **(5×2=10)**
  - a) Explain network security model.
  - b) Discuss along with example substitution ciphers.
  - c) Explain on linear and differential cryptanalysis.
  
2. Attempt **any one** : **(7×1=7)**
  - a) Explain blowfish algorithm.
  - b) Explain DES encryption process.
  
3. Attempt **any three** : **(6×3=18)**
  - a) Explain with block diagram public key cryptosystems.
  - b) Explain D-H key exchange algorithm and its implementation.
  - c) Explain RSA algorithm.
  - d) Explain strength of DES and what is triple DES ?

**P.T.O.**



SECTION – II

4. Attempt **any two** : **(5×2=10)**
- a) Describe secure hash algorithm.
  - b) What is birthday attack ? Explain in detail.
  - c) Explain SSL architecture.
5. Attempt **any one** : **(7×1=7)**
- a) What are the requirements for message authentication ?
  - b) What are different Web Security Threats ?
6. Attempt **any three** : **(6×3=18)**
- a) Write a note on PGP.
  - b) Describe IP Security services.
  - c) Write a note on Public key distribution.
  - d) Write a note on Security of MAC.
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SLR-PL – 87

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**M.E. (Electronics and Telecommunication) (Semester – II)**  
**Examination, 2016**  
**(New-CBCS)**  
**WIRELESS SENSOR NETWORK AND OPTIMIZATION (Elective – II)**  
**(Paper – X)**

Day and Date : Monday, 23-5-2016

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) What is difference between Cellular network and Ad-hoc Wireless sensor Network ?
- 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**

b) Draw Bluetooth protocol stack and explain Personal Area Network. **8**

OR

b) What are the issues in ad-hoc Wireless Sensor Network ? **8**

P.T.O.



SECTION – II

3. Solve **any three**. **(8×3=24)**

- a) State design goals of a MAC protocol for ad-hoc wireless networks.
- b) Explain classification of MAC protocol.
- c) Explain Ad-hoc on demand distance – Vector Routing protocol.
- d) Explain ZigBee and ZigBee protocol stack.

4. a) State classification of energy management schemes. **3**

b) Explain battery scheduling techniques. **8**

OR

b) What are the issues in designing a routing protocol for ad-hoc wireless networks ? **8**

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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)**  
**(New-CBCS) Examination, 2016**  
**Elective – II : WAVELET TRANSFORM AND APPLICATIONS**  
**(Paper – X)**

Day and Date : Monday, 23-5-2016

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) Define MRA. Write about discrete time MRA.
  
2. Attempt **any two** of the following questions : **(5×2=10)**
  - a) Define CWT. State the necessary conditions.
  - b) Write about the drawback of Fourier Transform and Discrete Fourier Transform and how wavelet transform resolves it.
  - c) Explain frequency resolution and time resolution in wavelet transform.
  
3. Write a short note on **(any three)** : **(6×3=18)**
  - a) Wavelet basis functions
  - b) Criteria for wavelet selection with examples
  - c) Wavelet decomposition and reconstruction of functions in  $L^2(\mathbb{R})$
  - d) Multi-Resolution Analysis.



SECTION – II

4. Attempt **any one** of the following questions : **(7×1=7)**
- a) Explain Image fusion using wavelet transform.
  - b) Explain feature extraction in digital mammography.
5. Attempt **any two** of the following questions : **(5×2=10)**
- a) Write about Audio compression using DWT.
  - b) Discuss about transform coding.
  - c) Briefly explain the use of discrete wavelet sub-band in face recognition.
6. Write a short note on (**any three**) : **(6×3=18)**
- a) Edge detection using wavelet transform
  - b) Image compression using wavelet transform
  - c) ECG Signal Compression using Discrete Wavelet Transform
  - d) Video compression using multi-resolution technique.
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**M.E. (Electronics and Telecomm. Engg.) (Semester – II)**  
**(New-CBCS) Examination, 2016**  
**Elective – II : ADVANCED EMBEDDED SYSTEMS (Paper – X)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

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

SECTION – I

1. Attempt **any two** : **(6×2)**
  - 1) Give the features of ARM 11.
  - 2) Explain ARM 11 block diagram in detail.
  - 3) Explain processor operating states of Mp 11.
  
2. Attempt **any two** : **(6×2)**
  - 1) Explain data types supported by MP 11 CPU processor.
  - 2) Explain the concept of Pipeline stages.
  - 3) Give the details of exceptions used in MP 11 processor.
  
3. Attempt **any two** : **(6×2)**
  - 1) Explain memory organization in ARM 11.
  - 2) Explain the instruction bit pattern of MRC and MCR instructions of CP 15 registers.
  - 3) Explain c0, Main ID Register.



SECTION – II

4. Attempt **any two** : **(6×2)**
- 1) Explain the task scheduling processes.
  - 2) Explain the concept of code optimization.
  - 3) Explain the features of real time operating system.
5. Attempt **any two** : **(6×2)**
- 1) Explain software architecture of an embedded system.
  - 2) Explain kernel structure of embedded system.
  - 3) Explain features of Linux.
6. Write a short note on **any two** : **(5×2)**
- 1) Raspberry Pi Architecture.
  - 2) GPIO of Raspberry Pi.
  - 3) LCD interfacing with Raspberry Pi.
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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)**  
**Examination, 2016**  
**(Old – CGPA)**  
**RF AND MICROWAVE CIRCUIT DESIGN (Paper – VI)**

Day and Date : Saturday, 14-5-2016

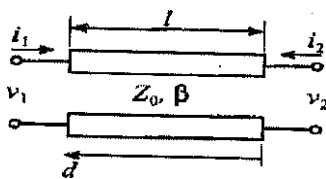
Total Marks : 70

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

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

SECTION – I

1. Solve **any two** questions : **(5×2=10)**
  - a) Define polarization of EM Wave. Briefly explain vertical and horizontal polarization.
  - b) A  $600 \Omega$  lossless transmission line is fed by a  $50 \Omega$  generator. If the line is 200 m Long and of  $500 \Omega$  determine in dBs i) Reflection loss ii) Transmission loss and iii) Return loss.
  - c) Explain planar transmission line.
  
2. Solve **any one** question : **(7×1=7)**
  - a) Derive expressions for the input impedance of short circuit transmission line. Express the input impedance of short circuit transmission line as a function of frequency.
  - b) Compute the ABCD matrix representation of following transmission line with characteristic impedance  $Z_0$ , propagation constant  $\beta$  and length  $\ell$ .



P.T.O.



3. Attempt **any three** questions : **(6×3=18)**
- a) Explain the construction and characteristics of GaAs MESFET.
  - b) A transmission line has a characteristic impedance of  $50\Omega$  and it is terminated in a load impedance of  $(50+j50)\Omega$ . The operating wavelength  $\lambda = 5$  cm. Calculate SWR. Plot the normalized load impedance and the SWR Circle on the Smith Chart.
  - c) Explain the characteristics of ideal substrate material and ideal conductor material used for the manufacturing of monolithic microwave integrated circuits.
  - d) Explain the different types of interconnecting networks.

## SECTION – II

4. Solve **any two** questions : **(5×2=10)**
- a) State and define S parameters and explain their meanings.
  - b) Discuss the term insertion loss and loss factor.
  - c) Derive expression for conversion between S parameters and Z parameters.
5. Solve **any one** question : **(7×1=7)**
- a) Describe different configuration of discrete two component L-section impedance matching networks.
  - b) Prove the Kurda's first and second identity with the help of ABCD parameters.
6. Attempt **any three** questions : **(6×3=18)**
- a) Explain about active and passive phase shifters.
  - b) Write short notes on constant VSWR circles in case of microwave amplifiers.
  - c) Explain characteristics of Schottky diode with net sketches.
  - d) Write and explain Amplifier power relations.
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Seat No.	
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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)**  
**Examination, 2016**  
**(Old CGPA)**

**WIRELESS COMMUNICATION (Paper – VII)**

Day and Date : Monday, 16-5-2016

Max. Marks : 70

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

- Instructions :** 1) Q. No. 1 is compulsory.  
2) Solve **any four** questions from Q. No. 2 to 6.  
3) Figures to **right** indicate **full** marks.  
4) **Assume** suitable data if necessary.

1. Attempt the following :
    - a) Explain Wireless Local Loop (WLL) technologies. 5
    - b) Explain diffraction and scattering in mobile radio propagation. 5
    - c) Explain the fading effect due to Doppler spread. 4
  2.
    - a) Explain impulse response model of a multipath fading channel. 7
    - b) Compare 2G, 2.5G and 3G mobile telephone standards with respect to the RF channel bandwidth, peak data rate, typical data rate, modulation type and maximum number of concurrent users. 7
  3.
    - a) Explain the necessity of indoor and outdoor propagation models. 7
    - b) For a mobile receiver operating at frequency of 860 MHz and moving at 100 Km/hr
      - i) Sketch the Doppler spectrum if a CW signal is transmitted and indicate the maximum and minimum frequencies.
      - ii) Calculate the level crossing rate and average fade duration if  $\rho = -20\text{dB}$ . 7
  4.
    - a) Explain Universal Mobile Telecommunication System (UMTS). 7
    - b) In an unslotted ALOHA system the packet arrival times form a Poisson process having a rate of  $10^3$  packets/sec. If the bit rate is 10 Mbps and there are 1000 bits/packet, find
      - i) Normalized throughput of the system
      - ii) The number of bits per packet that will maximize the throughput. 7
  5.
    - a) Determine the maximum throughput that can be achieved using ALOHA and slotted ALOHA protocols. 7
    - b) Explain Integrated Services Digital Networks (ISDN) with block schematic. 7
  6.
    - a) Explain protocols used for network access. 7
    - b) Compare AMPS and ETACS. 7
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**M.E. (Electronics and Telecommunication) (Semester – II) (Old – CGPA)  
Examination, 2016  
ADAPTIVE SIGNAL PROCESSING (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
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.*

1. Attempt **any two** : **15**
- a) Explain in detail open loop and closed loop adaptation.
  - b) Explain gradient search algorithm by steepest descent method. Draw learning curve.
  - c) Explain in detail applications of closed loop adaptation.
2. Attempt **any two** : **10**
- a) State and explain mean ergodic theorem.
  - b) Find eigen values and eigenvectors of input correlation matrix  $R = \begin{bmatrix} 2 & 1 \\ 1 & 3 \end{bmatrix}$ .
  - c) Compute the circular convolution using DFT & IDFT method  
 $x_1(n) = \{3, 4, 1, 2\}$  and  $x_2(n) = \{1, 4, 2, 4\}$
3. Attempt **any two** : **15**
- a) Define power spectral density and state properties of it.
  - b) The sequences  $y(n)$  and  $u(n)$  are related by the difference equation  
 $y(n) = u(n+a) - u(n-a)$ , where  $a$  is a constant ? Evaluate the auto correlation function of  $y(n)$  in terms of  $u(n)$ .
  - c) Evaluate the transfer function of the following two stochastic models :
    - i) Moving Average Model
    - ii) Auto regressive Moving Average Model





4. Attempt **any two** : **10**
- a) What is the minimum mean square error produced by this Wiener filter ?
  - b) Explain in detail linear optimum filtering.
  - c) Explain in detail why  $T_{\text{mse}}$  and  $\tau_{\text{mse}}$  are identical in the case of the LMS algorithm.
5. Attempt **any two** : **10**
- a) Explain block LMS algorithm. State the convergence properties of it.
  - b) Explain regularization used in RLS algorithm.
  - c) What is the ratio of adaptation time of the LMS/Newton algorithm to that of the LMS Algorithm ? When is this ratio equal to 1 ?
6. Attempt **any two** : **10**
- a) Explain application of adaptive signal processing as adaptive modeling and system identification.
  - b) Explain in detail the matrix inversion lemma.
  - c) Explain exponentially weighted recursive least squares algorithm.
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Seat No.	
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**M.E. (E and TC) (Semester – II) Examination, 2016  
(Old – CGPA)  
CRYPTOGRAPHY AND NETWORK SECURITY (Elective – II)  
(Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

1. Attempt **any two** : **12**
  - a) What is a network security attack ? Discuss types.
  - b) Explain linear and differential cryptanalysis.
  - c) Discuss in detail about playfair cipher.
  
2. Attempt **any two** : **12**
  - a) Discuss in detail on random number generation.
  - b) Discuss on rotor machines.
  - c) Discuss the implementation of RC4 algorithm.
  
3. Attempt **any two** : **12**
  - a) Draw and explain public key cryptography system for secrecy and authentication.
  - b) Explain RSA algorithm and its implementation.
  - c) Explain MAC with DAA (Data Authentication Algorithm).
  
4. Attempt **any two** : **12**
  - a) Explain in detail procedure for implementation of SHA, secure hash algorithm.
  - b) Illustrate diagrammatically basic uses of hash function to encrypt.
  - c) Perform encryption and decryption using RSA, for  $p = 11$ ,  $q = 13$ ,  $e = 11$  and  $M = 7$ .



5. Attempt **any two** : **12**
- a) What types of attacks are addressed by message authentication ?
  - b) Explain public key distribution techniques.
  - c) Explain about Message Digest Algorithm MD5.
6. Attempt **any two** : **10**
- a) Draw and explain x.509 certificate format.
  - b) Explain on firewall types, characteristics and limitations.
  - c) Discuss PGP services in detail.
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**M.E. (Electronics and Telecommunication) (Semester – II)  
Examination, 2016  
(Old CGPA)  
Paper – X : MOBILE COMPUTING (Elective – III)**

Day and Date : Monday, 23-5-2016

Max.Marks : 70

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

***N.B. : All questions are compulsory.***

SECTION – I

1. Solve **any three** : **(8×3=24)**
- a) Explain hidden node problem in wireless MAC protocol.
  - b) Show position of the MAC protocol within a simplified protocol stack and explain it.
  - c) Compare FDMA, TDMA and CDMA.
  - d) Explain snooping protocol.
2. a) What is hybrid protocol ? **3**
- b) With figure explain Columbia Mobile IP proposal. **8**
- OR
- b) Explain route discovery, flooding and route maintenance in on demand distance vector routing protocol. **8**

SECTION – II

3. Solve **any three** : **(8×3=24)**
- a) What are different QOS parameters in wireless network ?
  - b) What are different security protocols ? Explain SSL.
  - c) Explain security models.
  - d) Explain RSA algorithm with the help of one example.
4. a) What is mobile middleware ? **3**
- b) Explain applications for Symbian. **8**
- OR
- b) Explain Symbian application framework and components of a Symbian applications. **8**
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**M.E. (Electronics and Telecommunication Engg.) (Semester – II)  
Examination, 2016  
(Old CGPA )  
Elective – III : COMMUNICATION SYSTEM DESIGN (Paper – X)**

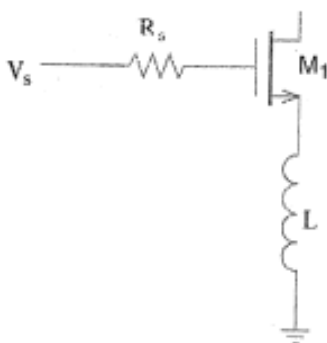
Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

**Instructions :** 1) *Q. 1 is compulsory.*

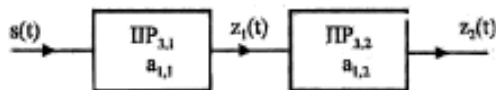
- 2) Solve **any four** questions from Q. 2 to Q. 6.
- 3) Figures to the **right** indicate **full** marks.
- 4) Assume suitable data if necessary.

- 1. a) Explain the working of the FSK transmitter. 5
- b) Explain the generalized topology and the lumped parameter representation of a Low Noise Amplifier. 5
- c) Explain the concept of impedance matching for the following LNA. 4





2. a) Write a note on third order intercept point. 7
- b) Two non-linear stages are cascaded as shown below. Derive an expression for the third order intercept point of the cascaded system 7



3. a) Draw the circuit diagram of a wideband LNA. Explain the dc bias provided. 7
- b) Prove that the noise figure of a narrowband amplifier is  $F = 1 + \frac{2}{3} \left( \frac{L_2}{L_1} \right)$ . 7
4. a) With the help of a neat circuit diagram, explain the working of a unbalanced mixer. What are its drawbacks ? 7
- b) Explain the operation of a Gilbert Mixer circuit. 7
5. a) Derive an expression for the signal transfer function and the noise transfer function of a sigma delta modulator. 7
- b) Derive an expression for the transfer function of a switched capacitor integrator. 7
6. a) Explain the Hybrid method of baseband detection of QPSK signal . What are the advantages of the Hybrid method ? 7
- b) For a Gilbert Mixer derive an expression for third order Intermodulation distortion. 7

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**SLR-PL – 100A**

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**M.E. (Electronics and Telecommunication Engineering) (Semester – III)  
Examination, 2016  
Self-Learning Subject  
MODELING AND SIMULATION OF COMMUNICATION SYSTEM (Paper – I)**

Day and Date : Wednesday, 25-5-2016  
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**

1. Solve **any two** questions : **(5×2=10)**
  - a) What is performance estimation ?
  - b) Explain multi-disciplinary aspects of simulation.
  - c) Explain errors in system and device modeling.
  
2. Solve **any one** question : **(7×1=7)**
  - a) Explain Key steps in the design flow and role of simulation in communication system engineering.
  - b) Explain link budget and system level specification process in the design of communication system.
  
3. Attempt **any three** questions : **(6×3=18)**
  - a) Explain the process for simulation sampling frequency.
  - b) Write a note on floating point arithmetic format.
  - c) Explain the classification of system properties for performance evaluation techniques.
  - d) Write sources of error in simulation.

**P.T.O.**



SECTION – II

4. Solve **any two** questions : **(5×2=10)**
- a) Explain Seed numbers and vectors.
  - b) Explain minimum standard algorithm.
  - c) Derive equation for correlation coefficient relating to X and Z.
5. Solve **any one** question : **(7×1=7)**
- a) Explain Multiplicative Algorithm with Prime and non-prime modules.
  - b) Explain Hilbert Transform and write its properties.
6. Attempt **any three** questions : **(6×3=18)**
- a) Explain how Monte Carlo technique is used to estimate the value of pie.
  - b) Write a note on Monte Carlo integration.
  - c) Explain block diagram representation of systems.
  - d) Write a note on rejection technique for generating random variables.
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**M.E. (Mechanical) (Semester – I) Examination, 2016**  
**(CBCS – CGPA)**  
**COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING (Paper – I)**

Day and Date : Monday, 9-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- 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) A closed system undergoes frictionless process according to law  $P = \left[ \frac{4.5}{V} + 2 \right]$  where pressure  $P$  is in  $\text{N/m}^2$ , volume  $V$  is  $\text{m}^3/\text{kg}$ . During this process volume changes from  $0.04 \text{ m}^3/\text{kg}$  to  $0.12 \text{ m}^3/\text{kg}$  with change in internal energy  $\Delta U = 94.43 \text{ J/kg}$ . Find the heat transfer per kg using Simpson's  $\frac{3}{8}$  rule. Take  $h = 0.013 \text{ m}^3/\text{kg}$ . According to first law of thermodynamics, heat transfer  $Q = \Delta U + W$  and work done  $W = \int_{V_1}^{V_2} p dv$ . **10**
- b) A rod is rotating in a plane. The following table gives the angle  $\theta$  (radian) through which the rod has turned for various values of time  $t$  (sec.). Calculate the angular velocity and angular acceleration of the rod at  $t = 0.6$  seconds. **8**
- |            |   |      |      |      |      |      |
|------------|---|------|------|------|------|------|
| $t$ :      | 0 | 0.2  | 0.4  | 0.6  | 0.8  | 1.0  |
| $\theta$ : | 0 | 0.12 | 0.49 | 1.12 | 2.02 | 3.20 |
2. a) Fit a curve  $T = at^2 + bt + c$  where  $T = \text{temp. in } ^\circ\text{C}$  and  $t = \text{time in sec.}$  for the given data. **8**
- |       |   |   |   |    |
|-------|---|---|---|----|
| $t$ : | 0 | 1 | 2 | 3  |
| $T$ : | 0 | 5 | 8 | 14 |



- b) Current in a circuit are given by the following equations. 9

$$28I_1 - 3I_2 = 10$$

$$-3I_1 + 28I_2 - 5I_5 = 0$$

$$-10I_2 + 25I_3 - 15I_4 = 0$$

$$-15I_3 + 45I_4 = 0$$

$$-5I_2 + 30I_5 = 0$$

Estimate the current using Gauss elimination method.

3. a) Using cubic spline interpolation, find the value of y at x = 3.5. For the function

$$f(x) = x^2. \text{ For } \sum_{i=1}^4 x(i) \quad 9$$

$$x \quad : \quad 1 \quad 2 \quad 3 \quad 4$$

$$y = f(x) = x^2 \quad : \quad 1 \quad 4 \quad 9 \quad 16$$

- b) By the method of factorization solve following equations. 8

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

#### SECTION – II

4. a) The rate of emission of a radioactive substance is proportional to the amount N of the substance remaining at any instant 't', governed by the equation

$$\frac{dN}{dt} = -kN \text{ where } -ve \text{ sign indicates that radioactivity decreases with time.}$$

Taking k = 0.01 and at t = 0, N = 100 gm find how much material remains when t = 100 sec. Use Runge- Kutta 4<sup>th</sup> order method with h = 50. 10

- b) Explain Rayleigh – Ritz method. 8

5. a) Given  $\frac{\partial^2 f}{\partial x^2} = \frac{\partial f}{\partial t}$ ,  $f(0, t) = f(5, t) = 0$ ,  $f(x, 0) = x^2 [z5 - x^2]$  find f using Schmidt method for parabolic equation in the range taking h = 1 and upto 5 seconds. 7

- b) Explain use of mathematical modelling in the field of engineering. 6

- c) What are types of 1D and 2D element ? 4

6. a) Explain standard five point formula and digonal five point formula with schematic diagram. 6

- b) Derive an equation for Milne's predictor and corrector formula. 8

- c) What is difference between Euler's method and modified Euler's method. 3



SLR-PL – 123

Seat No.	
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**M.E. Mechanical Engineering (Semester – I) Examination, 2016  
(CBCS/CGPA) (Paper – II)  
INDUSTRIAL INSTRUMENTATION**

Day and Date : Tuesday, 10-5-2016

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 :
  - i) Accuracy
  - ii) Precision
  - iii) Linearity
  - iv) Drift
  - v) Hysteresis
  - vi) Resolution. **6**
2. a) Derive an expression for output response of second order system to a step input. **6**  
b) Define the following :
  - i) Threshold
  - ii) Dead Zone
  - iii) Fidelity
  - iv) Static Sensitivity
  - v) Range and Span. **5**
3. a) Explain photo-emissive, photo-conductive and photo-voltaic transducer. **6**  
b) Explain inverting, non-inverting and summing operational amplifiers. **5**

P.T.O.



4. Write short notes on (**any three 4×3**) : **12**
- i) Hydraulic load cell
  - ii) Prony brake dynamometer
  - iii) D-A converter
  - iv) Capacitive type transducer.

SECTION – II

5. a) Explain law of intermediate temperatures and law of intermediate metals. **6**
- b) Explain sliding vane type meter. **6**
6. a) Explain Bimetallic thermometers. **6**
- b) Explain different sound measurement conditions. **5**
7. a) Explain system analysis by harmonic testing. **6**
- b) Explain Particle counters. **5**
8. Write short notes on (**any three 4×3**) : **12**
- i) McLeod Gauge
  - ii) Thermistors
  - iii) Electromagnetic flow meter
  - iv) Electrodynamic type microphone.
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Seat No.	
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**M.E. (Mechanical) (Semester – I) (CBCS/CGPA) Examination, 2016  
SOLID MECHANICS (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- 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) What are 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 is solved by the stress function  $\phi = -\frac{F}{d^3}xy^2[3d - 2y]$  applied to the region included by  $y = 0$  to  $y = d$  and  $x = 0$  to  $x = l$ . 11
3. Derive the equation of compatibility 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) Relation between  $E$ ,  $\mu$  and  $G$
  - ii) Airy's stress function
  - iii) Soap film analogy.



## SECTION – II

5. a) Define shear centre and explain the principles used in finding the shear centre. 4  
 b) Find the shear centre for a thin channel as shown in Fig. 1. 8

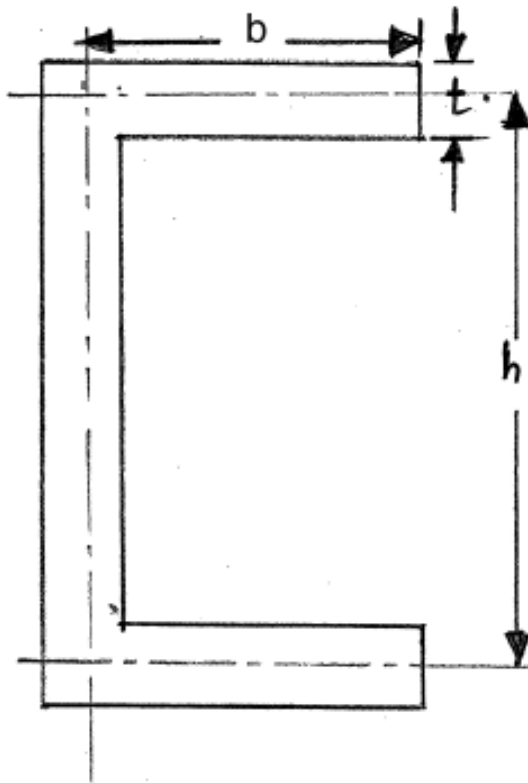


Fig.1

6. a) Explain membrane stresses with suitable examples. 5  
 b) Find the membrane stresses in partially filled storage tank. 6
7. a) State and explain basic assumptions made in theory of contact stresses. 3  
 b) Derive expression for area of contact and pressure distribution in case of contact between two spheres. 8
8. Write a note on **any two** of the following : 12  
 i) Shell of uniform strength  
 ii) Torsion of hollow shaft  
 iii) Contact stresses in ball bearing.



SLR-PL – 125

Seat No.	
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**M.E. (Mechanical Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY  
(Paper – IV)**

Day and Date : Thursday, 12-5-2016

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) What are different objectives of research ? 5  
b) Explain motivational factors of research. 6
2. a) Explain the data collection methods with examples. 6  
b) Explain Hypothetical proposal for future development. 5
3. a) Explain the relationship between modeling and simulation. 6  
b) What are blocking and nuisance factors for Experimental Modeling ? 6
4. Write a short note on following (**any 3**) : (3×4=12)
  - a) Controllable and uncontrollable variables
  - b) Check list for good report
  - c) Cause effect relation
  - d) Errors in research
  - e) Fuzzy theory.

P.T.O.



## SECTION – II

5. a) Give the importance of software for research work. **6**  
b) What factors should be considered while writing research paper for publication based on dissertation ? **6**
6. a) Write a note on layout of research report. **6**  
b) What is creativity ? Explain. **5**
7. a) Explain Convergent Vs Divergent thinking. **6**  
b) Explain types of Data. **6**
8. Write a short **note** on **any 3** of the following : **(3×4=12)**  
a) Appendices.  
b) Use of computational tools.  
c) Techniques of creativity.  
d) Normal Distribution.  
e) Importance and parameters of review paper.
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**M.E. (Mechanical Engg.) (Semester – I) (CBCS/CGPA) Examination, 2016  
FINITE ELEMENT METHOD (Elective – I) (Paper – V)**

Day and Date : Friday, 13-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. a) Derive the general equation for determining the stiffness of an element with usual notations. 6  
b) Explain in details discretization of element. 6
2. a) Explain method of size and number of elements. 6  
b) Explain steps of FEM. 5
3. a) Explain different types of 1D, 2D, 3D elements. 6  
b) Explain type of meshing and its effect on accuracy of result. 5
4. Write short notes (**any three**) : (4×3=12)
  - a) Cubic elements
  - b) Simplification through symmetry
  - c) Superparametric element
  - d) Stiffness matrix.

SECTION – II

5. a) Explain convergence requirement of shape functions. 6  
b) Explain harmonic response analysis using FEM. 6



6. a) Explain model checking. 6
- b) Explain model validity and accuracy. 5
7. a) Integrate the following using local integration formula 6
- i)  $\int_A N_i N_j dA$
- ii)  $\int_A N_i N_j^2 N_k dA$
- b) Explain convergence requirement of shape functions. 5
8. Write short notes (**any three**) : (4×3=12)
- a) Transient thermal analysis
- b) Results processing
- c) Shell elements
- d) Modal analysis using FEM.
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Seat No.	
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**M.E. Mechanical Engineering (Semester – II) (New-CBCS/CGPA)  
Examination, 2016  
DESIGN ENGINEERING (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Solve **any three** questions from **each** Section.  
2) Figures to the **right** indicate **full** marks.  
3) Assume necessary data if required and state it **clearly**.

SECTION – I

1. a) Synthesize a double dwell 3-4-5 cam for following data : 6  
Dwell at zero displacement for 90°  
Rise of 25 mm in 90°  
Dwell at 25 mm for 90°  
Fall by 25 mm for 90°  
Cam velocity is  $2\pi$  rad/sec.  
b) Compare the kinematics of SHM and Cycloidal motion cam with the help of SVAJ diagrams. 6
2. a) Explain Kinematic Design of 3-4-5 and 4-5-6-7 cam. 6  
b) Explain importance of combined motions with suitable examples. 5
3. a) Write a short note on form and contiguity constraint. 6  
b) Explain with neat sketches the resultant stresses of combined thermal and working stresses for pressure vessel. 5
4. Write short notes on : 12
  - a) Variable speed drives
  - b) Form follows the function
  - c) Fracture mechanics approach to fatigue.



SECTION – II

5. a) In a test involving continuous satisfactory performance of 110 electronic instruments under excessive vibration conditions, the following failure frequencies were observed. The total test period being 8 hours. 6

<b>Time Interval</b>	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
<b>No. of Failures</b>	3	16	22	42	11	9	4	3

Determine :

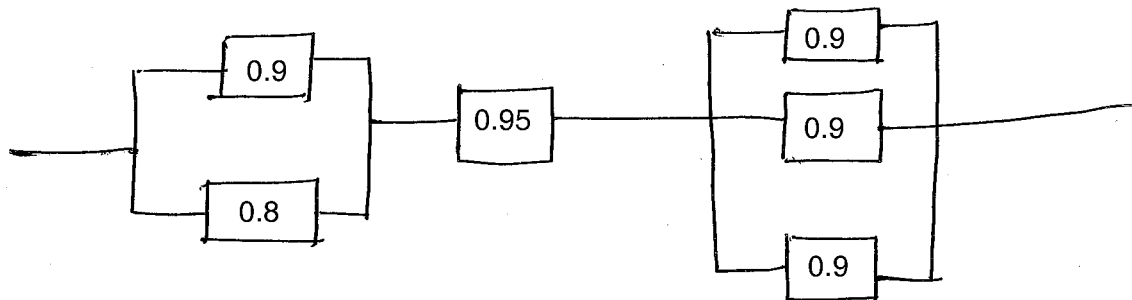
- i) Failure Density
  - ii) Hazard rate
  - iii) Reliability.
- b) Derive the expression :

$$Z(t) R(t) = f(t).$$

6. a) In a life test of 10 bulbs it is found that they fail at the following test hours. Determine MTTF of bulbs.

Failure Hours : 802, 852, 901, 940, 993, 1060, 1105, 1137, 1182, 1202. 4

- b) Calculate the reliability of the system as shown in fig. 7





7. a) Derive an expression for deflection of an elastic semi-infinite beam subjected to moment. **6**
- b) Write a note on : Discontinuity stresses in cylindrical pressure vessel with flat head. **5**
8. Write short notes on : **12**
- a) Relaxation and creep in bending
- b) Spring back and shape factor in plastic bending
- c) Weibull distribution.
-





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**M.E. Mechanical (Semester – II) (New-CBCS/CGPA) Examination, 2016  
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Paper – VII)**

Day and Date : Monday, 16-5-2016

Max. Marks : 70

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

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

SECTION – I

1. a) Explain basic terminology of fiber-reinforced composite material. 9  
b) List out the applications of composite materials with suitable examples. 8
2. a) Explain Strengths of an Orthotropic Lamina. 9  
b) What is Stiffness ? Explain Elasticity Approach to Stiffness. 8
3. Write short notes on (**any three**) : (3×6=18)
  - 1) Classification and characteristics of composite materials.
  - 2) Stress-Strain Relations for Anisotropic Materials.
  - 3) Comparison of Approaches to Stiffness.
  - 4) Maximum stress theory.

SECTION – II

4. a) Explain classical lamination theory. 9  
b) Discuss mechanics of Materials approach to strength. 8
  5. a) What is Buckling ? Explain Governing Equations for Buckling. 9  
b) Explain effect of discontinuity in laminates. 8
  6. Write short note on (**any three**) : (3×6=18)
    - 1) Inter-laminar stresses.
    - 2) Bending of laminated plates.
    - 3) Basic principles of fracture mechanics.
    - 4) Design of composite structures.
-



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**M.E. (Mechanical Engineering) (Semester – II) (New-CBCS/CGPA)**  
**Examination, 2016**  
**MECHATRONICS SYSTEM DESIGN (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016

Max. Marks : 70

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

**Instructions :** 1) Answer **any five full** questions.

2) **Draw** meaningful sketches **wherever** necessary in pencil only.

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

4) Make suitable assumptions, **if required** and state them clearly.

1. a) Describe briefly electrical actuation systems. 7  
b) Draw ladder diagrams for logic functions AND, OR, NOR, XOR. 7
2. a) Describe timers in PLC. 7  
b) Draw a block diagram of a basic microcontroller and describe the function of each subsystem. 7
3. a) Explain in details two examples of mechatronic systems. 7  
b) Describe principle and working of tachogenerator used for measuring angular velocity. 7
4. Describe in details any one Condition Monitoring application of PLC. 14





5. a) Describe any one flow sensor used for measurement of liquid flow. **7**
- b) Write a note on Instrumentation Amplifier. **7**
6. Write notes on the following : **14**
- i) Shift Registers in PLC
  - ii) Force Sensors
  - iii) Filtering.
7. Write brief notes on the following : **14**
- i) Mechatronic control in automated manufacturing
  - ii) Artificial Neural Networks in Mechatronics
  - iii) Micro-sensors.
8. Describe in details real time interfacing for cantilever beam force measurement system. **14**
-



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**M.E. (Mechanical Engineering) (Semester – II) Examination, 2016  
(New-CBCS/CGPA)  
Paper – IX : INDUSTRIAL PRODUCT DESIGN**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**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 the importance of creativity in design and development of new products. **7**  
b) Explain the concept of industrial design. **7**
  2. a) Discuss the ergonomic aspect of design of machine tools. **7**  
b) Write a note on manufacturing aspects of industrial designs. **7**
  3. a) Explain effect of color with reference to ergonomics of consumer products. **7**  
b) Discuss standard and legal requirements of a consumer product. **7**
  4. a) Explain aesthetics expressions of symmetry and balance. **7**  
b) Explain influence of line and form with reference to aesthetics of a product. **7**
  5. a) Explain value analysis and cost reduction. **7**  
b) Write a note on 'Selection of material'. **7**
  6. a) Write a note on Prototype Designs. **7**  
b) Discuss the drawing office procedures. **7**
  7. a) Write a note on expressions of balance. **7**  
b) Write a note on maintenance aspect of product design. **7**
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**M.E. (Mechanical Engg.) (Semester – II) (CBCS/CGPA) (New)  
Examination, 2016**

**MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II) (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Answer **any three** questions from Section – I and **any three** questions from Section – II.  
2) Make suitable assumptions if required and state them clearly.  
3) Figures to the **right** indicate **full** marks.  
4) Draw neat sketches, block diagram, flow charts etc. **wherever** necessary.

SECTION – I

1. a) Discuss the characteristics and applications of material handling equipment. **6**  
b) Explain principles in design of material handling system. **5**
2. Discuss types, design considerations for various types of industrial trucks used in material handling. **12**
3. Discuss construction, working and below mentioned parameters for  
a) Flat belt conveyors  
b) Bridge crane.  
Parameters to be covered-sizes, power requirement, speed, capacity, advantages and limitations. **12**
4. a) Describe advantages and limitations of hand drive and electric drive for hoisting machinery. **6**  
b) Discuss the ways to minimise the material handling in a plant. **5**



## SECTION – II

5. Give detailed design steps for following elements (any four) of belt conveyors. Assume suitable material and its properties and other materials. **12**
- a) Driver motor power.
  - b) Belt width
  - c) Reduction ratio of gear box
  - d) Design of belt for strength
  - e) Design of support structure.
6. a) Discuss the system concept in material handling. **6**
- b) Explain the relationship between material handling and plant layout. **5**
7. a) Discuss the construction and design steps of following component parts of material handling devices. **6**
- I) Sprockets and drums
  - II) Band brake.
- b) Discuss fault finding and failure analysis of material handling systems. **5**
8. Write note on (**any 3**) : **12**
- a) EOT cranes
  - b) Material handling and productivity
  - c) Material handling cost reduction
  - d) Stability and structural analysis.
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**M.E. (Mechanical Engg.) (Semester – II) (New-CBCS/CGPA)  
Examination, 2016**

**Paper – X : ROBOTICS (Elective – II)**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

- Instructions :**
- 1) Answer **any five full** questions.
  - 2) Draw meaningful sketches **wherever necessary in pencil only**.
  - 3) Figures to **right** indicate **full** marks.
  - 4) Make suitable assumptions, if required and state them **clearly**.

1. a) Explain the different types of actuators used for robots. Describe working of a hydraulic actuator system. 7  
b) Give classification of the robot end-effector from the view point of control. Explain a cam actuated gripper used for robots. 7
2. Describe the applications and working principle of : 14  
i) Tactile sensors ii) Range sensors
3. Write notes on the following : 14  
a) Inspection robot  
b) Spray painting robot
4. a) Explain the textual robot language structure. 7  
b) Explain the four main types of motion control used in robot programming. Which provides the best control ? Describe briefly. 7



- 5. a) With the help of sketch describe pitch,yaw and roll motions of a robot wrist. **7**
  - b) Describe the origin and various generations of robots. Explain the work envelope of a cylindrical robot. **7**
  - 6. Describe inverse kinematics problem. Explain the solution to the inverse kinematics problem with an example. **14**
  - 7. Give the advantages of using pneumatic drives in the robots. Explain the different types of pneumatic drives used in the robots with the help of neat sketches. **14**
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**M.E. Mech. Manufacturing Process Engg. (Semester – I)**  
**CBCS/CGPA Pattern Examination, 2016**  
**ELECTRO PHYSICAL PROCESSES (Paper – II)**

Day and Date : Tuesday, 10-5-2016

Max. Marks : 70

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

**Instructions :** 1) Answer **any five full** questions.  
2) Draw meaningful sketches wherever necessary in pencil only.  
3) Figures to **right** indicate **full** marks.  
4) Make suitable assumptions, if required and state them clearly.

1. a) Derive a theoretical model for MRR in AJM as suggested by Sheldon and Finnie. 10  
b) Explain why the MRR by AJM when applied to ductile materials is low. 4
  2. a) Explain the characteristic features of modern machining processes that distinguish them from conventional machining processes. 7  
b) Give classification of modern machining process on the basis of application to machine various engineering materials. 7
  3. a) With neat sketch explain EDM process and its principle. 7  
b) Explain the process capabilities and limitations of LBM. 7
  4. a) Describe basic EDM circuits and explain relaxation pulse generation circuit. 9  
b) Discuss various functions, requirements and types of dielectric fluids used in EDM. 5
  5. a) Discuss the effects of the following process parameters on MRR in USM :  
i) Amplitude and frequency of vibration  
ii) Grain size  
iii) Concentration of slurry and  
iv) Applied static load. 9  
b) Sketch and explain any two types of tool feed systems used in USM. 5
  6. a) With sketch explain the principle and working of an ECM process. 7  
b) Describe Electro Chemical Discharge Grinding with its principle and application. 7
  7. Write short notes on (**any three**) : 14
    - a) Application of LASER in micromachining
    - b) Advantages and applications of EBM
    - c) Wire EDM
    - d) Process capabilities of EDM.
-



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**M.E. (Mech.) (Manufacturing Process) (Semester – I) Examination, 2016  
(CBCS/CGPA Pattern)  
COMPUTER AIDED MANUFACTURING (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions:** 1) Answer **any five full** questions.  
2) Draw meaningful sketches **wherever** necessary in pencil only.  
3) Figures to **right** indicate **full** marks.  
4) Make suitable assumptions, **if required** and state them clearly.

1. a) How Concurrent Engineering is different from Traditional Engineering approach ? Explain. 7  
b) What is Quality Loss Function ? Explain. 7
  2. a) What is Enterprise Resource Planning ? Explain. 7  
b) Explain various types of Co-ordinate Measurement Machines. 7
  3. a) What is Virtual manufacturing ? Explain briefly. 7  
b) Explain Rank Order Clustering Method with suitable example. 7
  4. a) What is shop Floor Control ? Explain. 7  
b) Explain Material Requirement Planning with suitable example. 7
  5. a) Explain with neat sketches, linear slides used in CNC machines. 7  
b) Explain how speed and feed control are achieved through electric drives in CNC machine tools. 7
  6. a) Explain generative CAPP system in details. 7  
b) Explain Opitz coding system. 7
  7. a) Explain, in details major benefits of using FMS in industries. 7  
b) Explain tool management system in FMS. 7
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**M.E. Mech. (Mfg. Process) (Semester – I) (CBCS/CGPA) Examination, 2016**  
**RELIABILITY AND TEROTECHNOLOGY (Paper – IV)**

Day and Date : Thursday, 12-5-2016

Max. Marks : 70

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

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

1. a) Discuss total productive maintenance in brief. 7  
b) What are the ordering rules and inventory policies ? 7
  2. a) Discuss spectra-photometer. 7  
b) Explain condition based maintenance. 7
  3. a) What is AHP ? What is the application of AHP ? 7  
b) Discuss breakdown maintenance. 7
  4. a) Discuss reliability, maintainability and availability. 7  
b) Explain AGREE. 7
  5. a) What is risk priority number ? 7  
b) What is fault free analysis ? 7
  6. Discuss series, parallel and redundant configurations by taking a suitable example and calculator system reliability of each. 14
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**M.E. (Mechanical) (Mfg. Process Engg.) (CBCS/CGPA) (Semester – I)  
Examination, 2016  
DESIGN FOR MANUFACTURING (Paper – V) (Elective – I)**

Day and Date : Friday, 13-5-2016  
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 seven key steps in product development process. **14**
  2. Explain in detail Morphology of design. **14**
  3. With suitable examples and neat sketches explain any five DFA guidelines. **14**
  4. Explain the design process. And explain the steps involved in problem solving methodology. **14**
  5. With neat sketches explain the design for machining. **14**
  6. Write short notes on **any two** : **(2×7=14)**
    - a) Design for Environment (DFE).
    - b) Product design review and design review.
    - c) Explain the difference between concurrent engineering and sequential engineering.
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**M.E. Mechanical – Manufacturing Process Engg. (Semester – II)**  
**Examination, 2016**  
**(New – CBCS/CGPA)**  
**ADVANCED MANUFACTURING TECHNIQUES – II (Paper – VI)**

Day and Date : Saturday, 14-5-2016

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 investment casting ? Explain with neat sketch. 10
- b) Discuss the lapping in detail. 7
2. a) Explain in detail casting defects and remedies. 10
- b) Explain the solidification process in casting. 7
3. Write short notes on (**any three**) : (3×6=18)
  - 1) Burnishing
  - 2) Shell mould casting
  - 3) Die continuous casting
  - 4) Honing

SECTION – II

4. a) Explain HERF in detail. 10
  - b) Explain injection moulding. 7
  5. a) Explain isostatic moulding. 9
  - b) Discuss blow moulding. 8
  6. Write short notes on (**any three**) : (3×6=18)
    - 1) Methods of powder production.
    - 2) Sintering.
    - 3) Hydro Forming.
    - 4) Solid Phase Welding.
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**M.E. Mechanical (Manufacturing Process) (Semester – II)  
(CGPA New – CBCS) Examination, 2016  
ROBOTICS AND ROBOT APPLICATIONS (Paper – VII)**

Day and Date : Monday, 16-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) Answer **any five full** questions.  
2) Draw meaningful sketches **wherever** necessary in pencil **only**.  
3) Figures to **right** indicate **full** marks.  
4) Make suitable assumptions, if **required** and state them **clearly**.

1. a) Define Robot Vision and Describe a vision sensor used to take the image of an object. 7  
b) Explain the advantages and disadvantages of various types of actuators. Describe the working of hydraulic actuator system. 7
2. a) Explain various functions of gripper. Explain the working of magnetic grippers used for robots. 7  
b) Discuss the performance characteristics of robot sensors. Describe the working of proximity and range sensors. 7
3. a) Define a robot. Discuss the various types of joints used in robots. 7  
b) Discuss the laws of robotics and explain various mechanical design considerations of robots. 7
4. a) What are the generations of robots ? Discuss. Sketch and describe the typical configuration and degrees of freedom of wrist assembly. 7  
b) Explain the functions of various components of a robot with a neat sketch. 7



- 5. a) Explain relative merits and demerits of various textual robot languages. Discuss various program instructions. 7
  - b) Discuss loading and unloading functionalities of robots. 7
  - 6. a) Explain homogenous transformation of coordinates. Write homogenous transformation matrices for translation followed by rotation. 7
  - b) With a sketch, explain the specifications of degrees of freedom required on a robot wrists used for painting applications. 7
  - 7. a) Describe the non-manufacturing applications of robots. Explain robot application for welding and machine loading. 7
  - b) Describe the functioning of an inverse kinematics algorithm. 7
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**M.E. Mechanical (Mfg. Process Engg.) (Semester – II) Examination, 2016  
(New–CBCS/CGPA)  
MANUFACTURING PROCESS MODELLING (Paper – VIII)**

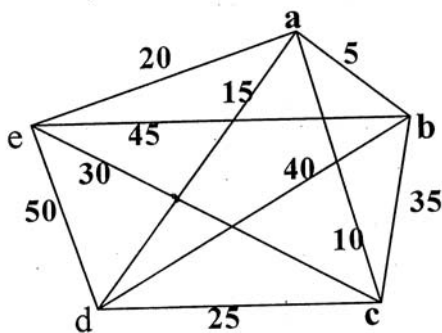
Day and Date : Wednesday, 18-5-2016

Max. Marks : 70

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

- Note :**
- i) Answer **any five** full questions.
  - ii) Figures to the **right** indicate **full** marks.
  - iii) **Use** of nonprogrammable calculator is **allowed**.
  - iv) Make **suitable** assumptions **whenever** necessary and state it clearly.

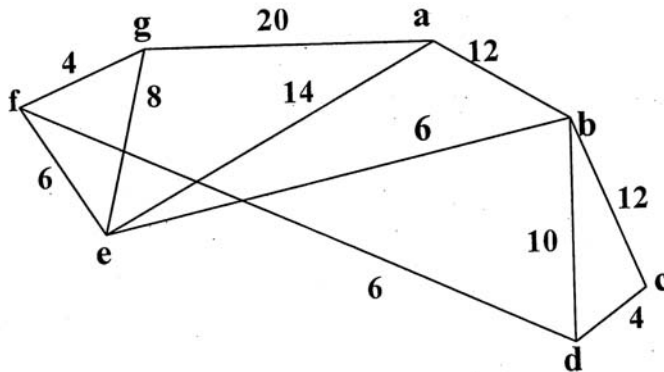
- 1. Give and explain the eight performance measures of any manufacturing system. **14**
- 2. a) Carry out the closest insertion method for the travelling sales man problem for the complete weighted graph shown below from vertex “a”. **8**



- b) Define the following terms : **6**
  - i) Walks and Path
  - ii) Trail.



3. a) Difference between discrete and continuous system. 6
- b) Use Dijkstra’s algorithm on connected weighted graph shown below to find length of shortest paths from the vertex “a” to each of other vertices. 8



4. a) Discuss what is meant by correlation and their types. 6
- b) From the following given data, find : 8
- i) the two regression equations and
  - ii) estimate the value of X when Y = 75, if coefficient of correlation = 0.66

	X	Y
Arithmetic mean :	36	85
Standard Deviation :	11	08

5. Explain in detail the steps in the simulation study. 14
6. Write short notes on the following ;
- i) Recurrent network 4
  - ii) Boltzman learning. 4
  - iii) Encoding scheme. 3
  - iv) Multilayer network. 3

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**M.E. Mech. (Manufacturing Process Engg.) (Semester-II)  
(New-CBCS/CGPA) Examination, 2016  
Paper – IX : MACHINE TOOL ENGINEERING**

Day and Date : Friday, 20-5-2016

Total Marks : 70

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

**Instructions :** 1) Attempt **any five full** questions.  
2) Assume suitable data **whenever** necessary and state if **necessary**.

1. a) What is kinematic drive ? Explain in brief about various drive in machine tool. **7**  
b) Explain in brief about evaluation of force, power consumption and tool life for turning operation. **7**
  2. a) State AHP approach in analyzing the criticality of metal cutting parameters. **7**  
b) Compare FMS with automatic manufacturing system. Give its advantages and disadvantages. **7**
  3. a) Explain with block diagram. Process optimization adaptive control system. **7**  
b) What is variators ? Explain in brief about types of variators. **7**
  4. a) What do you know about forced vibration of machine tools ? Explain in brief. **7**  
b) Explain in brief effect of machine compliance on machining accuracy. **7**
  5. a) Discuss advantages and disadvantages of ball recirculating lead screw in comparison with sliding friction lead screw. **7**  
b) Why testing of machine tool is essential ? Describe the procedure for acceptance test. **7**
  6. a) Why is damping of machine tools important ? How is it accomplished ? **7**  
b) Explain the trends used in material used for machine tool structures. **7**
  7. Write short note on (**any two**). **14**
    - a) Trends in the development of new machine tools.
    - b) Speed structure diagram.
    - c) Different speeds of machine tool spindle.
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**M.E. Mechanical (Manufacturing Process) (Semester – II)**  
**Examination, 2016**  
**(New CBCS/CGPA)**  
**TOTAL QUALITY CONTROL (Elective – II) (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Note :** 1) Attempt **any five full** questions.  
2) Figures to **right** indicate **full** marks.  
3) Make suitable assumptions, if **required** and state them **clearly**.

1. What is quality ? What are the dimensions of quality ? Discuss quality spiral. **14**
  2. a) Discuss TQM philosophy by Juran and Deming. **7**  
b) Classify Quality Cost. **7**
  3. a) Discuss advanced control chart. **7**  
b) What is six sigma ? Compare six sigma with specification limits. **7**
  4. Explain Quality Function Deployment (QFD) in detail. **14**
  5. a) Explain quality loss function. **7**  
b) What is acceptance control chart ? **7**
  6. a) Explain Quality assurance in detail. **7**  
b) Discuss ISO 9000 series of standards in detail. **7**
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**M.E. (Mechanical) Thermal Engineering (Semester – II)**  
**(New CBCS/CGPA) Examination, 2016**  
**DESIGN OF THERMAL SYSTEMS (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- N.B. :**
- 1) Question No. 1 is **compulsory** and solve **any two** questions from **each** Section including Q. No. 1.
  - 2) **Use** of nonprogrammable calculator is **allowed**.
  - 3) Assume suitable data **wherever** necessary.
  - 4) Figures to the **right** indicate **full** marks.

SECTION – I

1. A heating and ventilating system for public indoor swimming pool is to be designed. Specifications.

Pool water temperature = 26°C

Indoor air dry bulb temperature = 27°C

Outdoor design temperature = – 12°C

Outdoor design humidity ratio = 0.00105 kg/kg

For odor control minimum rate of outdoor air for ventilation = 5.8 kg/sec.

For comfort, temperature of air introduced = 38 to 65°C.

Construction features

Pool dimensions 15 × 45 m

Essentially structure has masonry walls and glass roof : glass area = 1850 m<sup>2</sup>, wall area = 670 m<sup>2</sup>, 'U' value of wall = 1.2 W/(m<sup>2</sup>.k)

Supplementary information :

Rate of evaporation of water from pool, g/sec = (0.04) (area, m<sup>2</sup>) (P<sub>w</sub> – P<sub>a</sub>)

Where P<sub>w</sub> = water vapour pressure at pool temp.

P<sub>a</sub> = Partial pressure of water vapour in surrounding temp. of air in KPa.



A choice of the type of window must be made (single, double or triple). They have the following heat transfer coefficients.

	Heat transfer coefficient (w/m <sup>2</sup> .k)		
	Single	Double	Triple
Outside air film	34	34	34
Glass	118	8	3.4
Inside film	11.4	11.4	11.4

The basic purpose of the system is as follows :

a) Describe at least two different concepts for accomplishing the objectives of the design. Use schematic diagram it useful.

b) Perform the design calculations to specify the following.

Flow rate of ventilation air \_\_\_\_\_ kg/sec

Temperature of air entering space \_\_\_\_\_ °C

Type of glass selected \_\_\_\_\_

Temperature of inside surface of glass \_\_\_\_\_

Condition of indoor air : dew point \_\_\_\_\_ °C

Heat supplied to raise temperature of ventilation air from room temperature to supply temp. \_\_\_\_\_ kw.

**18**

2. a) An equation of the form  $y - y_0 = a_1(x - 1) + a_2(x - 1)^2$  is to fit the following three (x, y) points : (1, 4), (2, 8) and (3, 10) what are the values of  $y_0$ ,  $a_1$ ,  $a_2$ .

**10**

b) Define coefficient of determination and general procedure of fitting a straight line among the data.

**7**

3. a) A flow rate of 0.8 kg/sec of water is heated in a heat exchanger by condensing steam at 100°C. When water enters at 15°C, it leaves the heat exchanger at 62°C. If the inlet water temperature were changed to 20°C while its flow rate and condensing temp. remained constant, what would its outlet temperature be ?

**10**

b) Explain method of successive substitution of simulation.

**7**



SECTION – II

4. a) A total length of 100 m of tubes must be installed in a shell and tube heat exchanger, in order to provide the necessary heat transfer area. The total cost of installation in dollars includes :

- 1) The cost of the tubes, which is constant at 900 \$
- 2) The cost of the shell =  $1100D^{2.5}L$
- 3) The cost of the floor space occupied by the heat exchanger = 320 DL where L = length and D = diameter of the shell in meters.

The spacing of the tubes is such that 200 tubes will fit in a cross section area of 1m<sup>2</sup> in the shell.

Determine the diameter and length of the heat exchanger for minimum first cost. (Use Lagranges method for optimization).

12

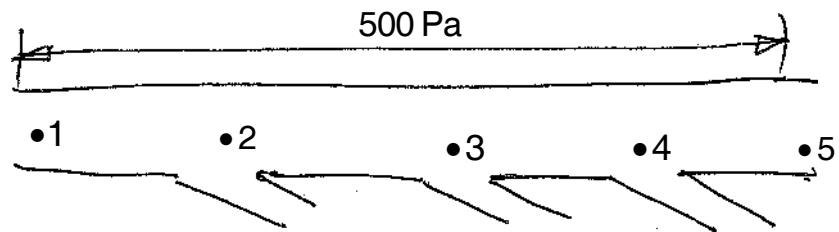
b) Explain dynamic programming method of optimization with one example.

6

5. a) The total pressure drop from point 1 to point 5 in the multibranch duct system shown in fig. is to be 500 Pa. Table presents the costs for various duct sizes in each of the sections as a function of the pressure drop in the section. Use dynamic programming to determine the pressure drop in each section that results in the minimum total cost of the system.

Pressure drop and costs of sections of duct in above problem.

Section	Pressure drop KPa	Cost
1 - 2	100	222
	150	205
	200	193
2 - 3	100	180
	150	166
	200	157
3 - 4	100	135
	150	125
	200	117
4 - 5	100	93
	150	86
	200	81



- b) Explain search method of optimization.
6. a) Describe linear programming method of optimization of thermal system with one example. 10
- b) Draw block diagram of any thermal system of your choice and reduce it to get transfer function. 7

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**M.E. (Mech./Thermal Engineering) (Semester – II) Examination, 2016**  
**(New CBCS/CGPA Pattern)**  
**COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING**  
**(Paper – VII)**

Day and Date : Monday, 16-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- 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) Locate the root of  $f(x) = x^{10} - 1 = 0$ , between 0 and 1.3 using bisection method and method of false position. Comment on which method is preferable. 9
- b) Write algorithm of Gauss-Seidal iterative method. 8
2. a) Explain Newton-Raphson method for determination roots of nonlinear equation. 8
- b) The table below shows the temperature  $f(t)$  as a function of time. 9

t :	1	2	3	4	5	6	7
f(t) :	81	75	80	83	78	70	60

Using Simpson's 1/3<sup>rd</sup> rule to estimate  $\int_1^7 f(t).dt.$

3. a) Using Runge-Kutta method of order 4, find  $y(0.2)$  given that, 10  
 $\frac{dy}{dx} = 3x + \frac{1}{2}y, y(0) = 1$  taking  $h = 0.1$ .



- b) In some determinations of the value  $V$  of carbon dioxide dissolved in a given volume of water at different temperature  $\theta$ , the following pairs of values were obtained. 8

$\theta$	0	5	10	15
$V$	1.80	1.45	1.18	1.00

Obtain by the method of least square relation of the form " $V = a + b\theta$ " which best fits to their observation.

### SECTION – II

4. a) The table below gives the result of an observation.  $\theta$  is the observed temperature in  $^{\circ}\text{C}$  of a vessel of cooling water,  $t$  is the time in minutes from the beginning of observation. 9

$t$	1	3	5	7	9
$\theta$	85.3	74.5	67.0	60.5	54.3

Find the approximate rate of cooling at  $t = 3$  and  $3.5$ .

- b) Explain forward difference along with table. 8
5. a) Explain application of finite difference techniques in convection heat problem. 8
- b) Apply the finite difference method to a plate of  $3\text{ cm} \times 3\text{ cm}$ . Find temperature at a distance of  $1\text{ cm}$  from corner in  $x$  direction and  $1\text{ cm}$  from a corner in  $y$  direction. 9
6. Write short notes on **any three** of the following. 18
- Rayleigh Ritz Method
  - Various elements defined in FEM
  - Difference between FDM and FEM
  - Galerkin method.
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**M.E. (Mechanical – Thermal Engg.) (Semester – II) Examination, 2016  
(New-CBCS/CGPA)  
THEORY AND DESIGN OF I.C. ENGINE (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- 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. **8**  
b) The bore of cylinder of the four stroke diesel engine is 150 mm. The maximum gas pressure inside the cylinder is limited to 3.5 MPa. The cylinder head is made of gray cast iron FG 200 ( $S_{ut} = 200 \text{ N/mm}^2$ ) and factor of safety is 5. Determine the thickness of the cylinder head.  
Stud are used to fix the cylinder head to the cylinder and obtain a leak-proof joint. They are made of steel FeE 250 ( $S_{yt} = 250 \text{ N/mm}^2$ ) and factor of safety is 5. Calculate (i) number of stud (ii) nominal diameter of stud (iii) pitch of stud. **9**
2. a) Explain various methods of controlling detonation in SI engine. **8**  
b) The following data is given for the cap and bolts of the big end of the connecting rod :  
Engine speed = 1500 rpm  
Length of connecting rod = 320 mm  
Length of stroke = 140 mm  
Mass of reciprocating parts = 1.75 Kg  
Length of crank pin = 54 mm  
Diameter of crank pin = 38 mm  
Permissible tensile stress for bolts =  $120 \text{ N/mm}^2$   
Permissible bending stress for cap =  $120 \text{ N/mm}^2$ .  
Calculate the nominal diameter of bolts and thickness of cap for the bid ends. **9**



3. a) What is octane number, explain its importance. How to determine octane number of unknown fuel ? 9
- b) Design a center crankshaft for single cylinder vertical engine considering case of the crank is at top dead center position and subjected to maximum bending moment-
- Cylinder bore = 125 mm  
 L/r ratio = 4.5  
 Maximum gas pressure = 2.5 Mpa  
 Length of stroke = 150 mm  
 Weight of flywheel cum belt pulley = 1 KN  
 Total belt pull = 2 KN  
 Width of hub for flywheel cum belt pulley = 200 mm  
 Allowable bending stress = 75 N/mm<sup>2</sup>  
 Allowable compressive stress = 75 N/mm<sup>2</sup>  
 Allowable shear stress = 40 N/mm<sup>2</sup>  
 Allowable bearing pressure = 10 N/mm<sup>2</sup>.
- The torque on the crank is maximum when the crank turns through 25° from the top dead center and this position the gas pressure inside the cylinder is 2 MPa. The center to center distance between the main bearings 1 and 2 is twice of piston diameter. The Belts are in horizontal direction, assume l/d ratio = 1 for crank pin. 9

## SECTION – II

4. a) Explain recent advances in I.C. Engine for improving efficiency of I. C. Engine. 8
- b) Design exhaust valve for a horizontal diesel engine from 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<sup>2</sup>  
 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) Compare Thermo-Syphon cooling with pressure cooling system. **8**
- 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<sup>2</sup>
  - Mechanical efficiency = 80%
  - Ratio of heat absorbed by piston to the total heat developed = 0.05
  - Temperature difference  $T_c - T_c = 220^\circ \text{C}$
  - 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**
6. a) Explain need of lubrication system in IC Engine. Discuss various important properties of lubricating oil. **9**
- 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**



### Data for solving problems

#### Reboring allowance for I.C. Engine cylinder :

<b>D</b>	75	100	150	200	250	300	350	400	450	500
<b>C</b>	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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**M.E. (Mech. -Thermal Engineering) (Semester – II) Examination, 2016  
(New-CBCS/CGPA)  
DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM  
(Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

- 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**.

SECTION – I

1. a) A cascade refrigeration system is required to meet a load of 100 TR at  $-60^{\circ}\text{C}$  evaporator temperature. It uses R-22 refrigerant for low temperature system having cascade temperature of  $-10^{\circ}\text{C}$ .  $\text{NH}_3$  is used for High temperature refrigeration condenser temperature of  $40^{\circ}\text{C}$  and cascade evaporator temperature of  $-20^{\circ}\text{C}$ . Assume that refrigerants become dry-saturated vapour at entry to their respective compressors and liquid refrigerants are not subcooled. Find
  - i) Mass flow rate of refrigerants R-22 and R-717.
  - ii) Total compressor power
  - iii) COP of cascade system. 12
- b) Explain factor affecting the heat transfer capacity of an evaporator. 6
2. a) The humidity ratio of atmospheric air at  $28^{\circ}\text{C}$  DBT and 760 mm of Hg is 0.01 kg/kg of dry air. Determine (i) Partial pressure of water vapour (ii) Relative humidity (iii) Dew point temperature (iv) Specific enthalpy and (v) Vapour density. 9
- b) Explain BPF of cooling and heating coil. 8
3. Write note on the following :
  - a) Various types of refrigeration system controls. 6
  - b) Water cooled condensers. 5
  - c) Explain mass transfer by molecular diffusion and convection. 6



## SECTION – II

4. a) Explain electrolux vapour absorption refrigeration system. **8**  
b) Explain various types of refrigeration air condition systems. **9**
5. a) The following data refer to summer air conditioning of a building.  
Indoor design conditions : 25°C DBT and 50% RH  
Outside design conditions : 43°C DBT and 27°C WBT  
Room latent heat gain = 21000 kJ/h  
Room sensible heat gain = 84000 kJ/h  
BPF of the cooling coil used = 0.2  
The air is supplied to the building at 14.6°C  
The return air from the room is mixed with the outside air before entry to cooling coil in the ratio of 4 : 1 by mass. Determine.  
i) ADP of the cooling coil  
ii) Entry condition of cooling coil  
iii) Fresh air mass flow rate  
iv) The refrigeration load on the cooling coil. **12**  
b) Explain temperature-concentration diagram for binary mixture. **6**
6. a) Explain design of cooling tower. **9**  
b) Explain dehumidification and humidification equipment. **8**
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Seat  
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**M.E. (Mechanical Thermal Engineering) (Semester – II)**  
**(New CBCS/CGPA) Examination, 2016**  
**POWER PLANT ENGINEERING (Elective – II) (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Instructions :** 1) **Neat** diagrams must be drawn **whenever** necessary.  
2) Make **suitable** assumptions if necessary and mention them **clearly**.  
3) Figures to **right** indicate **full** marks.

1. Solve **any two** (8 marks **each**) :

- 1) a) Steam is the working fluid in an ideal rankine cycle. Saturated vapour enters the turbine at 8.0 MPa and saturated liquid exits the condenser at a pressure of 0.008 MPa. The net power output of the cycle is 100 MW. Determine for cycle-thermal efficiency and mass flow rate of steam in kg/hr.
- b) Reconsider the cycle, but include in the analysis that turbine and pump each have an isentropic efficiency of 85%. Determine for cycle-thermal efficiency and mass flow rate of steam in Kg/hr.

Pressure (MPa)	Vf (m <sup>3</sup> /Kg)	Enthalpy (KJ/Kg)			Entropy (KJ/Kg K)		
		$h_f$	$h_{fg}$	$h_g$	$s_f$	$s_{fg}$	$s_g$
8	–	–	–	2758.0	–	–	5.7432
0.008	0.0010084	173.88	2403.1	–	0.5926	7.6361	8.2287

2) The following data is available for a hydro-power plant :

Available head = 140 m, catchment area = 2000 sq. km., annual average rainfall = 145 cm, turbine efficiency = 85%, generator efficiency = 90% percolation and evaporation losses = 16%. Determine :

- a) power developed    b) specific speed  
c) type of turbine to be used if runner speed is to be kept below 240 rpm.
- 3) Explain the principle of overfeed stocker. And explain spreader stocker with neat sketch.

P.T.O.

2. Solve **any three** :

- 1) Compare fission and fusion process. 6
- 2) Explain working of pulverized fuel handling system with any one of its type. 6
- 3) Explain any one of high pressure boiler. 6
- 4) List out and explain different hydro-plant controls. 7

3. Solve **any two (8 marks each)** :

- 1) An industrial consumer has an annual energy consumption of 201500 kWh at a load factor of 0.35. The tariffs (Rs. 4,000 + Rs. 1,200 per kW of maximum demand + Rs. 2.20 per kWh) Find :
  - a) His annual bill
  - b) What is the bill if total energy consumption is same but load factor improved to 0.55 ?
  - c) What is the bill if energy consumption is reduced by 25% and load factor remain as the same initial value of 0.35 ?
  - d) Average energy cost in each case.
- 2) In combined Gas Turbine (GT) – Steam Turbine (ST) plant, the exhaust gas from open cycle gas turbine is the supply gas to the steam generator of steam cycle at which additional fuel is burned in the gas. The pressure ratio for the GT is 7.5, the air inlet temperature is 15°C and the maximum cycle temperature is 750°C.  
Combustion of additional fuel raises the gas temperature to 750°C and the gas leaves the steam generator at 100°C The steam is supplied to the turbine at 50 bar, 600°C and the condenser pressure is 0.1 bar. The total power output of plant is 200 MW. The Calorific value of fuel is 43.4 MJ/Kg. Neglecting the effect of mass flow rate of fuel on air flow, Determine
  - a) flow rates of air and steam required.
  - b) power output of GT and ST.
  - c) thermal efficiency of combined plant
  - d) A : F ratio.

Take  $C_p = 1.11 \text{ KJ/Kg K}$  and  $\gamma = 1.33$  for combustion gases and  $C_p = 1.005 \text{ KJ/Kg K}$  and  $\gamma = 1.4$  for air.

Neglect pump work. Draw T-S diagram.





Property table for steam :

Pressure Bar	Enthalpy KJ/Kg			Entropy KJ/Kg K			$V_f$ m <sup>3</sup> /Kg
	$h_f$	$h_g$	At 600°C	$s_f$	$s_g$	At 600°C	
50			3670				
0.1	192	2583.9	-	0.6492	8.1488		0.001010

Take Enthalpy of steam at inlet of condenser = 2305 KJ/Kg for steam turbine plant.

- 3) Describe any two types of commonly used relays with neat sketch.
  - 4. Attempt **any three** :
    - 1) List out number of electrical equipment which are available in a power plant. And explain double bus bar system with sketch. 6
    - 2) List out various types of Tariff and explain Hopkinson demand rate method. 6
    - 3) Explain various factors affecting economics of generation and distribution of power. 6
    - 4) Explain F.W. Bergbaurenerative system with neat sketch. 7
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**M.E. (E and TC) (Digital Electronics and Communication System)  
(Semester – I) Examination, 2016  
(New-CBCS)  
Paper – III : CMOS VLSI DESIGN**

Day and Date : Wednesday, 11-5-2016

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) Give physical structure of an NMOS transistor. Explain it with neat diagram. **6**  
b) With the help of physical structure of PMOS enhancement transistor, explain accumulation, depletion and inversion modes. **5**
2. a) Explain impact of technology scaling on CMOS inverter. **5**  
b) Define noise margin and explain how it can be obtained from voltage transfer characteristics of CMOS inverter. **6**
3. a) Compare static and dynamic designs in CMOS. **6**  
b) What is pass transistor logic and how universal gates can be implemented using this logic ? **6**
4. Write notes on **any three** of the following : **(4×3=12)**
  - a) Speed and power dissipation in CMOS
  - b) Dynamic logic : basic principle
  - c) Cascading dynamic gates
  - d) Static behaviour of CMOS inverter.

P.T.O.



SECTION – II

- 5. a) Explain C<sup>2</sup>MOS register. 6
    - b) Explain the bistable principle. 5
  - 6. a) Explain sources of Skew and Jitter. 6
    - b) Explain clock synthesis and synchronization using phase locked loop. 5
  - 7. a) Explain designing of SRAMS. 6
    - b) Explain various clock distribution techniques with examples. 6
  - 8. Write notes on **any three** of the following : **(4×3=12)**
    - a) True single transistor (TSPCR)
    - b) Timing classification methods
    - c) Latch based clocking
    - d) Designing ROMS.
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**M.E. E & TC (Digital Electronics and Comm. System)**  
**(Semester – I) Examination, 2016**  
**(New – CBCS)**  
**MODERN DIGITAL SIGNAL PROCESSING (Paper – IV)**

Day and Date : Thursday, 12-5-2016

Max. Marks : 70

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

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

SECTION – I

1. a) Explain frequency sampling method for design of FIR filter. 8  
b) Design an ideal low pass filter with a frequency response  
$$H_d(e^{j\omega}) = 1 \text{ for } -\pi/2 \leq \omega \leq \pi/2$$
$$= 0 \text{ for } \pi/2 \leq |\omega| \leq \pi$$
Find values of  $h(n)$  for  $N = 11$ . Find  $H(z)$ . 9
2. a) Draw the block diagram of forward linear prediction. Derive the equation for coefficient of the linear predictor by using 'p' stage lattice filter. 8  
b) Consider a signal  $x(n) = s(n) + w(n)$ , where  $s(n)$  is an AR(1) process that satisfies the difference equation  $s(n) = 0.6 s(n-1) + v(n)$ , where  $\{v(n)\}$  is a white noise sequence with variance  $\sigma_v^2 = 0.64$  and  $\{w(n)\}$  is a white noise sequence with variance  $\sigma_w^2 = 1$ . Design a winner filter of length  $M = 2$  to estimate  $\{s(n)\}$ . 9
3. a) Draw the timing diagram related to sampling rate conversion. Derive fundamental equation for implementing sampling rate conversion. 9  
b) Write a short note on anti-imaging filter. 9

P.T.O.



## SECTION – II

4. a) Design a Chebyshev filter for the following specification using bilinear transformation. 9
- $$0.8 \leq |H(e^{j\omega})| \leq 1 \quad 0 \leq \omega \leq 0.2\pi$$
- $$|H(e^{j\omega})| \leq 0.2 \quad 0.6\pi \leq \omega \leq \pi.$$
- b) Derive equation of bilinear transformation for mapping from s-plane to z-plane. 8
5. a) For the analog transfer function  $H(s) = \frac{2}{(s+1)(s+2)}$ , determine  $H(z)$ . Use impulse invariance method. Assume  $T = 1$  sec. 9
- b) Explain the method of periodogram for the estimation of power density spectrum. 8
6. a) Explain with diagram ALU of TMS 320 C54X. 9
- b) Write a note on pipelining, used in DSP processor. 9
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Seat No.	
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**M.E. (E and TC) Digital Electronics and Communication System  
(Semester – I) (Old – CGPA) Examination, 2016  
CMOS VLSI DESIGN (Paper – II)**

Day and Date : Tuesday, 10-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**Instructions:** 1) Attempt **any three** questions from **each** Section.  
2) Figures to **right** indicate **full** marks.

SECTION – I

1. a) Draw and explain accumulation, depletion and inversion modes of operation of MOS Transistor. 6  
b) Give physical structure of NMOS Transistor. 5
2. a) Draw and explain static CMOS inverter and switch model of CMOS inverter. 6  
b) Explain dynamic power dissipation in CMOS inverter. 5
3. a) Design half adder using CMOS logic. 6  
b) Explain ratioed logic with neat diagram. 6
4. Write notes on **any three** of the following : **(4×3=12)**
  - a) Technology Scaling.
  - b) Cascading Dynamic Gates.
  - c) Leakage in dynamic circuits.
  - d) Power and energy delay.

P.T.O.



## SECTION – II

5. a) Draw and explain Master-Slave edge Triggered register. Write timing properties of multiplexer based master slave registers. **6**
- b) Explain with neat schematic True Single Phase Clocked Resister (TSPCR) and write transistor sizing issues in TSPCR. **5**
6. a) Explain the sources of skew and jitter. **6**
- b) Explain various timing basics. **5**
7. a) Explain designing of DRAMS in detail. **6**
- b) How PLL can be used for clock synchronization ? **6**
8. Write notes on **any three** of the following : **(4×3=12)**
- a) Designing Fast adders.
- b) Synchronizers and Arbiters.
- c) Clock Distribution.
- d) Static latches and Bistable principle.
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**M.E. (E and TC) (Digital Electronics and Communication System)**  
**(Semester – I) Examination, 2016**  
**(Old – CGPA)**  
**MODERN DIGITAL SIGNAL PROCESSING (Paper – III)**

Day and Date : Wednesday, 11-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. Design an ideal bandpass filter with a frequency response

$$H_d(e^{j\omega}) = 1 \text{ for } \frac{\pi}{4} \leq |\omega| \leq \frac{3\pi}{4}$$
$$= 0 \text{ otherwise}$$

Find the values of  $h(n)$  for  $N = 11$ . Also find  $H(z)$ . 9

2. a) Compare in detail different types of windows used in FIR filter design. 7  
b) Draw the block diagram of forward linear prediction. Derive the equations for coefficient of the linear predictor by using 'p' stage lattice filter. 7
3. a) Explain the Burg method for the AR model parameter. 6  
b) Explain design of FIR differentiator. 6

SECTION – II

4. a) Explain the process of decimation by a factor D. 6  
b) Explain with diagram digital filter banks – analysis, synthesis, subband coding. 6
5. a) Derive equation of BLT for mapping for S-plane to Z-plane. 7  
b) Define wavelet. What are the types of wavelet? 7
6. For the given specification, design high pass filter. 9  
 $\alpha_p = 3 \text{ dB}$ ,  $\alpha_s = 15 \text{ dB}$   $\Omega_p = 1000 \text{ rad/sec}$ ,  $\Omega_s = 500 \text{ rad/sec}$ .





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**M.E. (E and TC) (Digital Electronics and Communication Systems)  
(Semester – I) (Old – CGPA) Examination, 2016  
PROBABILITY AND RANDOM PROCESS (Paper – IV)**

Day and Date : Thursday, 12-5-2016

Max. Marks : 70

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

SECTION – I

1. a) State and explain Bay's theorem along with the concept of Total Probability. **6**  
b) What is PMF ? Explain the concept of PMF with two examples. **6**

OR

- c) Proof that for any two event A and B  $P_r(A \cup B) = P_r(A) + P_r(B) - P_r(A \cap B)$ . **6**
2. a) Suppose Mr 'X' is a good archer. He can regularly hit a target having 3-ft diameter and often hit the bull's eye, which is 0.5 ft in diameter, from 50 ft away suppose the miss is measured as the radial distance from the centre of the target and further, that the radial miss distance is a Rayleigh random variable with constant in Rayleigh constant being  $\sigma^2 = 4$  (sq ft).  
i) Determine the probability of Mr 'X' hitting target  
ii) Determine the probability of Mr 'X' hitting the Bull's eye. **7**
- b) Define characteristics function and obtain characteristic function for Gaussian random variable with zero mean and unit variance. **6**

OR

- c) Write PDF, CDF, for following random variable with application. **6**  
i) Uniform random variable  
ii) Gamma random variable  
iii) Chi square random variable.



3. a) Suppose a source send symbol from a three letters alphabets with probability  $P_a = 1/4, P_b = 1/2, P_c = 1/4$ . 5  
 i) Determine the entropy of source  
 ii) Give a source code that has an average code length that matches the entropy.
- b) Let  $X$  be a random variable with  $E[X] = 1$  and  $\text{Var}[X] = 4$  find the following. 5  
 i)  $E[2x - 4]$                       ii)  $E[X^2]$ .

## SECTION – II

4. a) A certain pair of random variable has a joint PDF given by

$$F_{x,y}(x,y) = \frac{2abc}{(ax + by + c)^3} u(x) u(y)$$

For positive  $a, b, c$  find the marginal PDF. 7

OR

- b) Let  $X$  and  $Y$  be independent and both exponentially distributed with  $F_x(V) = F_y(V) = be^{-bv} u(V)$  find CDF of  $Z = X - Y$ . 7
- c) Define Poisson random process give example of Poisson processes explain how to obtain mean and autocorrelation function of Poisson random variable. 6
5. a) Define following for a pair of random variable. 6  
 i) Covariance  
 ii) Correlation coefficient  
 iii) Autocorrelation.
- b) Write the note on following : 6  
 i) Complex Random Variable  
 ii) Ergodic random Processes with example.
- OR
- c) A random vector is generated by rolling the die and observing the outcome. The component of random vector are determine by successive rolls of die. If die is roll two times. 6  
 i) List the possible realization of random vector  
 ii) Determine probability of each realization  
 iii) Determine the mean vector.
6. a) Write a note on Mar off process with examples. 5  
 b) What are properties of ACF ? Explain them with examples. 5



Seat No.	
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**M.E. (E & TC – Digital Electronics and Communication Systems)  
(Sem . – II) Examination, 2016  
MICROWAVE DEVICES AND CIRCUITS (Paper – VI)  
(New CBCS Pattern)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

- Note :** 1) *All questions are compulsory.*  
2) *Figure to the right indicates maximum marks.*  
3) *Consider the data whenever necessary.*

SECTION – I

1. Attempt **any three** : **15**  
a) Explain Maxwell's equation for conductor.  
b) Explain time harmonic field.  
c) Explain waveguide terminators in details.  
d) Explain circular to rectangular waveguide transition.
2. Attempt **any two** : **20**  
a) What is slow wave structure ? What are its types ? Explain Helical TWT in details.  
b) Explain EM wave equation for conductor.  
c) Explain hybrid ring with its S parameter.

SECTION – II

3. Attempt **any three** : **15**  
a) Explain PIN diode as limiter.  
b) Explain MMIC formation.  
c) Explain InP diode.  
d) Explain Avalanche effect. What are the types of microwave avalanche diode ?
4. Attempt **any two** : **20**  
a) Explain IMPATT diode in details. Also draw its V-I characteristics.  
b) Explain PIN diode in details. Also draw its characteristics curve.  
c) Explain Tunnel diode in details. Also draw its V-I characteristics.
-



Seat No.	
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**M.E. (E and TC) Digital Electronics and Communication System  
(Semester – II) (New-CBCS) Examination, 2016  
HIGH SPEED DIGITAL DESIGN (Paper – VII)**

Day and Date : Monday, 16-5-2016

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.

SECTION – I

1. a) Explain power consumption of high speed logic circuits according to the following power categories.
  - i) Input power
  - ii) Internal Dissipation
  - iii) Drive circuit dissipation 6
- b) Explain active power dissipation when driving a capacitive load. 5
2. a) Explain with neat circuit diagram typical power supply network. 6
- b) What is power supply noise ? Explain single supply noise and effect of single supply noise on CMOS logic. 5
3. a) What is signaling ? Explain signaling convention and signaling modes for transmission lines. 6
- b) Explain signaling over lumped transmission media. 6
4. Write short notes on **any three** of the following. (4×3=12)
  - a) Lossless LC transmission Lines.
  - b) Intersymbol Interference.
  - c) Cross Talk.
  - d) Driving Lossy LC lines.



## SECTION – II

5. a) Explain prototyping circuits in high speed electronics. **6**  
b) Explain power supply conditioning with low dropout references. **5**
6. a) What is RFI ? What is the effect of RFI on analog circuits ? Explain the techniques that can be used to protect analog circuit from RFI. **6**  
b) What is sampling and Nyquist bandwidth ? Explain effect of anti aliasing filters on system dynamic range. **5**
7. a) Draw and explain ADC model showing Noise and distortion sources. **6**  
b) Explain high speed AD 9220 12 bit ADC. **6**
8. Write notes on **any three** of the following. **(4×3=12)**  
a) Simulation tools.  
b) Power supply noise reduction and filtering.  
c) Base band Antialiasing Filter.  
d) High Speed Sampling.
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Seat No.	
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**M.E. (E&TC) (Digital Electronics & Communication System) (Semester – II)  
Examination, 2016  
(New – CBCS)  
ADVANCED EMBEDDED SYSTEM (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016

Max. Marks : 70

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

- Note :** 1) *All questions are compulsory.*  
2) *Figures to **right** indicate **full** marks.*  
3) *Assume suitable data **wherever** necessary.*

SECTION – I

1. a) Write short note on microcontroller. 6  
b) Explain the functions of following units in a general purpose processor. 6
  - 1) Control Unit
  - 2) Instruction queue
  - 3) Program counter.
2. a) What is RISC ? Explain standard RISC. 5  
b) Explain DRAM refresh techniques. 6
3. a) Explain compilation process used in embedded system. 6  
b) Explain run time libraries required for writing software for embedded system. 6

SECTION – II

4. a) What is real time task scheduling ? Explain terms task instance, response time, task precedence. 6  
b) Explain addressing modes of ARM-9 processor. 6
  5. a) What are the key features ARM-9 processor ? 6  
b) Define and explain inter process communication. 5
  6. a) Explain schedule algorithms. 6  
b) What is semaphore ? How it is used ? 6
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Seat No.	
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**M.E. (E&TC-Digital Electronics and Communication Systems)  
(Semester – II) Examination, 2016  
CRYPTOGRAPHY & NETWORK SECURITY (Paper – IX)  
(New CBCS)**

Day and Date : Friday, 20-5-2016

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 triple data encryption with two keys in details.
  - b) Explain RAS algorithm.
  - c) Explain Distribution of Public Key. Explain any two type.
  
2. Attempt **any two** : **15**
  - a) Explain encryption technique.
  - b) Explain steganography in details.
  - c) Explain Principle of ciphers.

SECTION – II

3. Attempt **any two** : **20**
    - a) What is public key Infrastructure ? Explain it.
    - b) Explain IP security. Explain with its Scenario.
    - c) Explain secure socket layer.
  
  4. Attempt **any two** : **15**
    - a) Explain birthday attack.
    - b) Explain authentication function.
    - c) Explain hash function.
-



Seat No.	
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**M.E. (E&TC Digital Electronics and Communication Systems)  
(Semester – II) (New-CBCS) Examination, 2016  
Elective – II : ARTIFICIAL NEURAL NETWORKS (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

**Instructions :** 1) *Figure to right indicates full marks.*  
2) **All questions are compulsory.**

SECTION – I

1. Attempt **any two** : **20**
  - a) Explain Habbian learning method for Artificial Neural Network Model.
  - b) Explain Delta learning Law for Artificial Neural Network Model.
  - c) Explain Outstar learning law for Artificial Neural Network Model.
  
2. Attempt **any two** : **15**
  - a) Explain what error back propagation is.
  - b) What are the requirements of learning Laws ?
  - c) What are the types of activation functions in Neural Network ? Explain.

SECTION – II

3. Attempt **any two** : **20**
    - a) Explain Hopfield network algorithm.
    - b) Explain Continuous Hopfield Model.
    - c) Explain Boltzman's Machine in detail.
  
  4. Attempt **any two** : **15**
    - a) Explain characteristics recognition using ANN.
    - b) Explain Radial basis function.
    - c) Explain MAXNET.
-





Seat No.	
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**M.E. (E & TC – Digital Electronics and Communication Systems)  
(Semester – II) (Old – CGPA) Examination, 2016  
RF AND MICROWAVE CIRCUIT DESIGN (Paper – VI)**

Day and Date : Saturday, 14-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

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

SECTION – I

1. Attempt **any two**. 20
  - a) Derive the transmission line equation.
  - b) State and explain the Maxwell's equation for air and conducting material.
  - c) Derive EM wave equation in dielectric media.
  
2. Attempt **any two** : 15
  - a) Explain different modes of Gunn diode.
  - b) Give the Scattering Matrix for microwave network.
  - c) Explain Insertion loss and dissipation factor in case of R-L-C microwave filter.

SECTION – II

3. Attempt **any two** : 20
    - a) Explain different types of Microwave field effect transistors. Explain any one with characteristics curve.
    - b) Explain MMIC manufacturing with layout for MMIC.
    - c) Explain basic oscillator circuit with neat diagram.
  
  4. Attempt **any two** : 15
    - a) Explain stability criteria for microwave amplifier.
    - b) Explain the characteristics of High power amplifier.
    - c) Draw and explain MESFET.
-





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**M.E. (E and TC) Digital Electronics and Communication System  
(Semester – II) (Old-CGPA) Examination, 2016  
HIGH SPEED DIGITAL DESIGN (Paper – VII)**

Day and Date : Monday, 16-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**Instructions :** 1) Attempt **any three** questions 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) Explain power consumption of high speed logic circuits according to the following power categories. 5
  - i) Input power
  - ii) Internal Dissipation
  - iii) Drive circuit dissipation.
2. a) Explain local loads and signal loads in detail. 6  
b) What is power supply noise ? Explain single supply noise and effect of single supply noise on CMOS logic. 5
3. a) What are the major variables in the design of the transmitter ? Explain with neat figures current mode transmission and voltage mode transmission. 6  
b) What is cross talk ? Explain with neat figures capacitive coupling to a floating line and capacitive coupling to a driven capacitive line. 6
4. Write short note on **any three** of the following : (4×3=12)
  - a) High speed properties of logic gates.
  - b) Lossy LRC transmission lines.
  - c) Intersymbol interference.
  - d) Signaling modes for transmission lines.

P.T.O.



## SECTION – II

5. a) Explain simulation tools in high speed electronics. **6**  
b) Explain grounding in high speed system. **5**
6. a) Explain with neat diagram a framework for solving any EMI problem. **6**  
b) Explain different noise reduction tools related to power supply. **5**
7. a) Draw and explain ADC model showing noise and distortion sources. **6**  
b) Define and explain in brief following terms related to ADC. **6**  
i) SINAD  
ii) SNR  
iii) ENOB  
iv) Analog bandwidth  
v) SFDR.
8. Write notes on **any three** of the following : **(4×3=12)**  
a) Power supply conditioning  
b) Prototyping circuits  
c) Base band antialiasing filters  
d) Harmonic sampling.
-



Seat No.	
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**M.E. (E&TC) (Digital Electronics and Communication Systems)  
(Semester – II) (Old-CGPA) Examination, 2016  
ADVANCED EMBEDDED SYSTEMS (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

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

SECTION – I

1. a) Explain block diagram of microcontroller architecture. 7  
b) Write short note on GPP. 5
2. a) Explain location, power consumption, way of data storage for following type of memories : 7
  - i) Processor memory
  - ii) Internal on chip memory
  - iii) Primary memory
  - iv) Cache memory
  - v) Secondary memory.
- b) Explain interfacing of microcontroller with external memory. 4
3. a) Explain pointers and arrays in 'C'. 6  
b) Explain compiling and cross compiling. 6

P.T.O.



SECTION – II

- |   |   |
|---|---|
| 4. a) Explain seven characteristics of real time system.          | 7 |
| b) What is priority inversion problem ? How it can be solved ?    | 7 |
| 5. a) Explain Round Robin algorithm for task scheduling.          | 6 |
| b) Explain debugging process of ARM.                              | 6 |
| 6. a) What is pipelines ? What is its effect on efficiency ?      | 3 |
| b) Explain data processing and data transfer instructions of ARM. | 6 |
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Seat No.	
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**M.E. (E&TC-Digital Electronics and Communication Systems)  
(Semester – II) (Old CGPA) Examination, 2016  
WIRELESS AND MOBILE NETWORKS (Paper – IX)**

Day and Date : Friday, 20-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Total Marks : 70

**Instructions :** 1) Figure to **right** indicates **full** marks.  
2) **All** questions are **compulsory**.

SECTION – I

1. Attempt **any two** : **20**
- a) 1) Explain the factors influences on small scale fading.  
2) Explain Doppler shift in multipath propagation.
  - b) Explain the impulse response model for multipath channel.
  - c) Explain RAKE receiver in brief.
2. Attempt **any two** : **15**
- a) Explain Rayleigh's fading.
  - b) Consider a transmitter which radiates a sinusoidal carrier frequency of 1850 MHZ. For a vehicle moving 60 mph, compute the received carrier frequency in mobile is moving :
    - a) Directly toward the transmitter
    - b) Directly away from the transmitter and
    - c) In a direction which is perpendicular to the direction of arrival of transmitted signal.
  - c) Explain any two categories of antenna diversity.



SECTION – II

3. Attempt **any two** : **20**
- a) Draw and explain DHCP in brief.
  - b) Explain 802.11 protocol stacks.
  - c) Explain TCP segment format for mobile communication.
4. Attempt **any two** : **15**
- a) Explain the concept of Advoc Network.
  - b) Explain Mobile IP in brief.
  - c) Explain Wireless Application Protocol.
-





Seat No.	
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**M.E. (E & TC) Digital Electronics and Communication Systems  
(Semester – II) (Old – CGPA) Examination, 2016  
EL – II : IMAGE AND VIDEO PROCESSING AND BROADCASTING  
Paper – X**

Day and Date : Monday, 23-5-2016

Max. Marks : 70

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

**N.B. :** 1) *All questions are compulsory.*  
2) *Assume suitable data if required.*

SECTION – I

1. Write a short note on **any two** : **(6×2=12)**  
1) DWT Transform      2) DCT      3) SVD
2. a) Explain limitations in sampling and reconstruction. **4**  
b) Explain in detail 2D sampling theory. **4**
- OR
- b) Explain color vision model.  
c) Explain image observation models. **5**
3. a) Explain Least Squares Filters. **5**  
b) Explain blind convolution. **5**
- OR
- b) Explain Log entropy restoration in detail.

SECTION – II

4. Answer **any two** :  
a) Explain Spatial feature extraction. **5**  
b) Explain morphological processing for structures. **5**  
c) What is Randon transform ? Explain its properties. **5**
5. a) Explain different structural approaches for texture. **7**  
b) Explain Fourier reconstruction algorithm with its application to MRI. **6**
- OR
- b) Explain Fan beam reconstruction.
6. a) Explain Video over IP. **6**
- OR
- a) Explain MPEG-4 in detail.  
b) Explain Back projection operator in detail. **6**
-



SLR-PL – 200A

Seat No.	
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**M.E. (Electronics and Telecommunication Engineering : Digital  
Electronics and Communication System) (Semester – III)  
Examination, 2016  
SELF-LEARNING SUBJECT  
Modeling and Simulation of Communication System (Paper – I)**

Day and Date : Wednesday, 25-5-2016  
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

1. Solve **any two** questions : **(5×2=10)**
  - a) With neat block diagram explain analytically intractable system.
  - b) Explain about role of simulation in communication system.
  - c) Explain System Modeling and Device Modeling.
  
2. Solve **any one** question : **(7×1=7)**
  - a) Explain multi-disciplinary aspects of simulation.
  - b) Explain classification of system properties for performance evaluation technique.
  
3. Attempt **any three** questions : **(6×3=18)**
  - a) Write a note on fixed point arithmetic.
  - b) Write a note on errors in system and device modeling.
  - c) Explain the process of quantization.
  - d) Explain validation processes for Random process models and system model.

P.T.O.



## SECTION – II

4. Solve **any two** questions : **(5×2=10)**
- a) Explain a Linear Congruence technique for implementation of Random number generator.
  - b) Explain Histogram method.
  - c) Explain frequency domain representation of periodic continuous signals.
5. Solve **any one** question : **(7×1=7)**
- a) Explain techniques for generating Uncorrelated Gaussian Random Numbers.
  - b) Explain tools for generating pseudo-random number that are uniformly distributed between 0 and 1.
6. Attempt **any three** questions : **(6×3=18)**
- a) Explain Monte Carlo simulation model for communication system.
  - b) Explain properties of Fourier transform.
  - c) Write a note on Gibbs phenomenon and Hilbert transform.
  - d) Write a note on Monte Carlo estimation.
-



Seat No.	
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**M.E. (Electrical Engineering) (Semester – I) (CBCS/CGPA)  
Examination, 2016  
POWER ELECTRONICS (Paper – I)**

Day and Date : Monday, 9-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

**Instruction :** Attempt **all** questions.

SECTION – I

1. Explain speed of separately excited dc motor is controlled by a single phase converter. 9
2. What is an IGBT ? Draw its switching characteristics. What are its advantages over BJT and MOSFET ? 9
3. What are the different power electronic converter systems ? Specify the form of input and output, and mention two applications in each case. 9
4. What are the voltage and current specifications of thyristor ? Define latching current and holding current of a thyristor. 8

SECTION – II

5. A single phase full converter, operating from a 230 V, 50 Hz supply has a pure resistive load of  $R = 15 \text{ Ohm}$ . If the average load current is 11.78 A, Calculate,
  - i) Delay angle
  - ii) RMS output voltage and current
  - iii) Average and RMS thyristor current. 9
6. With the help of neat circuit diagram and associated waveforms discuss the operation of a buck converter. 9
7. Explain the operation of 1-phase full bridge inverter supplying a resistive load. Derive the expression for the output RMS voltage. 9
8. With the necessary circuit diagram and waveforms, explain the principle of operation of single phase dual converter. 8



Seat No.	
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**M.E. (Electrical Engineering) (Semester – II) (New CBCS/CGPA)  
Examination, 2016**

**POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM (Paper – VI)**

Day and Date : Saturday, 14-5-2016

Total Marks : 70

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

**SECTION – I**

1. Attempt **all** :

- a) Explain the various benefits and perspectives of facts technology. **8**
- b) Explain basic types of facts controller and their relative importance in brief. **9**

OR

Explain thyristorized switch series capacitor (tssc) in detail.

2. Solve **any two** questions from the following : **(2×9=18)**

- a) Explain midpoint regulation for line segmentation.
- b) Explain thyristorised switched capacitor in detail.
- c) Explain series static VAR compensation in detail.

**SECTION – II**

3. Attempt **all** :

- a) Explain IPFC in detail. **8**
- b) Explain Load compensation in details. **9**

OR

The particulars of a series compensated with a TCSC are  $V = 480 \text{ V}$ ,  $F = 60 \text{ HZ}$ ,  $X = 16 \text{ ohm}$  and  $P_p = 96 \text{ kW}$ . The particulars of the TCSC are  $\delta = 80^\circ$ ,  $C = 25 \mu\text{F}$  and  $L = 0.4 \text{ mh}$ . Find i) The compensated capacitance reactance ii) The degree of compensation iii) The line current iv) The reactive power v) The delay angle  $\alpha$  of the TCSC if the effective capacitive reactance is  $X_t = -40 \text{ ohm}$ .

4. Solve **any two** questions from the following : **(2×9=18)**

- a) Explain UPFC in detail.
- b) Explain the principle of phase compensation in detail.
- c) Compare shunt compensation, series compensation and phase angle compensation in detail.



**SLR-PL – 209**

<b>Seat No.</b>	
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**M.E. (Electrical Engineering) (CBCS/CGPA) (Semester – II)**

**Examination, 2016**

**POWER QUALITY (New) (Paper – VII)**

Day and Date : Monday, 16-5-2016

Max. Marks : 70

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

**SECTION – I**

1. a) What is the meaning of power quality disturbances ? State at least two reasons for increased power quality concern. **8**
- b) With a waveform sketch, explain the terms : **9**
  - i) Voltage sag
  - ii) Voltage interruption
  - iii) Voltage swells
  - iv) Sag with harmonics.
2. a) Explain the characteristics of power quality events in Short duration variations and Long duration. **8**
- b) Discuss about the Computer Business Equipment Manufacture Associations (CBEMA). Explain about the events described in the curve. **9**

**P.T.O.**



SECTION – II

1. Explain for the following :

- i) Harmonic sources from commercial loads.
- ii) Harmonic sources from industrial loads.
- iii) Harmonic sources from residential loads.

**18**

OR

What is the need of locating harmonic sources ? How will you find the harmonic sources from point of common coupling ? Give the identification procedure on the basis of voltage indices.

- 2. a) Explain briefly about practical considerations in the design of Passive Filters. **9**
- b) Discuss about combined shunt and series voltage controller. **9**

OR

Explain in detail about principles of operation of shunt active power filter with neat schematic.

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**SLR-PL – 210**

<b>Seat No.</b>	
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**M.E. (Electrical Engineering) (Semester – II) Examination, 2016  
(New – CBCS/CGPA)  
AC DRIVES (Paper – VIII)**

Day and Date : Wednesday, 18-5-2016

Total Marks : 70

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

**SECTION – I**

1. Attempt **all** :

- a) Derive torque expression for a three phase induction motor and draw its torque-slip characteristic. **8**
- b) Draw a family of torque speed characteristics for a three phase induction motor under stator voltage control. Show load torque curve on this graph. Why this speed control strategy is suitable for only fan type loads ? Comment on efficiency under stator voltage control. **9**

**OR**

Compare stator voltage control and E/f control strategies for speed control of a three phase induction motor.

2. Solve **any two** questions from the following : **(2×9=18)**

- a) Show that under variable frequency control (E/f control), torque produced by a three phase induction motor depends on “s.k”, where s = slip and k = fraction of frequency.
- b) Draw and explain torque and power capability curves for a three phase induction motor. Hence explain constant torque and constant power regions of its operation.
- c) What is closed loop slip control scheme ? With neat block diagram, explain closed loop control of three phase induction motor speed using slip control.

**P.T.O.**





## SECTION – II

3. Attempt **all** :

a) With neat circuit schematic, explain static Scherbius drive. State basic philosophy used for operating induction motor in variable speed mode in this drive. 8

b) Why three phase synchronous motor is not inherently self-starting ? How do we make it self-starting ? 9

OR

With neat block diagram, explain in detail “self-control” mode of synchronous motor drive.

4. Solve **any two** questions from the following : (2×9=18)

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.

b) State advantages of three phase synchronous motor over three phase induction motor. With simple equivalent circuit and phasor diagrams, explain its operation in variable power factor mode. Derive its torque equation.

c) Explain operation of switched reluctance motor. How speed of such motor is controlled using drive ?

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Seat No.	
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**M.E. Electrical (Semester – II) (New – CBCS/CGPA) Examination, 2016  
ADVANCED CONTROL ENGINEERING (Paper – IX)**

Day and Date : Friday, 20-5-2016

Total Marks : 70

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

SECTION – I

1. Attempt **all** : **(2×9=18)**

- a) What are the control structures for controlling various plants ? Explain in detail.
- b) Explain relay control systems for off-line and on-line identification in detail.

OR

Design the PI-PD controller for SISO process model  $G(s) = \frac{2}{s^2 - 4}$  and

PI-PD controller  $G_{c1}(s) = K_p \left( 1 + \frac{1}{T_i s} \right)$  and  $G_{c2}(s) = K_b + T_d s$ . Given model parameters :  $k = 2$ ;  $\alpha_1 = 0$  and  $\alpha_0 = -4$ . Using plot for the optimized coefficients  $c_1 = 0.5 \rightarrow d_2 = 1.595$  and  $d_1 = 2.12$ . Estimate the PI-PD controller parameters controller design for SISO process.

2. Design the feedback-compensation scheme having the process model and the controller transfer function be  $G(s) = \frac{4}{s(2s + 1)}$  and  $G_c(s) = 2s + 1$  for unit step input. **(1×8=8)**

3. Derive the equivalent gain of the relay. **(1×9=9)**

OR

Series-feedback compensation scheme with  $G(s) = \frac{4e^{-2s}}{4s - 1}$  and the controllers

$G_{c1}(s) = \frac{0.262s + 0.131}{2s}$  and  $G_{c2}(s) = 0.5(s + 1)$ . Determine the time-domain performance measures for static load disturbances.

- a) In the absence of the inner-loop controller.
- b) With the inner-loop controller in action.

P.T.O.



## SECTION – II

1. Attempt **all** : **(2×9=18)**

- a) How to identify the FOPDT model by using state-space analysis ?
- b) How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

OR

How to identify the dynamics models of plant in frequency – domain based identification ?

2. Derive the expression for determining exact conditions for existence of limit cycles. **(1×8=8)**

3. How to identify the SOPDT T.F. model with pole multiplicity is  $G(s) = \frac{k(T_0s + 1)}{(T_1s + 1)^2}$  ? **(1×9=9)**

OR

Describe the first order system by using state-space analysis.

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SLR-PL – 214

Seat No.	
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**M.E. (Electrical Engineering) (Semester – II) Examination, 2016  
HIGH VOLTAGE DC TRANSMISSION (Elective – II)  
(New – CBCS/CGPA) (Paper – X)**

Day and Date : Monday, 23-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. Attempt **all** :

- a) Explain differences between HVAC and HVDC. What are the different applications of D.C. transmission system ? 8
- b) With the help of neat sketches, analyze a six pulse rectifier bridge circuit with an overlap angle less than  $60^\circ$ . Deduce the relevant equations and draw the necessary graphs. 9

2. Solve **any two** : (2×9=18)

- a) What is meant by Peak Inverse Voltage (PIV), pulse number, valve rating and transformer rating ? Show that rating of the valve used in Graetz circuit is  $2.094 P_d$ , where  $P_d$  is d.c. power transmitted.
- b) In a monopolar HVDC link which is energised with 3-ph, 50 Hz, 400 kv source, the Dc current is 1 KA and the rectifier (six pulse bridge converter) end DC voltage is 500 Kv. For delay angle  $15^\circ$
- Find the commutation resistance.
  - Find the commutation angle  $u$ .
  - If AC voltage reduced to 200 kv, find the commutation angle  $u$ . Assume DC current is constant.
- c) Explain in detail the converter control characteristics of HVDC systems.

P.T.O.



## SECTION – II

3. Attempt **all** :

- a) Discuss the various faults exist in converter station. Explain. **8**
- b) Explain the following current control methods of MTDC system :
  - i) Current margin method
  - ii) Two ACR method. **9**

4. Solve **any two** : **(2×9=18)**

- a) What are the causes of over voltages and explain type of over voltages in a converter station in details ?
  - b) Give in detail the different sources of reactive power. Write a note on the following sources of reactive power
    - i) Synchronous condensers
    - ii) Static VAR system.
  - c) Classify the solution methodology for AC-DC load flow and explain.
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SLR-PL – 215

Seat No.	
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**M.E. (Electrical Engineering) (Semester – III) Examination, 2016  
SELF LEARNING SUBJECT : SMART GRID (Paper – I)**

Day and Date : Wednesday, 25-5-2016  
Time : 11.00 a.m. to 2.00 p.m.

Max. Marks : 70

SECTION – I

1. Attempt **all** :

- a) Explain the following terms related to Smart Grid.  
i) Objectives                      ii) Functions                      iii) Challenges.                      **8**
- b) Explain the concept plug in Hybrid Electric Vehicles.                      **9**

OR

Explain phase measurement unit and its importance in smart grid.

2. Solve **any two** questions from the following :                      **(2×9=18)**

- a) Concept of Smart Grid and its characteristics.  
b) Explain in detail the Outage Management System (OMS) and functions of each part of OMS.  
c) Write a note on Smart Substation and its benefits.

SECTION – II

3. Attempt **all** :

- a) Write down the challenges and disadvantages of microgrid development.                      **8**  
b) Explain “micro turbine”.                      **9**

OR

Write a note on :

- i) Wi-Max                      ii) ZigBee

4. Solve **any two** questions from the following :                      **(2×9=18)**

- a) Explain concept of microgrid and its need and application. What are the key differences between a Microgrid and a conventional power plant ?  
b) Describe the concept power quality conditioning technologies.  
c) Explain the term “NAN”. Explain the concept of WAN related to smart grid.
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