SLR-PD – 1

Seat No.	

M.E. (Civil-Structural Engineering) (Semester – I) Examination, 2015
(Paper – I) THEORY OF ELASTICITY AND PLASTICITY

Day and Date : Friday. 22-5-2015 Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

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

SECTION – I

1. a) By ignoring, is the following state of stress is possible :

$\sigma_x = 20\ x^2yz,\ \sigma_y = xy^3z,\ \sigma_z = 3\ x^3 + y^3 - 5yz$

$\tau_{xz} = 0,\ \tau_{xy} = -\ 3\ xy^2z,\ \tau_{yz} = -\ 12\ z^2xy^2 + 14\ x^2$

If Not, what body forces will satisfy the equilibrium equations ? **11**

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

2. a) Write generalized stress strain relation for problem in elasticity. **5**

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

3. a) Find values of k_i for following Airy's stress function to satisfy equilibrium equation : **9**

$\phi = K_1x^4 + 2xy\ (K_2x^2 + 3K_3xy + K_4y^2) + K_5y^4$

b) Derive six strain compatibility equations for in Cartesian coordinate for 3-D problem in elasticity. **9**

P.T.O.

SECTION – II

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

5. Write note on : **(3×6=18)**

   a) Drucker's Postulate

   b) Prandtl-Reuss relations

   c) Idealized material behaviour in plasticity

6. a) Find yield stress in unidirectional tension using Mises criterion for a material with following state of stress : **8**

   $\sigma_x = 100$ MPa, $\sigma_y = 83$ MPa, $\tau_{xy} = 45$ MPa

   b) Find collapse load for a simply supported isotropic circular plate loaded with point load at centre. **9**

SLR-PD – 10

Seat No.	

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

Day and Date : Monday, 1-6-2015 Max. Marks : 70

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

Instructions : *1) Solve **any two** questions from **each** Section.*
*2) **Use** of IS 1893:2002 is **permitted**.*
*3) Figures to **right** indicate **full** marks.*
*4) Assume suitable data **if necessary** and state **it clearly**.*

SECTION – I

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

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

2. a) State and explain the concept of response spectrum and various types of response spectra. **10**

   b) What is combined spectrum ? What are its characteristics ? **7**

3. Derive expression for maximum displacement, velocity and acceleration response of SDOF system subjected to earthquake ground motion. From these expressions explain the concept of pseudo velocity and pseudo acceleration spectra. **18**

SECTION – II

4. A four storey R.C.C. office building is of 5m × 5m size in plan. 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 is 12 kN/m^2 on floors and 12 kN/m^2 on the roof. The live load is 3 kN/m^2 on floors and 1.5 kN/m^2 on the roof. The height of each floor is 3.2 m. Determine the lateral forces and storey shear. **18**

5. What is confining reinforcement ? Explain in detail with neat sketches where and how the confining reinforcement is provided ? **17**

6. a) Define a soft storey. What are the IS provisions for soft storey ? **10**

   b) Explain the concept of structural health monitoring. **7**

SLR-PD – 100

Seat No.	

M.E. (Mechanical Engineering) Semester – I Examination, 2015
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Tuesday, 26-05-2015 Total Marks : 70

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

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

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

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

SECTION – I

1. a) Explain objectives and significance of research. **6**

   b) Describe the technique involved in defining a research problem. **5**

2. a) Explain the criteria of good research. **6**

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

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

   b) Explain the terms dependent and independent variables. **5**

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

   a) Importance of literature review in research.

   b) Statistical Process Control.

   c) Types of research.

   d) Controllable and Uncontrollable variables.

   e) Classification of mathematical models.

SECTION – II

5. a) Explain the guidelines for the design of experiments. **6**

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

P.T.O.

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

   b) Explain the difference between convergent and divergent thinking. **6**

7. a) Explain response surface method. **6**

   b) Comment on creativity and intelligence. **5**

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

   a) Descriptive and inferential data.

   b) Types of reports.

   c) Importance e and parameters of review paper.

   d) Normal Distribution.

   e) Regression analysis.

SLR-PD – 101

Seat No.	

M.E. (Mechanical Engg.) (Part – I, Semester – I) Examination, 2015
FINITE ELEMENT METHOD (Elective – I) (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain different softwares in use of FEM. **6**
   b) Explain in details discretization of element. **6**

2. a) Explain with the help of suitable examples plane stress and plane strain. **6**
   b) Explain different types of element. **5**

3. a) Explain steps of FEM. **6**
   b) Explain type meshing and its effect on accuracy of result. **5**

4. Write shorts notes (**any three**). **(4×3 = 12)**
   a) 3D 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**

P.T.O.

7. a) Integrate the following using loan integration formula. **6**

   i) $\int_L Ni\ Nj\ dx$

   ii) $\int_L Ni^2\ dx$.

   b) Explain isoparametric solid elements. **5**

8. Write shorts notes (**any three**). **(4×3 = 12)**

   a) Herimite's interpolation formula.

   b) Role of different softwares in the use of FEM.

   c) Shell elements.

   d) Modal analysis using FEM.

SLR- PD – 103

Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2015
DESIGN ENGINEERING (Paper – VI)

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Importance of SVAJ diagram. **4**

   b) Plot the SVAJ diagram for 3-4-5 polynomial cam
   Dwell zero displacement for 90°
   Rise at 20 mm displacement for 90°
   Dwell at 20 mm displacement for 90°
   Fall at 20 mm displacement for 90°
   Angular velocity of cam = 2π rad/sec. **7**

2. a) Explain significance of thermal stresses. **5**

   b) Explain in detail addition of thermal and working stresses. **7**

3. a) Explain design of variable drives. **4**

   b) What are the types of electric motors used as drives ? Discuss the important factors affecting the selection of electric motors. **7**

4. Write short note on **any three** of the following : **(4×3=12)**
   i) Fracture mechanics approach in design
   ii) Creep in materials
   iii) Form design
   iv) Polydyne cam.

P.T.O.

SECTION – II

5. a) Explain residual stresses in plastic bending. **4**

   b) Discuss the discontinuity stresses developed in cylindrical pressure vessels with hemispherical end covers. **7**

6. a) Explain significance of Bath tube curve. **5**

   b) With usual notations derive the expressions for Z(t), R(t), f(t), in reliability. **7**

7. a) Explain the terms shape factor and spring back. **4**

   b) In the test involving continuous satisfactory performance of elastic instrument under excessive vibratory conditions following failure frequencies are observed.

   Find :

   i) MTTF

   ii) R(t)

   iii) Z(t)

Time interval	0 – 1	1 – 2	2 – 3	3 – 4	4 – 5	5 – 6	6 – 7	7 – 8
No. of failures	3	16	22	42	11	9	4	3

7

8. Write short note on **any three** of the following : **(4×3=12)**

   i) Rayleigh distribution

   ii) Weibull distribution

   iii) Cumulative damage in fatigue

   iv) Systems reliability.

SLR-PD – 104

Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2015
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Paper – VII)

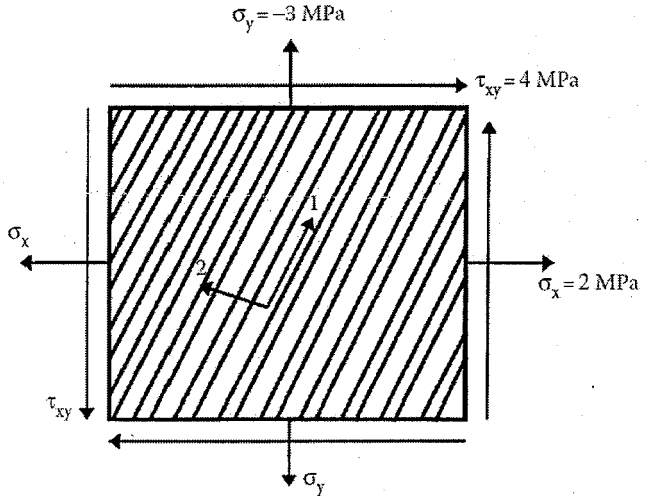
Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) What is the difference between the thermosets and thermoplastics ? Give some examples of both. **7**
   b) Write a note on types of ceramic fibers and particulate composites. **7**
2. a) Explain in detail the applications of composites. **7**
   b) What are prepregs ? Explain Prepreg Manufacturing. **7**
3. a) Reduce the monoclinic stress-strain relationships to those of an orthotropic material. **7**
   b) Find the following for a 60° angle lamina (Figure) of graphite/epoxy. **7**
      1) Transformed compliance matrix.
      2) Transformed reduced stiffness matrix.

      $\sigma_1 = 2MPa,\ \sigma_2 = -3MPa,\ \tau_{12} = 4MPa$.

      Engineering elastic constants of the unidirectional graphite/epoxy lamina are
      $E_1 = 181$ GPa, $E_2 = 10.3$ GPa
      $v_{12} = 0.28$, $G_{12} = 7.17$ GPa.



P.T.O.

4. a) Explain the Tsai-Hill failure criteria for biaxial orthotropic materials. **7**

   b) A glass/epoxy lamina consists of a 70% fiber volume fraction. Use the following properties of glass and epoxy, to determine the

      1) Density of lamina
      2) Mass fractions of the glass and epoxy
      3) Volume of composite lamina if the mass of the lamina is 4 kg
      4) Volume and mass of glass and epoxy in part (3). **7**

5. a) Derive the resultant forces and moments in terms of the midplane strains and curvatures for laminate. **7**

   b) Write short note on :

      - Inter-laminar Stresses
      - Strength of Laminate. **7**

6. a) Derive the governing Bending equilibrium equation for laminated plates. **7**

   b) Explain the transverse shear effects on cylindrical bending of an infinitely long cross-ply strip. **7**

7. a) Explain the application of fracture mechanics to composite materials. **7**

   b) Explain the effect of material properties on stresses at the edge of a circular hole in a orthotropic plate under principal stress applied :

      - Along the fiber orientation
      - At an angle to the fiber orientation. **7**

8. a) Explain in detail the configuration selection in structural design. **7**

   b) Write short note on stiffeners and stiffeners design parameters. **7**

SLR-PD – 105

Seat No.	

M.E. (Mechanical Engg.) (Semester – II) Examination, 2015
Paper – VIII : MECHATRONICS SYSTEM DESIGN

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Comment on traditional design and mechatronic design approach using suitable examples. **7**
   b) Explain the performance terminology of measurement systems. **7**
2. a) Write a note on Piezo-electric sensors. **7**
   b) Explain Signal Conditioning Process and explain Operational Amplifiers. **7**
3. a) Explain briefly pneumatic actuation systems. **7**
   b) With suitable example explain ladder programming. **7**
4. Write short notes on the following : **14**
   i) Timers in PLC
   ii) Mechatronic system modeling
   iii) Temperature sensors.
5. a) Explain counters in PLC. **7**
   b) Draw and Explain Pin configurations of 8051. **7**
6. Explain, in details, any one automation application of PLC. **14**
7. Explain, in details, how real time interfacing can be done for stepper motor control system. **14**
8. Write notes on the following : **14**
   i) Mechatronic on-line quality monitoring system.
   ii) Artificial intelligence in mechatronics.
   iii) Fuzzy control.

SLR-PD – 106

Seat No.	

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

Day and Date : Wednesday. 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Explain the concept of industrial design. **7**
   b) Explain the design and development process of industrial products. **7**
2. a) Discuss the ergonomic aspect of design of machine tools. **7**
   b) Explain the process of setting specifications of a product. **7**
3. a) Explain the importance of balance and proportion in case of consumer product. **7**
   b) Explain the standard and legal requirements of consumer products. **7**
4. a) Explain the concept of unity and order with variety. **7**
   b) Explain the influence of line and form in the aesthetics of a product. **7**
5. a) Explain the maintenance aspects of a product design. **7**
   b) Write a note on 'Drawing office procedure'. **7**
6. a) Explain significance and use of creativity in product design. **7**
   b) Discuss mechanics of seeing. **7**
7. a) Write a note on modeling technique used in product design. **7**
   b) Write a note on use of standardization in cost reduction. **7**

SLR-PD – 107

Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2015
MATERIAL HANDLING EQUIPMENT DESIGN (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Discuss the basic principles of material handling. **6**
   b) Explain classification of material handling equipment. **5**

2. Discuss types, design considerations for various types of industrial power trucks used in material handling. **12**

3. Discuss construction, working and below mentioned parameters for
   a) Screw conveyors
   b) Gravity roller conveyor.
   parameters to be covered - sizes, power requirement, speed, capacity, advantages and limitations. **12**

4. a) Explain System design and Economics in Material Handling. **6**
   b) Explain the relation of packaging and storage of material with material handling. **5**

P.T.O.

SECTION – II

5. Give detailed design steps for following elements (any four) of belt conveyors. Assume suitable material and its properties and other parameters.
   a) Driver motor power
   b) No. of idler roller
   c) Design of belt for strength
   d) Design of drive rollers
   e) Design of support structure. **12**

6. a) Explain steps for solving material handling problem. **6**

   b) Explain the parameters affecting performance of material handling system. **5**

7. a) Assuming suitable capacity, height and travel on cross beam and other required data, give the design steps of following elements of EOT crane.
      I) Hook design
      II) Wire rope design. **6**

   b) Discuss failure analysis of material handling systems. **5**

8. Write note on (**4** marks **each**) : **12**
   a) Chains and Sheaves
   b) Material handling and plant layout
   c) Sprockets and drums.

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SLR-PD – 108

Seat No.	

M.E. Mechanical Engineering (Semester – II) Examination, 2015
ROBOTICS (Elective – II) (Paper – X)

Day and Date : Friday, 5-6-2015 Max. Marks : 70

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

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

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

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

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

1. a) What is a robot ? With the help of sketch describe pitch, yaw and roll motions of a robot wrist. **7**

   b) Explain the origin and various generations of robots. Sketch and explain the work envelope of a cylindrical robot. **7**

2. a) Describe the textual robot language structure. **7**

   b) What are the four main types of motion control used in robot programming ? Which provides the best control ? Explain briefly. **7**

3. Discuss the advantages of using pneumatic drives in the robots. Discuss the different types of pneumatic drives used in the robots with the help of neat sketches. **14**

4. Explain the applications and working principle of : **14**

   i) Range sensors

   ii) Tactile sensors.

P.T.O.

5. a) What are the different types of actuators used for robots ? Explain the working of a hydraulic actuator system. **7**

   b) Classify the robot end-effector from the view point of control. Sketch and explain a cam actuated gripper used for robots. **7**

6. What is inverse kinematics problem ? Explain the solution to the inverse kinematics problem with an example. **14**

7. Write short notes on the following : **14**

   a) Spray painting robot.

   b) Inspection robot.

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SLR-PD – 11

Seat No.	

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

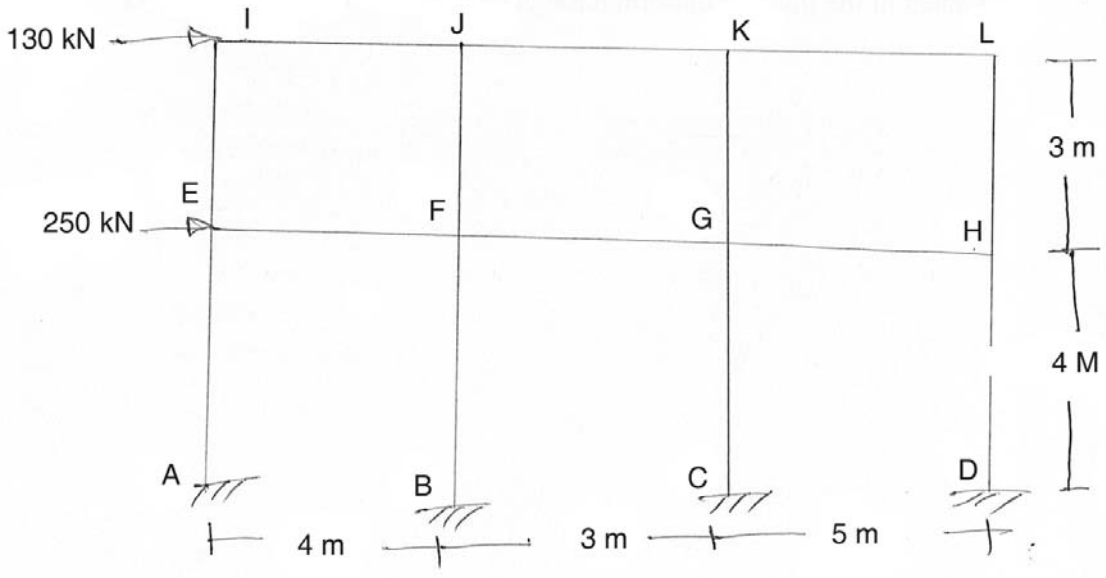
Day and Date : Wednesday, 3-6-2015 Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. The effective span of a through type girder railway bridge is 50 m for a single lane B.G. track. The cross girders a speed at 5.5 m apart. The stringers are spaced at 2.8 m between centre line. The weight of stock and check rails are 0.5 kN/m and 0.4 kN/m. Sleepers are placed 0.45 m c/c. Weight of P.S.C. sleepers is 25 kN/m^3. The main girders are provided at 6.2 m apart, determine the design forces in top, bottom, vertical and diagonal members of central panel. Design the bottom member and vertical member. The bridges is to carry a equivalent U.D.L. line load of 4200 kN for B.M. and 4500 for shear force. **18**

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



P.T.O.

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

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

   c) Find moment of resistance of the hot section 100 mm × 150 mm × 4 mm with lip 56 mm. **7**

SECTION – II

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

   b) A fixed beam of span 5 m carries a uniform distributed load 5.2 kN/m on the right hand 4.2 m portion of the beam. The load factor is 1.75 and the shape factor is 1.15. The yield stress is 250 MPa. Calculate the section modulus of the beam and locate the position of plastic hinges. **12**

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

   b) Design a cased column to carry a load of 1150 kN. The effective length of column is 4.2 m. **9**

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

   b) Determine the values of fully plastic moment of the frame, when loaded upto portal collapse. The portal frame has vertical layer AB = 2.4 m, CD = 5 m and horizontal portion BC = 5.5 m. The end A is fixed and is also fixed. A horizontal load of 35 kN towards B is acting at B and a vertical load of 45 kN acting downwards is a 2 m from B on BC portion. The plastic moment of the frame is uniform through out. Draw BMD also. **12**

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SLR-PD – 110

Seat No.	

M.E. (Mechanical – Manufacturing Process) (Semester – I) Examination, 2015
(Paper – I) ADVANCED MANUFACTURING TECHNIQUES

Day and Date : Friday, 22-5-2015 Max. Marks : 70
Time : 11.00 a.m to 2.00 p.m.

***Instructions** : 1) **All** questions are **compulsory** from each Section.*
*2) Figure to **right** indicate **full** marks.*
*3) **Assume** suitable data if required and state **clearly**.*

SECTION – I

1. a) Explain with neat sketch ECD. **5**
   b) Explain with neat sketch WJM. **5**

2. a) Explain in detail explosive welding. **5**
   b) Explain with neat sketch ECG. **5**

3. Write short note on : **(5×3=15)**
   i) AFM.
   ii) Welding defects and measurement.
   iii) Under water welding.

SECTION – II

4. a) Explain precision fine blanking process. **5**
   b) Explain CVD. **5**

5. a) Explain with neat sketch FDM. **5**
   b) Explain plasma spraying. **5**

6. Write short note on : **(5×3=15)**
   i) Electro less coating technology.
   ii) Prevention of corrosion and erosion wear.
   iii) SLS.

SLR-PD – 111

Seat No.	

M.E. (Mech. Manufacturing Process Engg.) (Semester – I) Examination, 2015
(Paper – II) : ELECTRO PHYSICAL PROCESSES

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Make a comparison of Modern Machining Processes as per their process capabilities. **7**

   b) Enlist and explain various applications of Modern Machining Processes. **7**

2. Derive the MRR relation in USM as suggested by Cook. **14**

3. a) Explain electrochemical discharge machining with a neat sketch stating its principle. **9**

   b) What are the functions and characteristics of an electrolyte used in ECM process ? **5**

4. a) Comment on future trends of Spark Machining. **7**

   b) Explain electrode feed control used in EDM. **7**

5. a) In EDM, employing R-C realization circuit, discuss the effect of :

      i) Charging resistance

      ii) Gap setting

      iii) Capacitance on MRR. **7**

   b) Discuss the process capabilities and limitations of LBM. **7**

P.T.O.

6. a) Explain various applications, advantages and limitations of AJM. **8**

   b) Write a short note on design of nozzle in AJM. **6**

7. Write short note on **(any three)** : **14**

   a) Process capabilities of EBM

   b) Application of LASER in micromachining

   c) Wire EDM

   d) Stray cutting in EDM.

SLR-PD – 112

Seat No.	

M.E. (Mech. Manufacturing Process) (Semester – I) Examination, 2015
Paper – III : COMPUTER AIDED MANUFACTURING

Day and Date : Monday, 25-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Explain parts classification and coding system. **7**
   b) Explain FMS types and explain FMS flexibilities. **7**

2. a) Explain how GT cell is different from Process Layout. **7**
   b) Explain the role of AS/RS and AGV in a manufacturing system. **7**

3. a) With appropriate example, discuss Process Capability Index. **7**
   b) What is Concurrent Engineering Approach ? Explain briefly. **7**

4. a) What is the importance of Group Technology in CAPP ? Explain. **7**
   b) Explain objectives of Cellular Manufacturing and explain composite part concept. **7**

5. a) Differentiate MRP and ERP. **7**
   b) What is SFC ? Explain. **7**

6. a) Explain Production Flow Analysis. **7**
   b) Discuss e-manufacturing. **7**

7. a) What is canned cycle ? Explain any two drilling canned cycles with their syntax. **7**
   b) Differentiate the NC and CNC machines. **7**

SLR-PD – 113

Seat No.	

M.E. – Mechanical (Mfg. Process Engg.) (Sem. – I) Examination, 2015
(Paper – IV) RELIABILITY AND TEROTECHNOLOGY

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70

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

***Note** : 1) Answer **any five full** questions.*
*2) Figures to the **right** indicate **full** marks.*
*3) **Use** of nonprogrammable calculator is **allowed**.*
*4) Make suitable assumptions **whenever** necessary and state it clearly.*

1. a) What is the bath-tub curve ? Explain important features of this curve. **6**

   b) The following short sample refers to an accelerated lie testing of a system. **8**

Failure No.	1	2	3	4	5	6
Operating Hours	26	10	21.5	15.5	35	32

   Plot the variation of reliability against time by :

   i) Mean and

   ii) Median Ranking Method.

2. a) Explain MTTF MTBF and MTTR. **6**

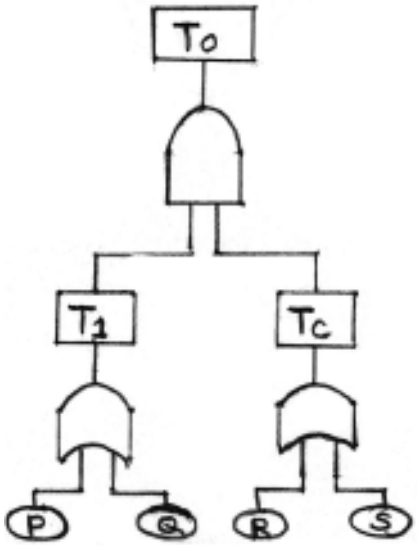
   b) Following table shows the results of life tests carried out on 500 components simultaneously. Evaluate hazards rate, failure density function and reliability of these functions. **8**

Operating Time (Years)	0	1	2	3	4	5
Number of Surviving Components	500	450	420	340	270	180

P.T.O.

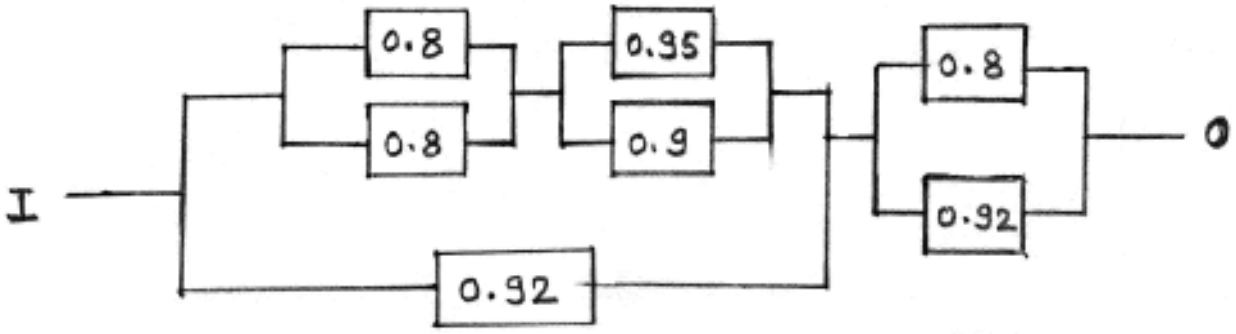
3. a) Discuss the method of allocations of reliabilities of various components of a system using ARNIC method. State the assumptions used. **6**

   b) A logical gate diagram for FMEA study has been shown in fig. 1. The basic failure modes of P, Q, R and S have failure rates 0.003, 0.004, 0.003 and 0.005 per hour respectively. Find out the failure rate of T_0. Assume mission time of 100 hrs. **8**



4. a) Explain the meaning and significance of terotechnology referring its various objectives and techniques involved. **6**

   b) Calculate the reliability for the system shown in the fig. 2 **8**



5. a) How Analytical Hierarchy Process (AHP) is used to make the decisions for organization ? **8**

   b) Discuss condition based maintenance. **6**

6. Write short notes on the following (**any two**) : **(2×7=14)**
   a) Preventive maintenance Vs Condition based maintenance
   b) Reliability Centered Maintenance (RCM)
   c) Availability and Maintainability.

SLR-PD – 115

Seat No.	

M.E. Mechanical (Mfg. Process) Engg (Semester – I) Examination, 2015
DESIGN FOR MANUFACTURING (Elective – I) (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Answer **any five full** questions.*
*2) Figures to the **right** indicate **full** marks.*
*3) **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.

SLR-PD – 116

Seat No.	

M.E. Mechanical (Manufacturing Process Engg.) (Part – I) (Sem – I) Examination, 2015
Elective – I : MANAGEMENT OF TECHNOLOGY (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Attempt **any five** questions.*
*2) Assume suitable data **wherever** necessary and state it clearly.*
*3) Draw appropriate sketches **wherever** required.*
*4) Figures to the **right** indicate **full** marks.*

1. Explain process innovation with models, sources and strategies. **14**

2. Explain the concept of technology road-mapping in technology forecast with example of computing technology. **14**

3. Explain the hype cycle with respect to technology management. State its uses with examples. **14**

4. Describe Metcalf's law in technology transfer and S-curve in technology adoption. **14**

5. What is MoT ? Illustrate factors affecting MoT. **14**

6. Describe Actor-Network theory related to technology management. **14**

SLR-PD – 118

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2015
Paper – VI : ADVANCED MANUFACTURING TECHNIQUES – II

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Q. No. **4** and Q. No. **8** are **compulsory**. Solve **any two** questions from **remaining three** questions from **each** Section.*

*2) Figure to **right** indicate **full** marks.*

*3) **Assume** suitable data **if required** and state **clearly**.*

SECTION – I

1. a) Explain continuous casting process. **5**

   b) Discuss different types of remedies in casting defect. **5**

2. a) What are the features of investment casting ? **5**

   b) Explain honing process. **5**

3. a) Write importance of deburring of casting. **5**

   b) Explain one process of inspection of casting. **5**

4. Write short note on : **(5×3=15)**

   a) Lapping.

   b) Super finishing process.

   c) Shell molding.

P.T.O.

SECTION – II

5. a) Explain magnetic forming process. **5**

   b) Discuss solid explosion forming process. **5**

6. a) Explain one powder manufacturing process. **5**

   b) What is significance of powder metallurgy in manufacturing ? Explain powder metallurgy process. **5**

7. a) Explain injection moulding process in plastic. **5**

   b) Explain blow moulding in plastic. **5**

8. Write short note on : **(5×3=15)**

   a) HERF.

   b) Expansion moulding.

   c) Sintering.

SLR-PD – 119

Seat No.	

M.E. Mechanical (Semester – II) (Manufacturing Process) Examination, 2015
ROBOTICS AND ROBOT APPLICATIONS (Paper – VII)

Day and Date : Saturday, 30-5-2015 Max. Marks : 70

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

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

1. a) Define a robot. With the help of sketch describe pitch, yaw and roll motions of a robot wrist. **7**

   b) Discuss the origin and various generations of robots. Sketch and explain the work envelope of a cylindrical Robot. **7**

2. a) Discuss the textural robot language structure. **7**

   b) What are the four main types of motion control used in robot programming ? Which provides the best control ? Explain briefly. **7**

3. What are the advantages of using pneumatic drives in the robots ? Discuss the different types of pneumatic drives used in the robots with the help of neat sketches. **14**

4. Discuss the applications and working principle of : **14**

   i) Range sensors ii) Tactile sensors.

5. a) What are the different types of actuators used for robots ? Explain the working of a hydraulic actuator system. **7**

   b) Classify the robot end-effector from the view point of control. Sketch and explain a cam actuated gripper used for robots. **7**

6. What is inverse kinematics problem ? Explain the solution to the inverse kinematics problem with an example. **14**

7. Write short notes on the following : **14**

   a) Spray painting Robot b) Inspection Robot.

SLR-PD – 12

Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. Answer **any three** of following : **(3×3=9)**

   A) With a neat sketch show the components of bridges.

   B) Describe the effective width method of analysis of deck slab.

   C) What is economic span of bridge ? How it is calculated ?

   D) How the water current forces are calculated ? Discuss.

   E) Explain the investigations required for the selection of bridge site.

2. Design a solid deck slab for following data : **13**

   a) Clear span = 8 m

   b) Wearing coat = 80 mm

   c) Curb = 600 mm wide, 250 mm thick

   d) Loading = 1RC class A (Two lane)

   e) Use M-25 core, Fe – 415 steel.

P.T.O.

3. Find load factors for all girders as shown in fig. 3.1. Design the exterior girder. Take 1RC class AA tracked loading. Consider M-25, Fe-415. **13**

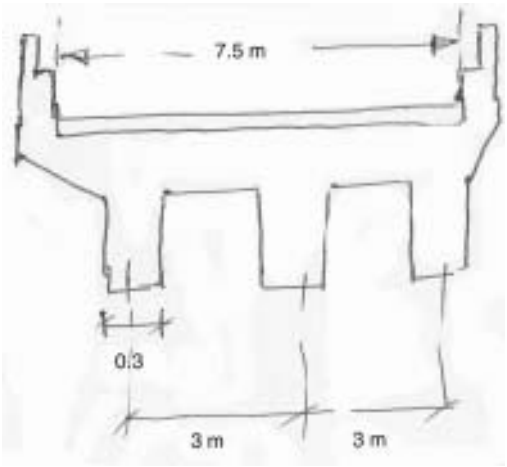


Fig. 3.1

Span = 16 m, five cross girder.

Remaining necessary data if required assume and mention.

SECTION – II

4. Answer **any three** of following : **(3×3=9)**

A) Write about different forces acting on Bridge Pier.

B) Explain different types of bearings with their suitability.

C) Explain various types of expansion joints.

D) Write about inspection of bridges.

E) Explain different erection methods for bridges.

5. Check the adequacy of abutment investigate FOS against sliding and overturning for the abutment as shown in fig. 5.1. **13**

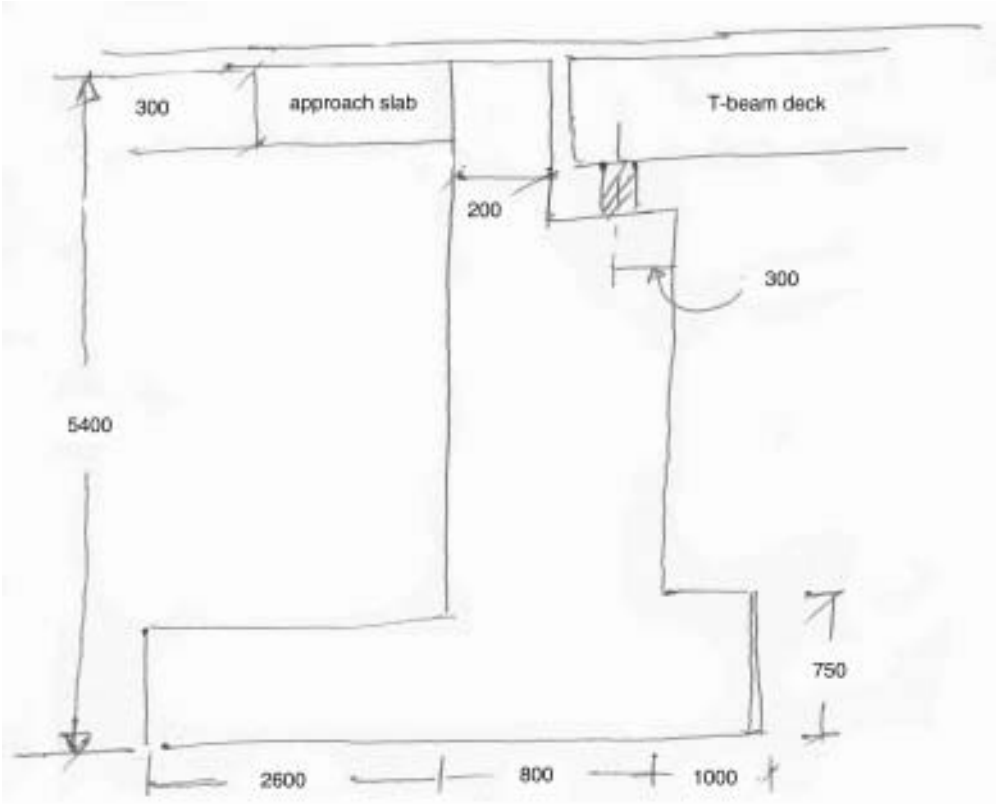


Fig. 5.1

6. A) Write a note on : **(3×2=6)**
   i) Reinforced earth abutment
   ii) Forces on Piers.

   B) Design a neoprene unreinforced bearing pad for following data : **7**
   1) Vertical load (sustained) = 192 kN
   2) Vertical load (Dynamic) = 65 kN
   3) Horizontal force = 60 kN
   4) Coeff. of friction = 0.3
   5) Modulus of rigidity of elastomer = $1^{N}/mm^{2}$.

SLR-PD– 120

Seat No.	

M.E. – Mechanical (Mfg. Process) Engg. (Semester – II) Examination, 2015
MANUFACTURING PROCESS MODELLING (Paper – VIII)

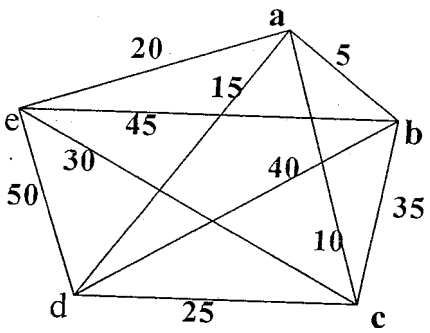
Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

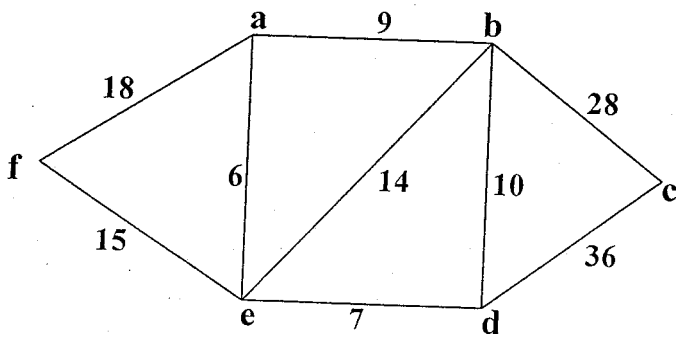
1. a) What is role of performance modeling in automated modeling system. **8**

   b) Explain Flexible manufacturing system. **6**

2. a) Carry out the closest insertion method for the travelling sales man problem for the complete weighted graph shown below from vertex "a". **7**



   b) Use Dijkstra's algorithm on connected weighted graph shown below to find length of shortest paths from the vertex "f" to each of other vertices. **7**



P.T.O.

3. a) Difference between deterministic Vs. Stochastic simulation model. **8**

   b) Write note on Boltzman learning and encoding scheme. **6**

4. a) Explain the multiple correlation analysis. **6**

   b) Find out regression coefficients bxy and byx, if $\Sigma x = 50$, $\overline{X} = 5$, $\Sigma y = 60$, $\overline{Y} = 6$, $\Sigma xy = 350$, $o'x = 5$ and $o'y = 8$. **8**

5. a) Explain components of generic algorithm in detail. **10**

   b) Write note on Single layer network. **4**

6. a) Differentiate between competitive learning and steepest learning. **8**

   b) Write short notes of the following : **6**

      i) Recurrent network

      ii) Multilayer network.

SLR-PD – 121

Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2015
Paper – IX : MACHINE TOOL ENGINEERING

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any five full** questions*
*2) Assume suitable data **wherever** necessary and state it **clearly**.*

1. a) Describe the following :
   1) Epi-cyclic drive in machine tool.
   2) Frictions in slide ways. **7**
   b) What is maintenance of machine tools ? Describe the procedure for acceptance test. **7**

2. a) Discuss the trends towards development of new metal cutting processes with one example. **7**
   b) Discuss briefly the economics of metal cutting processes and obtain optimum cutting speed corresponding to maximum tool life. **7**

3. a) Discuss use of system approach in analyzing problems connected with tribological behaviour of material and parts used in machine tool. **7**
   b) What are the points to be considered while designing slideways ? Explain briefly any three. **7**

4. a) Explain stepped and stepless drive. How is it obtained ? **7**
   b) Explain the following : **7**
   1) Ray diagram
   2) Speed spectrum in geometric progression.

P.T.O.

5. a) Explain the difference between FMC and FMS. Why is FMS's acceptance by industry slow ? **7**

   b) Name the basic features of a machine tool. Briefly explain any three. **7**

6. a) Explain the phenomenon of stick-slip vibration of machine tool and the concept of positional displacement error due to discontinuity of velocity. **7**

   b) Explain with neat sketch the limit constraint adaptive control system (Block diagram). **7**

7. Write short notes on **(any two)** : **14**

   a) Torso variator

   b) Mechanical and electrical automatic control systems

   c) Forced and self-excited vibrations.

SLR-PD – 122

Seat No.	

M.E. Mechanical (Mfg Process) Engineering (Semester – II) Examination, 2015
Paper – X : TOTAL QUALITY CONTROL (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70

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

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

1. a) Compare six-sigma with specification limits. **8**

   b) Explain quality cost in detail. **6**

2. a) Discuss Ishikawa's concept of quality with a suitable example. **7**

   b) Discuss the TQM philosophies by Crossby and Conway in brief. **7**

3. a) Discuss type-I and type-II error in detail. **6**

   b) What is the role of QFD in maintaining the quality ? Explain the methods of capturing the customer's requirements. **8**

4. a) Discuss the procedure of ISO documentation in detail. **6**

   b) Explain the dimensions of Quality in detail. **8**

5. Discuss the case study on IBM in quality control point of view. **14**

6. Write short notes of the following (**any two**) : **14**
   i) Quality Audit
   ii) House of Quality
   iii) Deming prize criteria.

SLR-PD – 125

Seat No.	

M.E. (Mech. – Mfg. Process) (Sem. – II) Examination, 2015
COMPUTATIONAL TECHNIQUES (Paper – X) (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) A circular shaft one meter length has varying radius 'r' as follows : **9**

x (m) :	0	0.25	0.5	0.75	1
r (m) :	1.0	0.9896	0.9589	0.9089	0.8415

An axial pull of 300 kN is applied at one end of the shaft whose modulus of elasticity is 200×10^9 N/m^2. The axial elongation of shaft (Δx) is given by,

$\Delta x = \frac{P}{E}\int_0^1 \frac{1}{A}\,dx$ where A = cross sectional area of shaft.

Determine elongation of shaft over the entire length by Simpson's $1/3^{rd}$ rule.

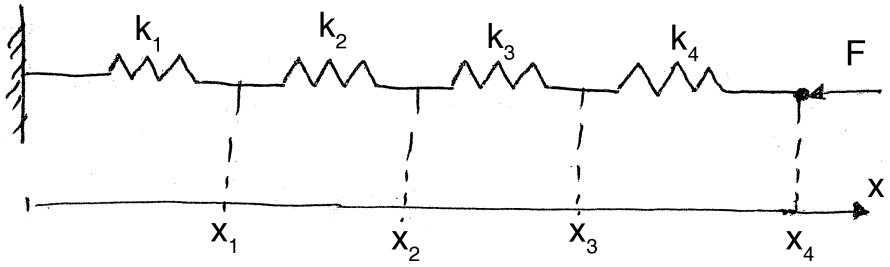
b) From the following table, obtain f (x) as a poly-nomial in power of (x – 5) : **8**

x :	0	2	3	4	5	6
f (x) :	4	26	58	112	466	922

Using Newton's divided method.

P.T.O.

2. a) Figure shows an arrangement of 4 springs in series being compressed with a force of F = 2000 N. At equilibrium force balance equations can be developed defining the interrelationship between the springs : **10**



$K_2 (x_2 - x_1) = K_1 x_1$

$K_3 (x_3 - x_2) = K_2 (x_2 - x_1)$

$K_4 (x_4 - x_3) = K_3 (x_3 - x_2)$

$F = K_4 (x_4 - x_3)$

Where 'K' are the spring constants if K_1 through K_4 are 150, 50, 100 and 200 N/mm. Find x_1, x_2, x_3, x_4 by Gauss elimination method ?

b) Fit a curve $T = at^2 + bt + c$ where T = temp. °C and t = time in second for the given data : **8**

t (sec.) :	0	1	2	3
T (°C) :	0	5	8	14

3. a) A closed system, undergoes a frictionless process according to the law

$P = \left[\frac{4.5}{V} + 2\right]$ where P = pressure (N/m^2)

V = Volume (m^3/kg).

During this process volume changes from 0.04 m^3/kg to 0.12 m^3/kg with change in internal energy (ΔU) = 94.43 J/kg. Find the heat transfer per kg using Simpson's $\frac{3}{8}^{th}$ rule. Take h = 0.013 m^3/kg. According to first law of thermodynamics, heat transfer (Q) is given as $Q = \Delta U + W$ and $W = \int_{v_1}^{v_2} P dv$ where W = work done. **10**

b) If x = 3.4327, find the values of absolute and relative errors if : **7**

i) x is truncated to three decimal places

ii) x is rounded off to three decimal places.

SECTION – II

4. A) Consider a ruled surface formed by linearly blending the curve P (0, w) and P (1, w). Determine the point on the surface Q (u, w) at u = w = 0.5 **10**

B) Consider the line segment with end points P_1 [1 1 0] and P_2 [62 0] lying in the xy plane. Rotating the line about the x-axis yields a conical surface. Determine the point on this surface at t = 0.5, $\phi = 60°$. **8**

5. A) Generate an ellipse with semi major axis a = 4 and semi minor axis b = 1 inclined 30° to the horizontal with centre at (2, 2). **10**

B) For the cube with the corner cut off, determine the diametric projection for a for shortening factor along the Z axis of $\frac{1}{2}$. **7**

6. A) Explain parametric representation of hyperbola. **7**

B) Generate the parabolic segment in the first quadrant for $1 \leq x \leq 4$ for the parabola given by $x = a\theta^2$ $y = 2a\theta$ for a = 1. **10**

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SLR-PD – 126

Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. I) Examination, 2015
Paper – I : ADVANCED FLUID MECHANICS AND CFD

Day and Date : Friday, 22-5-2015 Total Marks : 70

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

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

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

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

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

SECTION – I

1. a) Explain the Prandtl's mixing length theory for turbulent shear stress. **9**

   b) Prove that the maximum velocity in a circular pipe for viscous flow is equal to two times the average velocity of the flow. **8**

2. a) Find the expression for boundary layer thickness, shear stress, average coefficient of drag in terms of Reynols number for the following velocity profile for laminar boundary layer given as.

   $\mu / U = y / \delta$ **10**

   b) Explain Prandtl's mixing length theory. **8**

3. Write note on the following.

   a) Measurement of turbulent flow. **5**

   b) Separation of boundary layer. **6**

   c) Reynolds theory for turbulent flow. **6**

SECTION – II

4. a) What is computational fluid dyanamics ? Explain how it can be used as a design tool. **8**

P.T.O.

b) Air flows isentropically around a submerged object. At section 1 in the approaching stream the pressure $P_1 = 101.043$ KN/M^2, the density $\rho_1 = 1.226$ kg/m^3 and the velocity $V_1 = 125$ m/s. At point 2 near the object, the pressure P_2 is to be 39.24 KN/M^2. Calculate the temperature ratio between these two points and the Mach number at each point. Take $\gamma = 1.4$ and R = 287 J/Kg K. **9**

5. a) State the physical principle of momentum equation and derive the Navier-stokes equations in conservation forms space. **9**

   b) Explain the Relaxation Technique. **9**

6. a) Write short note on parabolic equation. **6**

   b) Write short note on different plots of computer graphics. **5**

   c) Physical boundary conditions in CFD. **6**

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SLR-PD – 127

Seat No.	

M.E. (Mech./Thermal Engineering) (Semester – I) Examination, 2015
Paper – II : MEASUREMENT IN THERMAL SYSTEMS

Day and Date : Saturday, 23-5-2015 Max. Marks : 70

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

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

SECTION – I

1. a) Explain different types of thermocouples. How thermocouples are selected with reference to fixed points ? Write about significance of calibration. **8**

   b) Explain how pyrometers are used to measure high temperatures. **9**

2. a) A thermocouple in a fixed-point bath yields the following replicate data in terms of deviates Xi from the standard reference table :

N	1	2	3	4	5	6	7	8	9
Xi	0.061	0.061	0.061	0.062	0.062	0.050	0.059	0.056	0.058

   Find the mean value, the range the precision index and the 95% confidence interval by both range and precision index estimates for the individual readings. **9**

   b) Define :
   a) Resolution
   b) Range
   c) Random error
   d) Systematic error

P.T.O.

e) Uncertainty

f) Coefficient of correlation

g) Sensitivity

h) Accuracy. **8**

3. Write note on the following :

a) Different mounting methods of thermocouple. **6**

b) Chauvenet's criteria for rejection of data. **6**

c) Errors caused by conduction, convection and radiation in temperature measurement. **6**

SECTION – II

4. a) With neat sketches explain how strain gauges are used for pressure measurement. **8**

b) Draw neat sketch of measurement of air velocity with the help of Pitot tube and explain. **9**

5. a) A Mcleodguage has volume of bulb and measuring capillary $V = 100 \times 10^{-6} m^3$ and measuring capillary diameter of 1 mm. Calculate the pressure indicated when the rading of measuring capillary is 30 mm in case approximate formula is used. What is the error if the exact formula is used for measurement of pressure. **8**

b) Explain significance of coefficient of discharge. Derive the relation for estimation of coefficient of discharge for orificemeter. **9**

6. a) Different Tap geometry for measurement of velocity of moving fluid. **6**

b) Explain Ultrasonic type of flowmeter. **5**

c) How heat transfer coefficient is estimated ? **7**

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SLR-PD – 128

Seat No.	

M.E. Mechanical (Thermal Engineering) (Semester – I) Examination, 2015
Paper – III : ADVANCED HEAT AND MASS TRANSFER

Day and Date : Monday, 25-5-2015 Total Marks : 70

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

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

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

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

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

SECTION – I

1. a) What is Critical Radius of Insulation and derive an equation for the critical radius for a cylindrical pipe. **8**

   b) A Nicrome wire of resistivity $1\ \mu\Omega$ m is to dissipate a power of 10 Kw into surrounding fluid which is at 60°C. If maximum operating temperature of wire is 900°C, find diameter of wire. Take h = 900 W/m^2°C and K = 60W/mk. **9**

2. a) Compare thermal conductivity of solids, liquids and gases and its variation with temperature. **9**

   b) During manufacturing of plastic sheet 10 cm thick, the sheet are brought to a uniform temperature of 175°C and then allowed to cool to a surface temperature of 52°C in air at 38°C before further processing. How long a cooling period will be required if natural convection cooling is employed with average surface coefficient of 39.2 kJ/m^2-hr-deg ? Also determine the temperature at the center of plastic sheet when surface temperature has reached 52°C. Properties of plastic material are : density ρ = 1280 kg/m^3, Specific heat c = 1.6 kJ/kgK, thermal conductivity k = 0.98 kJ/m hr K. **9**

3. a) Derive the differential equation of continuity. **8**

   b) Derive Navier Stokes equation. **9**

P.T.O.

SECTION – II

4. a) Determine the heat exchange by radiation between two finite black surfaces. at temperature T_1 and T_2 separated by non-participating material. **6**

   b) Write note on radiation shield. **6**

   c) Explain radiation heat transfer coefficient. **6**

5. a) What is fouling factor, what are the reasons for occurring fouling. Derive an expression for overall heat transfer co-efficient for heat exchanger with fouling factor. **9**

   b) A tubular heat exchanger is to be designed for cooling oil from a temperature of 80°C. to 30°C by a stagnant water which may be assumed to remain constant at a temperature of 20°C. The heat transfer surface consists of 30 m long straight tube of 20 mm inside diameter. The oil (specific heat = 2.5 kJ/kgK and specific gravity = 0.8) flow through the cylindrical tube with an average velocity of 50 cm/s. Calculate the overall heat transfer coefficient for the oil cooler. **8**

6. Write short note on :

   a) Pool boiling curve. **4**

   b) Drop wise condensation and promoters for the same. **4**

   c) Diffusion in solids, gas and liquids. **5**

   d) Fick's law of diffusion. **4**

SLR-PD – 129

Seat No.	

M.E. (Mechanical) Thermal Engineering (Semester – I) Examination, 2015
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Tuesday, 26-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attempt* ***any two*** *questions from* ***each*** *Section.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Assume*** *suitable* ***data*** *if necessary.*
4) ***Draw*** *neat sketches, flow diagrams* ***wherever*** *required.*
5) ***Use*** *of non-programmable* ***calculator*** *is allowed.*

SECTION – I

1. a) What are the types of research describe in detail. **9**
   b) Explain how sample design can be determined. **9**
2. a) Explain factorial design. **8**
   b) Explain state variable and system parameters. **9**
3. a) What is descrete or continous system. **8**
   b) A plant has four machines. Each one is capable of producing three variations of a product. The profit per hour when producing three variations on respective machine is given table (III-b1) and production rate per hour is given in table (III-b2) when producing three variations of product. The demand for the three variations during the next month is expected 700, 500, 400 units for variation 1, 2 and 3 respectively. The maximum available hours to produce the three variations during next production period on the four machines are 90, 75, 90, 85 hours respectively. Determine how many of each variation product to be produced on the different machines. **9**

Variation	Machines			
	1	2	3	4
1	5	6	4	3
2	5	4	5	4
3	6	7	2	8

Table III-b1
(Profit per hour for each variation on a machine)

Variation	Machines			
	1	2	3	4
1	8	2	4	9
2	7	6	6	3
3	4	8	5	2

Table III-b2

(Production rate per hour for each machine and variation)

SECTION – II

4. a) Explain methods for setting up analysis of variable table. **9**

   b) Describe briefly the techniques of analysis of variance for one way classification. **9**

5. a) Describe different steps in writting report. **8**

   b) What are the guidelines for reviewing research proposals ? **9**

6. a) Explain typing instructions to be considered for landscape design. **8**

   b) Describe in brief the layout of research report covering all relevant points. **9**

_____

SLR-PD – 130

Seat No.	

M.E. Mechanical (Thermal Engineering) (Semester – I) Examination, 2015
Elective – I : ADVANCED THERMODYNAMICS (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) With usual notation, show that for Van der Waal's equation.

$$\left(Pr+\frac{3}{v_r^2}\right)(3Vr-1)=3Tr$$ **6**

b) Derive : $T.ds = Cv.\ dT + \frac{T\beta}{k}dv.$ **6**

c) Explain thermal death of universe. **6**

2. a) State third law of thermodynamics and discuss its importance. Also state the important corollaries of third law. **5**

b) Air is flowing steadily in an insulated duct. The pressure and temperature measurement of air at two station A and B are given below. Establish direction of flow of air in the duct. Assume that for air, specific heat C_p is constant 1.005 KJ/Kg K, $h = C_p.T$ and $\frac{v}{T}=\frac{0.287}{p}$ where, P in Kpa, v in m^3/Kg, T in K.

	Section A	Section B
Pressure	130 Kpa	100 Kpa
Temperature	50°C	13°C

7

c) What is entropy and concept of lost work. **5**

P.T.O.

3. a) Consider a steady heat transfer through 5 m × 7 m brick wall of house of thickness 30 cm. On a day when the temperature of outdoor is 0°C, the house is maintained at 27°C. The temperature of inner and outer surface of brick wall are measured to be 20°C and 5°C respectively. Determine rate of total entropy generation associated with this heat transfer process, also find total entropy generation. **8**

   b) Show that for ideal gas, the slop of constant volume line on the T-S diagram is more than that of constant pressure line. **5**

   c) Explain compressibility factor, law of corresponding states and Boyles isotherms. **4**

SECTION – II

4. a) Percentage composition by weight of sample of fuel reads as :
   Carbon=90%,
   Hydrogen=3.5%
   Oxygen=3%,
   Sulpher=1%.,
   Determine :
   i) Stoichiometric air required for 1 kg of fuel
   ii) Analysis of flue gasses by percentage weight. **9**

   b) Explain term heat of reaction and heating value of fuel. **8**

5. a) By burning a fuel the rate of heat release is 500 Kw at 2000 K. What would be the first law and second law efficiency if :
   a) Energy is absorbed in metallurgical furnace at the rate of 480 Kw at 1000 K
   b) Energy is absorbed at rate of 450 Kw for generation of steam at 500 K
   c) Energy is absorbed in chemical process at rate of 300 Kw at 320 K. Take $T_0 = 300$ K
   d) Had the energy absorbed rate been equal to 450 Kw in all these three cases, what would have been should law efficiency ? **7**

   b) What is Gravimetric and volumetric analysis in detail, also state application of this ? **5**

   c) Explain in detail Van't hoff equilibrium box. **5**

6. Write short note on :
   a) FD, BE and MB stastics **6**
   b) Survival equation **6**
   c) Importance of quantum effect. **6**

SLR-PD – 131

Seat No.	

M.E. (Mechanical) (Thermal Engineering) (Semester – II) Examination, 2015
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Thursday, 28-5-2015 Max. Marks : 70

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

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

SECTION – I

1. Design a air conditioning system for a room of size 3m × 3m situated in Solapur district where the outdoor conditions are 45°C DBP and 10% relative humidity. Assume suitable data and enlist the design parameter such as TOR of cooling system, fan specifications, compressor specifications and condenser, evaporator specifications. Justify the selection of appropriate refrigerant. **18**

2. a) A counter flow heat exchanger cools 5 kg/sec. of oil, C_p = 2.4 kJ/(kg. k), with water that has flow rate of 7.5 kg/sec. The specific heat of water is 4.19 kJ/kg.k. Under the original operating conditions the oil is cooled from 75 to 40°C when water enters at 25°C. To what temperature will the oil be cooled if it enters at 65°C and if there is no change in the entering water temperature.
The flow rates of either fluid, or the heat transfer coefficient. **10**

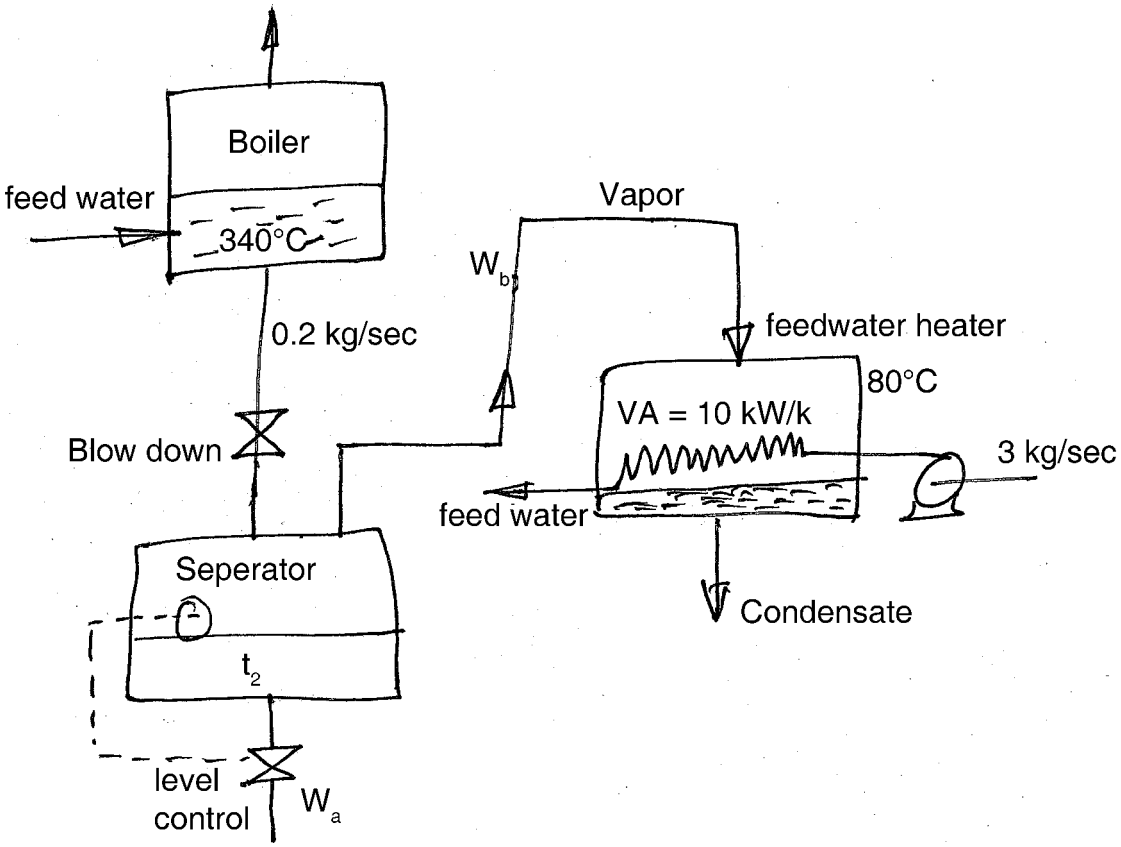
b) Select any three thermal elements and model it and explain the method of modelling. **7**

P.T.O.

3. a) Steam boilers sometimes use a continuous blow down of water to control the amount of impurities in the water. This high temperature water is capable of heating the feed water as shown in figure. A flow rate of 0.2 kg/sec. at a temperature of 340°C is blown down from the boiler. The flow rate of the feed water to the heater is 3 kg/sec and its entering temperature is 80°C. The UA value of the feed water heater is 10kW/K. Equations for the enthalpy of saturated liquid and vapor are respectively, $h_f = 4.19\ t$ and $h_s = 2530 + 0.4t$ where t is the temperature in °C. The system is to be simulated and the following variables computed : t_2, t_0, W_A and W_B.

   a) Construct an information flow diagram

   b) Using successive substitution, compute the values of the variables. **12**

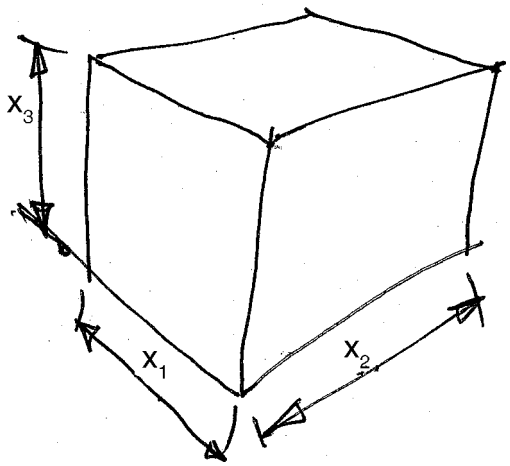


SECTION – II

4. a) A steel framework, as shown in figure is to be constructed at a minimum cost. The cost in dollars of all the horizontal members in one orientation is $200x_1$ and in the other horizontal orientation 300 x_2. The cost in dollars of all vertical members is 500 x_3. The frame must enclose a total volume of 900 m^3.

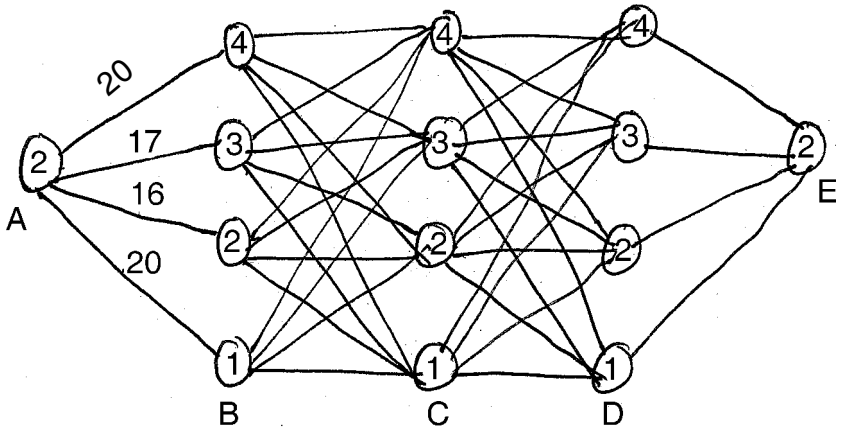
   i) Set up the objective function for total function cost and the constraints in terms of x_1, x_2 and x_3.

   ii) Using the method of Lagrange multiplier for constrained optimization. Determine optimal value of the dimensions and the minimum cost. **12**



   b) Write a short note on methods of optimization. **5**

5. a) A minimum cost pipeline is to be constructed between points A and E, passing successively through one node of each B, C and D as shown in figure. The costs from A to B, and from D to E are shown in figure and the costs between B and C and between C and D are given in table. Mark the shortest path of pipeline. Write all the steps of solving this problem. **12**



	To			
From	**1**	**2**	**3**	**4**
1	12	15	21	28
2	15	16	17	24
3	21	17	16	15
4	28	24	15	12

b) Explain different methods of simulation. **5**

6. a) How thermometers responds to the disturbances which is function of time ? Mathematically model the thermometer. Draw the block diagram for the model. Write the equation for the transfer function. Draw the response for the test signals. **10**

b) Explain the scope of design of thermal systems. **7**

SLR-PD – 132

Seat No.	

M.E. (Mechanical – Thermal Engg.) (Semester – II) Examination, 2015
Paper – VII : COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING

Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Apply Gauss Jordan method to solve the equations **9**

$X + Y + Z = 9$

$2X – 3Y + 4Z = 13$

$3X + 4Y + 5Z = 40$

b) Using bisection method, find the negative root of the equation. **8**
$X^3 – 4X + 9 = 0$

2. a) What are methods to obtain solution of linear algebraic equation and compare direct and iterative method ? **9**

b) Evaluate $\int_{-1}^{1} \frac{dx}{1+x^2}$ using Gauss formula for n = 2 and n = 3. **8**

3. a) Using Eulers method, find an approximate value of y corresponding to y = 1, given that $\frac{dy}{dx} = x + y$ and y = 1 when x = 0. **10**

b) Fit a power law curve to the following data : **8**

X	6	7	7	8	8	8	9	9	10
Y	5	5	4	5	4	3	4	3	3

P.T.O.

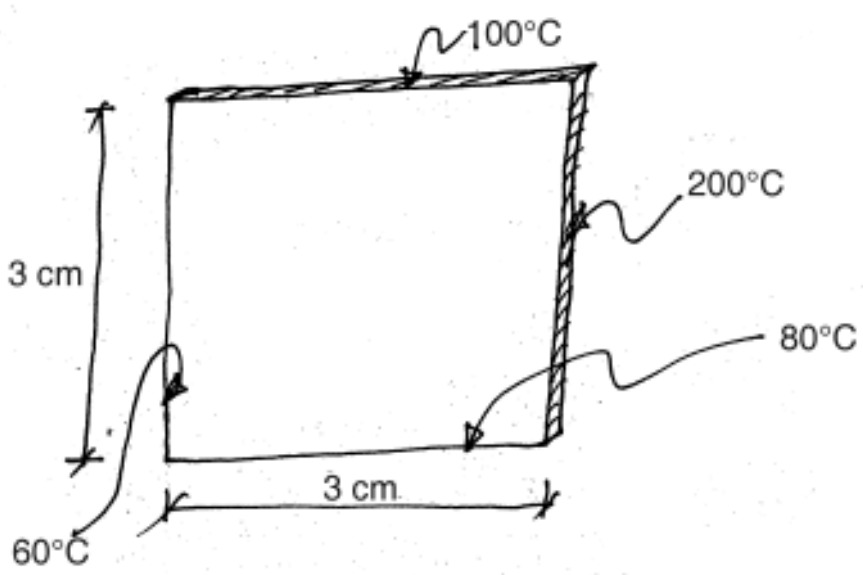
SECTION – II

4. a) Explain how forward and central difference scheme can be applied to a thermal systems for interpolated value. **8**

   b) If $y = a(3)^x + b(-2)^x$ and $h = 1$, prove that $\left(\Delta^2 + \Delta - 6\right)y = 0$. **9**

5. a) Explain how finite difference method can be applied to solve conduction through tapered fin having length L and cross section area at root = a_1 and tip cross section area = a_2. Assume insulated tip condition. **10**

   b) Using finite difference method find the temperature at the centre of the lamina shown in fig. assuming negligible thickness. **8**



6. Write short notes on **any three** of the following : **18**

   a) Displacement function, element stiffness and load matrices.

   b) Application of FEM.

   c) Shape function.

   d) Difference between FDM and control volume method of FEM.

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Seat No.	

M.E. Mechanical (Thermal Engineering) (Sem. – II) Examination, 2015
Paper – VIII : THEORY AND DESIGN OF I.C. ENGINE

Day and Date : Monday, 1-6-2015 Total Marks : 70

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

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

SECTION – I

1. a) Explain construction and working of sterling engine with figure. **9**

   b) A single cylinder four stroke cast iron diesel engine has following data :

Cylinder bore	=	300 mm
Length of stroke	=	450mm
Speed	=	300 rpm
Indicated mean effective pressure	=	0.85 Mpa
Maximum gas pressure	=	5 MPa
Fuel consumption	=	0.30 kg per BP per hr
Higher calorific value of fuel	=	44000 kJ/kg
Permissible tensile stress	=	40 N/mm^2
Mechanical Efficiency	=	80%

   Ratio of heat absorbed by piston to the total heat developed = 0.05

   Temperature difference $T_c - T_e = 220°C$

   Thermal conductivity factor k for cast iron = 46.6 W/m/°C

   Number of radial ribs = 4

   Determine :

   i) Thickness of piston head by strength and thermal consideration,

   ii) Thickness of rib,

   iii) State whether cup is required, if yes determine cup radius. **9**

P.T.O.

2. a) Explain principle of combustion chamber design of SI engine. **8**

   b) Design a center crankshaft for single cylinder vertical engine considering case of the crank is at top dead center position and subjected to maximum bending moment

   Cylinder bore = 150 mm,

   L/r ration = 4.75

   Maximum gas pressure = 4 Mpa,

   Length of stroke = 200 mm,

   Weight of flywheel cum belt pulley = 3.5 kN,

   Total belt pull = 1.8 kN,

   Allowable bending stress = 75 N/mm^2

   Allowable compressive stress = 75 N/mm^2

   Allowable shear stress = 40 N/mm^2

   Allowable bearing pressure = 10 N/mm^2

   The main bearing is 350 mm apart and the third bearing is 400 mm apart from the main bearing on its side. The belts are in horizontal direction, assume l/d ratio = 1 for crank pin. **9**

3. a) Explain in detail various effects of knocking in IC Engine. **8**

   b) The cylinder of four stroke diesel engine has following specifications :

   Brake power = 7.5 Kw

   Speed = 1400 rpm

   Indicated mean effective pressure = 0.35 MPa

   Mechanical efficiency = 80%

   Maximum gas pressure = 3.5 MPa

   The cylinder liner and head are made of gray cast iron FG 260 (S_{ut} = 260 N/mm^2 and μ = 0.25). The studs are made of plain carbon steel 40C8 (S_{yt} = 380 N/mm^2). The factor of safety for all parts is 6. Calculate :

   i) Bore and length of cylinder the cylinder liner

   ii) Thickness of cylinder liner

   iii) Thickness of the cylinder head. **9**

SECTION – II

4. a) List various recent advances in pollution control and explain catalytic convertor with figure. **8**

   b) Design exhaust value for a horizontal diesel engine using the following data :

   Cylinder bore = 250 mm,

   Length of stroke = 300 mm,

   Engine speed = 600 rpm,

   Maximum gas pressure = 4 MPa

   Seat angle = 45°

   Mean velocity of gas through port = 50 m/s

   Allowable bending stress for valve = 50 N/mm^2

   K for steel valve = 0.42

   Calculate :

   i) Diameter of valve port
   ii) Diameter of the valve head
   iii) Thickness of the valve head
   iv) Diameter of valve stem
   v) Maximum lift of valve. **9**

5. a) Why balancing of IC engine is important ? Explain procedure adopted for balancing of IC engine. **8**

   b) Determine the dimension of small and big end bearings of the connecting rod for a diesel engine with the following data :

   Cylinder bore = 100 mm

   Maximum gas pressure = 4 MPa

   (l/d) ratio for piston pin bearing = 2

   (l/d) ratio for crank pin bearing = 1.3

   Allowable bearing pressure for piston pin bearing = 12 MPa

   Allowable bearing pressure for crank pin bearing = 7.5 MPa. **9**

6. a) Explain need of cooling system in IC Engine. What are various coolant used in IC engine ? Explain "Splash lubrication with oil pump". **9**

   b) The following data is given for the cap and bolt of the big end of connecting rod :

   Engine speed = 1800 rpm

   Length of connecting rod = 350 mm

   Length of stroke = 175 mm

   Mass of reciprocating parts = 2.5 Kg

   Length of crank pin = 76 mm

   Diameter of crank pin = 58 mm

   Thickness of bearing bush = 3 mm

   Permissible tensile stress for bolt = 60 N/mm^2

   Permissible bending stress for cap = 80 N/mm^2

   Calculate the nominal diameter of bolts and thickness of cap for the big end. **9**

Data for solving problems

• Reboring allowance for I.C. Engine cylinder

D	75	100	150	200	250	300	350	400	450	500
C	1.5	2.4	4.0	6.3	8.0	9.5	11.0	12.5	12.5	12.5

Note : D and C are in mm

• Allowable mean velocities of the gas (v_p)

Types of Engine	**Mean velocity of gas (m/s)**	
	Inlet Valve	**Exhaust Valve**
Low speed engine	33 – 40	40 – 50
Medium speed engine	35 – 45	50 – 60
High speed engine	80 – 90	90 – 100

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Seat No.	

M.E. (Mech./Thermal Engineering) (Semester – II) Examination, 2015
Paper – IX : DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Attempt **any two** questions from **each** Section.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume suitable data if **necessary**.*
*4) **Use** of steam tables, psychrometric chart, refrigeration property charts is **allowed**.*
*5) **Use** of non-programmable calculator is **allowed**.*

SECTION – I

1. a) A cascade refrigeration system is design to supply 10 TR at an evaporator temperature of – 60°C and a condenser temperature of 25°C. The load at –60°C is absorbed by a unit using R-22 as the refrigerant and is rejected to a cascade condenser at – 20°C. The cascade condenser is cooled by a unit using R-12 as the refrigerant and operating between – 30°C evaporating temperature and 25°C condenser temperature. The refrigerant leaving the R-12 condenser is subcooled to 20°C but there is no subcooling of R-22 refrigerant. The gas leaving both the evaporators is dry and saturated and the compressions are isentropic. Neglecting losses, determine

   1) Compression ratio of each unit.
   2) Quantity of refrigerant circulated per minute for each unit.
   3) C.O.P. for each unit.
   4) C.O.P. of the whole system.
   5) Theoretical power required to run the system. **12**

   b) Explain centrifugal compressor. **6**

P.T.O.

2. a) The readings from a sling psychrometer are as follows DBT = 30°C, WBT = 20°C, Barometric reading = 740 mm of Hg, Determine

   1) Dew point temperature

   2) Relative humidity

   3) Specific humidity

   4) Degree of saturation

   5) Vapour density

   6) Enthalpy of mixture per kg of dry air. **9**

   b) Explain mass transfer by molecular diffusion and convection. **8**

3. Write note on the following.

   a) Applications of air conditioning **6**

   b) Expansion devices **6**

   c) Comfort scales. **5**

SECTION – II

4. a) Explain Electrolux refrigeration system. **8**

   b) Explain in detail methods of duct design. **9**

5. a) Given for the air conditioning of a room.

   Indoor conditions : 26°C DBT and 19°C WBT

   Outside conditions : 35°C DBT and 27°C WBT

   Room latent heat gain = 3.9 kW

   Room sensible heat gain = 11.1 kW

The conditioned air supplied to the room is 50 CMM and 25% fresh air and 75% recalculated air determine :

i) The DBT and WBT of supply air

ii) The DBT and WBT of mixed air before entering the cooling coil

iii) The ADP and BPF of the coil

iv) The refrigeration load on the cooling coil. **12**

b) Explain Enthalpy – concentration diagram for binary mixture. **6**

6. a) Design of cooling and dehumidifying coils. **9**

b) Explain dehumidification and humidification equipment. **8**

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Seat No.	

M.E. (Mechanical) (Thermal Engineering) (Semester – II) Examination, 2015
POWER PLANT ENGINEERING (Elective – II) (Paper – X)

Day and Date : Friday, 5-6-2015 Max. Marks : 70

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

Instructions *: 1)* ***All*** *questions from* ***each*** *Section are* ***compulsory****.*

2) ***Neat*** *diagrams must be drawn* ***whenever*** *necessary.*

3) Make suitable assumptions ***if necessary*** *and mention them* ***clearly****.*

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

SECTION – I

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

1) It is proposed to utilize the energy of the monsoon stream by constructing a dam across it. The stream discharge during the monsoon season of four months (June to September) is 20 m^3/sec and for the remaining year, it should be taken as 2.5 m^3/sec. Find : a) the minimum capacity required of reservoir on the upstream side in day-sec-meter. b) If the head loss in the pipe is 3% of the actual head and overall efficiency of generation is 90%. Find output of the station. Take mean level of water in reservoir above the tail race level as 80 meter. Take monsoon period from 1st June to 30th September and take the year of 365 days.

2) 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/h.

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/h.

Pressure (MPa)	$V_f(m^3/Kg)$	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

3) Explain desirable properties of moderator used in nuclear power plant. Also list out types of moderator commonly in use.

2. Solve **any three** :

1) Describe different safety protections provided in nuclear power plant. **6**

2) Explain working of pumped storage hydro-electric power plant with neat sketch. **6**

3) Explain working of cyclone burner with neat sketch. **6**

4) Explain the principle of overfeed stocker. And explain spreader stocker with neat sketch. **7**

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

1) 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 stem 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 KJ/Kg K and γ = 1.33 for combustion gases and C_p = 1.005 KJ/Kg K and γ = 1.4 for air. Neglect pump work. Draw T-S diagram. Property table for steam :

Pressure Bar	**Enthalpy KJ/Kg**			**Entropy KJ/Kg K**			**Vf m^3/Kg**
	h_f	h_g	At 600°C	s_f	s_g	At 600°C	
50			3670				
0.1	192	2583.9	–	0.6492	8.1488		0.001010

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

2) The following data relate to a 10 MW power station :

Cost of plant	=	Rs. 1,200 per kW
Interest, insurance and taxes	=	5% per annum
Depreciation	=	5%
Cost of primary distribution	=	Rs. 5,00,000
Interest, insurance taxes and depreciation	=	5%
Cost of coal including transportation	=	Rs. 4.4 per KN
Operating cost	=	Rs. 5,00,000
Plant maintenance cost		
i) Fixed	=	Rs. 20,000 per annum
ii) Variable	=	Rs. 30,000 per annum
Installed plant capacity	=	10000 KW

Max demand	=	9000 KW
Annual load factor	=	0.6
Consumption of coal	=	255000 KN

Determine :

i) Cost of power generation per KW per year

ii) Cost per kWh generated

iii) Total cost of generation per kWh.

Transmission or primary distribution chargeable to generation.

3) Explain F. W. Bergbau regenerative system with neat sketch. **8**

4. Solve **any three** :

1) Explain the functions of switch gear and explain auxiliary switches. **6**

2) Explain electromagnetic transducer with neat sketch. **6**

3) Write note on ‘‘Economic load sharing’’. **6**

4) Write note on – Pollution from Nuclear power plant. Elaborate – Radioactive pollution, waste from reactor (solid, liquid, gases). **7**

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SLR-PD – 139

Seat No.	

M.E. (E and TC – Digital Electronics and Communication Systems)
(Sem. – I) Examination, 2015
Paper – I : COMMUNICATION NETWORKS

Day and Date : Friday, 22-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is RARP ? Explain it in brief. **8**
   b) Draw and explain ICMP. **10**

   OR

   b) Explain different domain names used in internet and also name space used.

2. Attempt **any two** : **12**
   a) Explain IP datagram format.
   b) What is datagram and explain in brief.
   c) What is TCP ? Explain.

3. Attempt **any one** : **5**
   a) Explain Name address resolution used in internet (DNS).
   b) Explain UDP in detail.

SECTION – II

4. a) Draw and explain ATM cell header format. **10**
   b) Explain Gigabit Ethernet architecture. **10**

   OR

   b) Explain B-ISDN with structure in brief.

5. Attempt **any two** : **15**
   a) Explain RSVP message format
   b) Explain Physical layer of Gigabit Ethernet.
   c) Explain MPLS in details.

SLR- PD – 140

Seat No.	

M.E. (E & TC) (Digital Electronics and Communication System) (Semester – I) Examination, 2015
CMOS VLSI DESIGN

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Give physical structure of NMOS Transistor. **6**
   b) Draw and explain accumulation, depletion and Inversion modes of operation of MOS transistor. **5**

2. a) Explain analytically when and why the output transition in region C of the inverter characteristics is steep. **6**
   b) Draw and explain static CMOS inverter and Switch model of CMOS inverter. **5**

3. a) Draw and explain pass transistor logic. **6**
   b) Compare static and dynamic designs in CMOS. **6**

4. Write notes on **any three** of the following : **(4×3=12)**
   a) Technology scaling
   b) Dynamic behavior of CMOS inverter
   c) Speed and power dissipation in CMOS
   d) Issues in dynamic design.

P.T.O.

SECTION – II

5. a) Draw and explain Master-slave edge triggered resister. Write the timing properties of multiplexer based master-slave registers. **6**

   b) Draw and explain NOR based and NAND based SR flip-flop and Ratioed CMOS SR latch. **5**

6. a) Explain clock synthesis and synchronization using a phase locked loop. **6**

   b) Explain any two timing classification methods of digital systems. **5**

7. a) Explain with necessary diagram the synchronous timing basics i.e. clock skew, clock jitter. **6**

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

8. Write notes on **any three** of the following : **(4×3=12)**

   a) True Single Phase Clocked Register (TSPCR)

   b) Static latches and registers-The bistability principle

   c) Designing fast adders

   d) Synchronizers and arbiters.

SLR-PD – 141

Seat No.	

M.E. (E&TC – Digital Electronics and Communication System)
(Semester – I) Examination, 2015
MODERN DIGITAL SIGNAL PROCESSING (Paper – III)

Day and Date : Monday, 25-5-2015 Max. Marks : 70

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

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

SECTION – I

1. Attempt **any one** of the following : **(10×1=10)**

   a) Design an ideal high pass filter with a frequency response

   $$Hd(e^{j\omega}) = 1 \quad \text{for} \quad \frac{-\pi}{4} \le \omega \le \pi$$
   $$= 0 \quad \text{for} \quad |\omega| \le \pi/4$$

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

   b) Explain Levinson Durbin algorithm for computation of LPC's.

2. a) Design an ideal differentiator with frequency response $H(e^{j\omega}) = j\omega \quad -\pi \le \omega \le \pi$ using Hamming window with N = 7. **7**

   b) Explain with block diagram forward and backward predictor. **7**

3. a) Explain relationship between auto-correlation and model parameters in detail. **5**

   b) Derive the expression for energy density function for signal using Fourier transform. **5**

P.T.O.

SECTION – II

4. Attempt the following : **(10×1=10)**

Convert analog filter with system function $H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$ into a digital IIR filter by means of a bilinear transformation. The digital filter is to have resonant frequency of $\omega_r = \pi/2$.

5. a) Explain pade approximation method for design of digital filter. **7**

   b) Explain any four identities used in scaling of discrete time signals. **6**

6. a) Derive the fundamental equations for the discrete time implementation of sampling rate conversion. Draw the diagram for timing relations for sampling rate conversion. **7**

   b) How Haar wavelet function is defined ? Give its scaling function. **6**

SLR-PD – 142

Seat No.	

M.E. (E and TC) (Digital Electronics and Communication Systems) (Semester – I) Examination, 2015
PROBABILITY AND RANDOM PROCESS (Paper – IV)

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. a) What is CDF and PDF for single and joint variables with examples ? **6**

   b) For a sample Space 'S' explain different Axioms of Probability with examples. **6**

   OR

   b) A certain Auditorium has 30 rows of seat row 1 and 11 seat while row 2 has 12, rows 3 has 13 seats and so on to the back of auditorium where row 30 has 40 seats. A Door prize is to be given away by randomly selecting a row and randomly selecting seat within row.

      i) Find the probability that seat 15 was selected given 10 was selected.

      ii) Find the probability that row 10 was selected given seat 15 was selected. **7**

2. a) A Random variable has the following Exponential PDF. **6**

$$F_X(X) = f(x) = \begin{cases} a^{-bx}, & x \le 0 \\ 0 \quad , & \text{otherwise} \end{cases}$$

   Where 'a' and 'b' are constant

      i) Determine the relationship between 'a' and 'b'.

      ii) Determine the corresponding PDF.

P.T.O.

b) 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 is 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 given the target. **6**

OR

c) Prove the properties of Gamma functions. **6**

i) $\Gamma(n) = (b-1)!$ for $n = 1, 2, 3 ....$

ii) $\Gamma(x+1) = x\,\Gamma(n)$.

3. a) Calculate the mean value second moment and variance of following : **5**

i) Binomial $P_X(K) = \begin{pmatrix} n \\ k \end{pmatrix} P^K (1-P)^{n-k}$ Where K = 0, 1, 2, 3, ... n.

ii) Laplace $F_X(X) = \frac{1}{2b} \exp\left(-\frac{|X|}{b}\right)$.

b) Write a note on source coding. **5**

SECTION – II

4. a) Let X and Y be independent zero mean unit variance Gaussian random variable. Consider forming new random variable U and V according to

$U = X\cos\theta - Y\sin\theta$

$V = X\text{in}\,\theta - Y\sin\theta$. **7**

OR

b) 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 $F_X(X)$, $F_Y(Y)$, $F_{X/Y}(X, Y)$. **7**

c) Let X and Y be independent and both exponentially distributed with

$F_x(V) = F_y(V) = be^{-bv}\ u(V)$ find PDF of Z = X – Y. **6**

5. a) Let X_1, X_2 and X_3 be a set of three zero mean Gaussian random variable with a covariance matrix of form $C = \begin{bmatrix} 1 & \rho & \rho \\ \rho & 1 & \rho \\ \rho & \rho & 1 \end{bmatrix}$ find the following expected values.

   i) $E[X_1 / X_2 = x_2, X_3 = x_3]$

   ii) $E[X_1 X_2 / X_3 = x_3]$. **6**

   b) Explain the difference between Poisson process and Gaussian processes. **6**

OR

   c) Write a note on following : **6**

   i) Complex random variable.

   ii) Correlated and non correlated variable with examples.

6. a) Write a note on telephone networks and its relation with probability. **5**

   b) Explain a stationary and non stationary processes. **5**

SLR-PD – 143

Seat No.	

M.E. (E & TC – Digital Electronics and Communication System)
(Sem.– I) Examination, 2015
Elective – I : OPTICAL COMMUNICATION NETWORK (Paper – V)

Day and Date : Wednesday, 27-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Write a short note on (**any two**) : **(5×2=10)**
   1) LED transmitter
   2) Optical Communication system
   3) Difference between WDM and TDM.

2. A) What are the different modulation techniques used for optical communication ? **6**

   OR

   B) Explain subcarrier multiplexing in detail.

   C) An SOA operating at a signal wavelength of 1.55 μ m produces a gain of 30 dB with an optical bandwidth of 1 THz. The device has a spontaneous emission factor of 4 and the mode number is equal to 2.2 when the net gain coefficient over the the length of amplifier is 200. Determine
      a) the length of the device ;
      b) the ASE noise noise signal power at the output of the amplifier. **7**

3. A) Explain erbium doped amplifier in detail. **6**

   B) Explain the gain mechanism in EDF and derive the expression for small signal gain in steady state. **6**

   OR

   C) Explain different types of transmitters with their characteristics. **6**

P.T.O.

SECTION – II

4. Write a short note on (**any two**) : **(2×5=10)**
   1) Frequency domain dispersion measurement
   2) Noise effect on performance
   3) Comparison of SONET and SDH.

5. A) Measurements are made using a calorimeter and thermocouple experimental arrangement as shown in Figure 14.5 in order to determine the absorption loss of an optical fiber sample. Initially a high absorption fiber is utilized to obtain a plot of $(T\infty - Tt)$ on a logarithmic scale against t. It is found from the plot that the readings of $(T\infty - Tt)$. The test fiber is then inserted in the calorimeter and gives a maximum temperature rise of 4.3×10^{-4}°C with a constant measured optical power of 98 mW at a wavelength of 0.75 μm. The thermal capacity per kilometer of the silica capillary and fluid is a calculated to be 1.64×10^4 J°C^{-1}. Determine the absorption loss in dB km^{-1}, at a wavelength of 0.75 μm for the fiber under test. **6**

   B) Explain Storage area network, broadcast and next generation networks. **6**

   OR

   C) Explain OTDR in detail. **6**

6. A) Pulse dispersion measurements are taken over a 1.2 km length of partially graded multimode fiber. The 3 dB widths of the optical input pulses are 300 ps, and the corresponding 3 dB widths for the output pulses are found to be 12.6 ns. Assuming the pulse shapes and fiber impulse response are Gaussian calculate :
      a) the 3 dB pulse broadening for the fiber in ns km^{-1} ;
      b) the fiber bandwidth – length product. **6**

   OR

   B) Explain point to point link consideration with power budget. **6**

   C) Explain FDDI network in detail. **7**

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SLR-PD – 146

Seat No.	

M.E. (E and CT – Digital Electronics and Communication System) (Sem. – II) Examination, 2015
Paper – VI : RF AND MICROWAVE CIRCUIT DESIGN

Day and Date : Thursday, 28-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Attempt **any two** : **20**
   a) Derive the plane wave equation in air and conducting medium.
   b) State and explain Maxwell's equation in free space and time harmonic field.
   c) What are the transmission lines parameters ? Derive and explain them in brief.

2. Attempt **any two** : **15**
   a) Explain point contact diode.
   b) Explain scattering matrix for multi port network.
   c) Explain microwave bipolar junction transistor with its characteristics.

SECTION – II

3. Attempt **any two** : **20**
   a) Explain JFET for microwave in details with characteristics curve. Also enlist the advantages of JFET over BJT for microwave application.
   b) Explain MMIC manufacturing with layout for MMIC in brief.
   c) Explain Gunn oscillator with negative resistance region.

4. Attempt **any two** : **15**
   a) Explain noise figure circle for microwave amplifier.
   b) Give the classes of operation of microwave amplifiers.
   c) Draw and explain MESFET.

SLR- PD – 147

Seat No.	

M.E. (E and TC) (Digital Electronics and Communication System) (Semester – II) Examination, 2015
HIGH SPEED DIGITAL DESIGN (Paper – VII)

Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is transmission line ? Explain Infinitesimal and lumped models of a transmission line and derivation of line impedance. **6**

   b) Explain in detail electrical properties of wire. **5**

2. a) What is the use of series regulators ? Explain with neat circuit diagram power supply network using local regulation. **6**

   b) What is IR drops ? Explain with neat sketch an on chip power distribution network for a chip with peripheral bonding. **5**

3. a) Explain signaling over lumped transmission media. **6**

   b) Draw and explain the different noise sources in digital system. **6**

4. Write short note on **any three** of the following : **(4×3=12)**

   a) Balanced or symmetric transmission line

   b) Frequency, time, distance related to high speed digital design.

   c) On chip bypass capacitors.

   d) Signaling modes for transmission line.

P.T.O.

SECTION – II

5. a) Explain prototyping circuits in high speed electronics. **6**

   b) Explain simulation tools in high speed electronics. **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) Explain power supply conditioning with low dropout references. **5**

7. a) Explain with neat diagram quantization noise and dynamic performance analysis of an ideal N.B/T ADC. **6**

   b) What is sampling and Nyquest bandwidth ? Explain effect of antialiasing filters on system dynamic range. **6**

8. Write notes on **any three** of the following : **(4×3=12)**

   a) Grounding in High speed digital systems.

   b) Shielding concepts related to power supply.

   c) AD9220 12 bit ADC.

   d) Direct IF to digital conversion related to ADCs.

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Seat No.	

M.E. (E&TC) (Digital Electronics and Communication Systems)
(Semester – II) Examination, 2015
Paper – VIII : ADVANCED EMBEDDED SYSTEMS

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Define embedded system. Explain common architecture of embedded system. **6**

   b) Explain the function of following units in a general purpose processor .
   i) Instruction register ii) Program counter
   iii) Instruction queue iv) Control unit. **6**

2. a) Explain common memory types in detail. **7**

   b) Write short note on ASSP. **7**

3. a) What is interrupt latency ? **4**

   b) Explain conditional statements and conditional loops in 'C'. **5**

SECTION – II

4. a) What is task ? Give syntax of task. **4**

   b) What is real time system ? Explain two examples of real time system. **5**

5. a) Explain basic ARM memory interface. **6**

   b) Explain ARM processor core organisation. **6**

6. a) Write short note on ARM instruction set. **7**

   b) Which are the key features of ARM 9 processor ? **7**

SLR-PD – 149

Seat No.	

M.E. (E & TC – Digital Electronics and Communication Systems)
(Semester – II) Examination, 2015
Paper – IX : WIRELESS AND MOBILE NETWORKS

Day and Date : Wednesday, 3-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Figure to the **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) 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.

2. Attempt **any two**. **15**

   a) Explain Rayleigh's fading.

   b) Explain RAKE receiver in brief.

   c) Explain the properties of Block code. Also give the examples of block codes.

P.T.O.

SECTION – II

3. Attempt **any two**. **20**

   a) Draw and explain DHCP in brief.

   b) Explain 802.11 protocol stack.

   c) Explain TCP segment format for mobile communication.

4. Attempt **any two**. **15**

   a) Explain MAC protocol frame format for 802.11.

   b) Explain Mobile IP in brief.

   c) Explain Wireless Application Protocol.

SLR-PD – 150

Seat No.	

M.E. (E & TC) Digital Electronics & Communication Systems (Semester – II) Examination, 2015
Paper – X : IMAGE AND VIDEO PROCESSING AND BROADCASTING (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Write a short note on temporal properties of vision. **6**

   b) What are the practical limitations in sampling and reconstruction ? **6**

   OR

   b) Explain the difference between filtering and restoration.

2. a) Explain DWT with its properties. **5**

   b) Explain SVD and discuss its properties. **5**

   OR

   b) Explain Bayesian methods.

3. a) If $S(z) = \frac{4.25 - \left(z + z^{-1}\right)}{2.5 - \left(z + z^{-1}\right)}$, show that this is an ARMA model and find its order. **7**

   OR

   a) Explain Least square filters in detail.

   b) Explain in detail color coordinate systems. **6**

P.T.O.

SECTION – II

4. Write short note on **any two** : **(5×2=10)**

   1) Fan beam reconstruction

   2) SVC

   3) Coding of two tone images.

5. a) Explain the importance of projection in medical imaging. **7**

   b) Discuss the various techniques for boundary representation. **6**

   OR

   b) What are the different image analysis methods ? Discuss Scene matching and detection in detail.

6. Answer **any two** :

   a) Explain reconstruction of MRI using Fourier reconstruction. **6**

   b) Explain interframe coding. **6**

   c) Explain video over IP. **6**

SLR-PD – 153

Seat No.	

M.E. (Electronics and Telecommunication Engineering : Digital Electronics and Communication System) (Semester – III) Examination, 2015
(Self Learning Subject)
MODELING AND SIMULATION OF COMMUNICATION SYSTEM (Paper – I)

Day and Date : Sunday, 24-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Solve **any two** questions : **(5×2=10)**
   a) Explain deterministic and stochastic simulation.
   b) Explain system and random process modeling.
   c) Explain errors in system and device modeling.

2. Solve **any one** question : **(7×1=7)**
   a) Explain link budget and system level specification process in the design of communication system.
   b) Explain the process for validation and also explain validating of devices.

3. Attempt **any three** questions : **(6×3=18)**
   a) Explain the process for simulation sampling frequency.
   b) Write a note on fixed point arithmetic format.
   c) Write features of software environment for simulation of communication system.
   d) Write note on role of simulation in communication engineering system.

P.T.O.

SECTION – II

4. Solve **any two** questions : **(5×2=10)**

   a) Explain practical consideration in modeling of low pass equivalents for simulation.

   b) Describe the concept of Uniform Random Number Generators in brief.

   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 PN sequence generator.

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 Monte Carlo simulation of a communication system.

   d) Write a note on properties of system.

SLR-PD – 154

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2015
(Paper – I) : POWER ELECTRONICS

Day and Date : Friday, 22-5-2015 Max. Marks : 70

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

SECTION – I

Attempt **all** questions :

1. What is a power electronic converter system ? Draw the block diagram and mention any four applications of such a system. **9**

2. Draw the input and output characteristics of four of the following devices : **9**

   i) Power Diode ii) GTO

   iii) DIAC iv) TRIAC

3. Explain single half wave uncontrolled rectifier with R and R-L load. Derive the expression for the **9**

   i) Average value output voltage and current

   ii) RMS value of load voltage and current.

4. Explain three phase full bridge rectifier with a resistive load. **8**

SECTION – II

5. Show the circuit diagram of single phase semi converter and explain the operation, assuming constant load current. Sketch waveforms of output voltage and current in one SCR for a firing angle is 45°. **9**

6. Explaining the concepts of chopper controlled buck or boost regulator, describe the operation of a thyristorised buck-boost regulator. **9**

7. Classify the three phase bridge inverters ? Explain any one in detail. **9**

8. Describe the operation of single phase half wave a.c. voltage regulator with loads R and R-L and draw the voltage and current waveforms. **8**

SLR-PD – 155

Seat No.	

M.E. (Electrical) (Semester – I) Examination, 2015
Paper – II : POWER SYSTEM DYNAMICS AND CONTROL

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain the stability problem faced by power system in detail : **18**
   a) Voltage instability
   b) Frequency instability
   c) Loss of synchronisation of synchronous generator
   d) Mechanical-electrical system interaction instability.

2. a) Explain the concept of equilibrium with suitable example. **8**

   OR

   a) Using Euler's method find an approximate value of 'y' corresponding to $x = 1$, given that $\frac{dy}{dx} = x + y$ and $y = 1$ when $x = 0$.

   b) Give the assumption for synchronous machine modelling and write the stator and rotor flux linkage equation. **9**

SECTION – II

3. a) Explain the excitation control system and its protective circuit. **9**
   b) Write the advantage of the unit-exciter scheme over the common exciter bus scheme. **8**

4. a) Explain the modelling of induction machine. **9**
   b) Explain the effect of change in prime mover input on synchronous generator connected to infinite bus bar by keeping field excitation constant. **9**

SLR-PD – 156

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2015
Paper – III : DC DRIVES

Day and Date : Monday, 25-5-2015 Total. Marks : 70
Time :11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all**.

   a) Why speed torque characteristics of motor are consider for speed control. **8**

   b) Explain various braking method for separately exited dc shunt motor. **9**

   OR

   Compare the performance of single phase converter fed dc drive with 3-phase converter fed dc drive.

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

   a) A drive has following equation for motor and load torque

   $T = (1 + 2\omega_m)$ and $T_1 = 3\sqrt{\omega_m}$

   Obtain the equilibrium point and determine their steady state stability.

   b) Draw and explain speed torque characteristics single phase full wave full control converter fed dc drive in continues and discontinues mode for various value of firing angle.

   c) Draw the source current waveform of three phase six pulse converter fed dc drive with continuous conduction for following firing angle $\alpha = 30^{\circ}$ and $\alpha = 120^{\circ}$.

SECTION – II

3. Attempt **all**.

   a) How braking torque is controlled in 4 quadrant dc drive. **8**

   b) Explain with neat circuit diagram operation of four quadrant chopper fed dc drive. **9**

   OR

   Explain with block diagram how starting current of motor is controlled in closed loop speed control drive ?

P.T.O.

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

   a) Compare the chopper fed dc drive with converter fed dc drive in following point.

      i) Supply power factor

      ii) Ripple current frequency

      iii) Motor torque and Armature cu loss.

   b) A 220 V, 24 A, 100 rpm, separately excited dc motor has an armature resistance of 2 ohm. Motor is controlled by a chopper with frequency of 500 Hz and source voltage of 230 V. Calculate the duty ratio for 1.2 times rated torque and 500 rpm.

   c) Draw the block diagram closed loop speed control drive operate in Constant torque and Constant HP region.

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SLR-PD – 157

Seat No.	

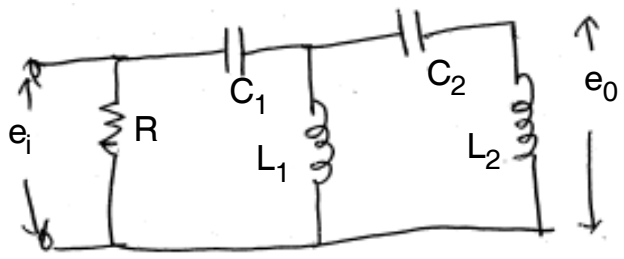
M.E. Electrical (I Semester) Examination, 2015
Paper – IV :CONTROL ENGINEERING

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **any four**. **(4×6=24)**

   a) Obtain the transfer function $E_0(s)/E_i(s)$ for the electrical system.



   b) Explain the effect of feedback on disturbance rejection in control systems.
   c) Explain the characteristics of the integral controller.
   d) Derive an expression for the transfer function of a field controlled dc servo motor.
   e) Explain with neat sketch, the construction and operation of electro pneumatic control valve.

2. Attempt **any one**. **(1×11=11)**

   a) In designing control systems, the following aspects must be taken into account.
      i) stability
      ii) noise filtering
      iii) sensitivity and robustness
      iv) disturbance rejection
      Explain the significance of each.
   b) Derive the transfer function model of thermal systems without carrier fluids and with carrier fluids.

P.T.O.

SECTION – II

3. Attempt **any four**. **(4×6=24)**

a) State space representation of positional positional control system.

b) Explain the performance specifications in time domain.

c) Diagonalize the following system shown.

$$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 3 & 0 & 2 \\ -12 & -7 & -6 \end{bmatrix} X + \begin{bmatrix} 1 \\ 0 \\ 2 \end{bmatrix} U \quad Y = [1\ 0\ 0]\ X$$

d) Write the correlation between time domain and frequency domain .

e) A unity feedback system is characterized by the open loop transfer function

$$G(s) = \frac{1}{s(0.5s+1)(0.2s+1)}$$

i) Determine the steady state errors to unit step, unit ramp and unit parabolic inputs.

ii) Determine the rise time, peak time, peak overshoot and settling time of the unit step response of the system.

4. Attempt **any one**. **(1×11=11)**

a) The forwards path transfer function of a certain unity feedback control system is given by G(s) = K/s (s+2) (s+8). Design a suitable lag compensator so that the system meets the following specifications.

i) Percentage overshoot $\leq$ 16% for unit step input .

ii) Steady state error $\leq$ 0.125 for unit ramp input.

b) A linear time invariant system is characterized by the state equation.

$$\begin{bmatrix} \dot{x}1 \\ \dot{x}2 \end{bmatrix} = \begin{bmatrix} 1 & 0 \\ 1 & 1 \end{bmatrix} \begin{bmatrix} x1 \\ x2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Where u is a unit step function. Compute the solution of these equations assuming initial condition $X_0 = \begin{bmatrix} 1 \\ 0 \end{bmatrix}$. Use inverse Laplace transform technique.

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SLR- PD – 158

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2015
Paper – V : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS
(Elective – I)

Day and Date : Wednesday, 27-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :

   a) What are the important and useful conclusions can be drawn for preliminary understanding of trends relating to power-handling capacity of a.c. transmission lines and line losses. **8**

   b) Inductance and capacitance calculations for single and multi-conductor line for calculation of Maxwell's potential coefficients. **9**

   OR

   Derive surface voltage Gradient on conductors under Maximum Surface Voltage Gradients for $N \geq 3$.

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

   a) A power of 12000 MW is required to be transmitted over a distance of 1000 km. At voltage levels of 400 kv, 750kv, 1000kv, and 1200 kv determine.

      iv) Possible no. of circuits required with equal magnitudes for sending and receiving end voltages with 30° phase difference.

      v) The currents transmitted and

      vi) The total line losses.

   b) What are the different modes of propagation in EHV-AC lines ?

   c) Describe the charge-potential relations of a transmission line with n conductors on a tower.

P.T.O.

SECTION – II

3. Attempt **all** :

a) Explain the clear difference between Travelling and standing wave theory. **8**

b) Explain the lightning stroke mechanism. **9**

OR

What is the purpose and significance of power circle diagram and its uses and also explain in detail the receiving end circle diagram for calculating reactive compensation for voltage control buses.

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

a) Derive the differential expression and their solutions for a transmission line with distributed inductance and capacitance.

b) What are the general principles of the lightning protection problem ?

c) Derive the generalized constants of a distributed parameter transmission line.

SLR-PD – 16

Seat No.	

M.E. (Mech. Design Engg.) (Semester – I) Examination, 2015
COMPUTATIONAL TECHNIQUES IN DESIGN ENGG.

Day and Date : Friday, 22-5-2015 Max. Marks : 70

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

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

SECTION – I

1. a) If P is the pull required to lift a load W by means of a pully block, find the linear law of the form P = C + mW, connecting P and W, using the following data. **6**

P : 12 15 21 25

W : 50 70 100 120

Where P and W are takening Kg-Wt. Compute P when W = 150 Kg.

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

c) Solve by Jacobi's iteration method, the equations **6**

$20x + y - 2z = 17$, $3x + 20y - z = -18$, $2x - 3y + 20z = 25$.

2. a) The velocity V(km/min) of a moped which starts from rest, is given at fixed interval of time t(min) as follows. **7**

t :	0	2	4	6	8	10	12	14	16	18	20
v :	0	10	18	25	29	32	20	11	5	2	0

Estimate approximately the distance covered in 20 minutes; using Simpson's $\frac{1}{3}^{rd}$ rule.

P.T.O.

b) Solve the following equations by factorization method. **10**

$3x + 2y + 7z = 4$

$2x + 3y + z = 5$

$3x + 4y + z = 7$

3. a) Apply Bessel's formula to find the value of f(27.5) from the table. **8**

x :	25	26	27	28	29	30
f (x) :	4	3.846	3.704	3.571	3.448	3.333

b) Fit a curve of the form $y = ae^{bx}$ to the following data : **9**

x :	0	1	2	3
y :	1.05	2.10	3.85	8.30

SECTION – II

4. a) Use Runge-Kutta method of order 4 find y for x = 0.1, 0.2, 0.3 given that $\frac{dy}{dx} = xy + y^2$, y(0) = 1. Continue the solution at x = 0.4 using Milne's method. **12**

b) Using modified Euler's method, find y(20.2) and y(20.4), given $\frac{dy}{dx} = \log_{10}\left(\frac{x}{y}\right)$, with $y_{(20)} = 5$ taking h = 0.2. **6**

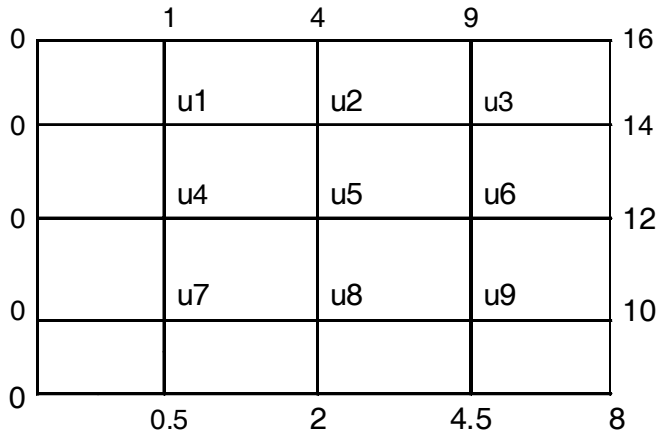
5. a) Find the largest eigen value and the corresponding eigen vector of the matrix

$$A = \begin{bmatrix} 25 & 1 & 2 \\ 1 & 3 & 0 \\ 2 & 0 & -4 \end{bmatrix}$$, by Power method. **7**

b) Solve the boundary value problem $\frac{d^2y}{dx^2} + x\frac{dy}{dx} + y = 3x^2 + 2$, y(0) = 0, y(1) = 1, by finite difference method. **10**

6. a) Solve the Laplace equation $u_{xx} + u_{yy} = 0$ for the following square mesh with boundary values as shown in fig.

[carryout three iterations] **12**



b) Explain Mathematical Modelling through linear diff. equation. **5**

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SLR-PD – 161

Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2015
POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM
(Paper – VI)

Day and Date : Thursday, 28-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :
   a) Explain power flow and dynamic stability consideration of a transmission interconnection. **8**
   b) Explain static VAR compensation and advanced static VAR compensation in detail. **9**

   OR

   Explain the principle of series compensation in detail.

2. Solve **any two** questions from the following : **(2×9=18)**
   a) Explain basic types of facts controller and their relative importance in brief.
   b) Explain thyristorised controlled reactor in detail.
   c) Explain Thyristorized Controlled Series Capacitor (TCSC) in detail.

SECTION – II

3. Attempt **all** :
   a) Explain IPFC in detail. **8**
   b) Explain the principle of phase compensation in detail. **9**

   OR

   Compare shunt compensation, series compensation and phase angle compensation in detail.

P.T.O.

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

   a) Explain UPFC in detail.

   b) The particulars of a series compensated with a TCSC are V = 480 V, F = 60 HZ, X = 16 ohm and P_p = 96 kw. The particulars of the TCSC are $\delta = 80°$, C = 25 μF and L = 0.4 mh. Find :

      i) The compensated capacitance reactance

      ii) The degree of compensation

      iii) The line current

      iv) The reactive power

      v) The delay angle α of the TCSC if the effective capacitive reactance is X_t = – 40 ohm.

   c) Explain load compensation in details.

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Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2015
POWER QUALITY (Paper – VII)

Day and Date : Saturday, 30-5-2015 Max. Marks : 70

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

SECTION – I

1. Explain the various types of power quality disturbances and their impacts power quality. **18**

2. a) What is an interruption ? Clearly differentiate 'Failure', 'Outage' and 'Interruption'. **8**

   b) Discuss about the Computer Business Equipment Manufacture Associations (CBEMA) curve. Explain about the events described in the curve. **9**

SECTION – II

3. a) Explain briefly about the phenomena of how current distortion affects the voltage distortion under the presence of harmonics. **9**

   b) How will you find the harmonic sources from point of common coupling ? **9**

4. a) Describe the operation of a combined shunt and series controller. **9**

   b) What is the advantage of three phase converter ? What is the disadvantage of 12 pulse drive ? **8**

   OR

   b) Explain schematic and working of unified power conditioner.

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Seat No.	

M.E. (Electrical Engineering) (Semester – II) Examination, 2015
Paper – VIII : AC DRIVES

Day and Date : Monday, 1-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Attempt **all** :

   a) Draw torque slip characteristic of a three-phase induction motor. Also draw motor current on the same characteristic. Explain the shape of torque slip characteristic. **8**

   b) Prove that under E/f control, for a given load torque fall in speed from synchronous to actual motor speed is same for any value of frequency of stator voltage. **9**

   OR

   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.

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

   a) Explain philosophy of speed control of a three phase induction motor using stator voltage control. Comment on T/I ratio under this control strategy.

   b) Explain with neat diagram, shift of operating point from initial frequency "f" to a new frequency "0.7 f" under E/f control strategy.

   c) With a neat block schematic, explain open loop control scheme for V/f control of a three phase induction motor.

P.T.O.

SECTION – II

3. Attempt **all** :

   a) What is closed loop slip control scheme ? With neat block diagram, explain closed loop control of three phase induction motor speed using slip control. **8**

   b) What are advantages of wound rotor induction motor over squirrel cage induction motor ? Draw schematic diagram of circuit arrangement used for changing resistance in rotor circuit of this motor. Write expression for effective resistance in rotor circuit using above circuit arrangement. **9**

   OR

   What is purpose of using damper windings in three phase synchronous motor ? Why these windings are not necessary in inverter fed synchronous motors ?

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

   a) Draw and explain typical power circuit configuration used for three phase induction motor speed control. Explain need of dynamic braking resistance in this configuration.

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

   c) With neat block diagram explain in detail “Self control” mode of synchronous motor drive.

SLR-PD – 164

Seat No.	

M.E. Electrical (Semester – II) Examination, 2015
Paper – IX : ADVANCED CONTROL ENGINEERING

Day and Date : Wednesday, 3-6-2015 Total Marks : 70

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

SECTION – I

1. Attempt **all**. **(2×9=18)**

   a) How to identify the dynamics models of plant in time – domain based identification ?

   b) Explain relay control systems for off-line and on-line identification in detail.

   OR

   Determine the unknown plant dynamics be $G(s) = \frac{1}{(s+1)^5}$. A symmetrical relay with height h = 1 produces a sustained symmetrical process output with A = 0.474 and P_u = 8.732. Assuming the steady state gain to be K = 1.

2. Explain the drawbacks of off-line identification relay test. How to overcome these drawbacks ? **(1×8=8)**

3. What information is obtained from time-domain and frequency-domain measures ? **(1×9=9)**

   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; α_1 = 0 and α_0 = –4. Using plot for the optimised coefficients

   c_1 = 0.5 -----> d_2 = 1.595 and d_1 = 2.12

   Estimate the PI-PD controller parameters controller design for SISO process.

P.T.O.

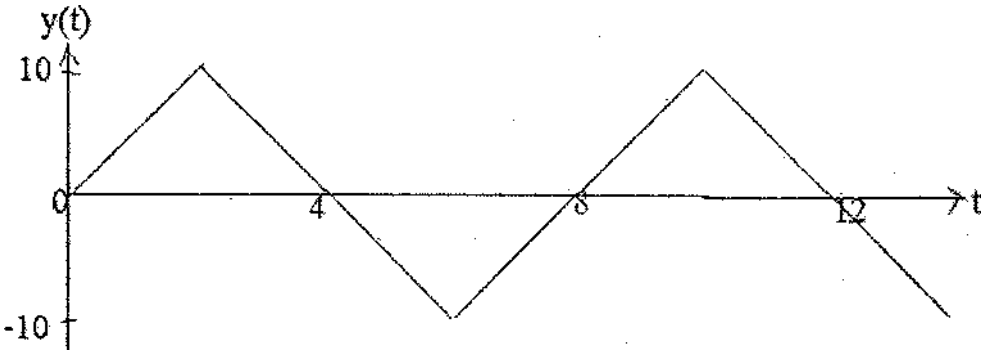
SECTION – II

1. Attempt **all**. **(2×9=18)**

   a) How to identify the SOPDT T.F. model with pole multiplicity is

   $$G(s) = \frac{k(T_0 s + 1)}{(T_1 s + 1)^2} \ ?$$

   b) The output waveform is as shown below. Identify the system model.



   OR

   How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

2. Obtain the analytical expressions for the SOPDT transfer function model. **(1×8=8)**

3. Estimate the parameters of the dynamics of the plant $G(s) = \frac{ke^{-\theta s}}{Ts \pm 1}$ and the dynamics of the controller $G_c(s) = K_c\left(1 + \frac{1}{T_i s} + T_d S\right)$ by using DF based on-line identification process. **(1×9=9)**

   OR

   What are the conditions for sustained oscillatory output of FOPDT transfer function model ?

SLR-PD – 167

Seat No.	

M.E. (Electrical Engineering) Semester – II Examination, 2015
HIGH VOLTAGE DC TRANSMISSION SYSTEMS (Elective – II)(Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70

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

SECTION – I

1. Attempt **all**

   a) With neat sketches explain the different kinds of D.C. links available. **8**

   b) 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. **9**

   OR

   Describe about starting and stopping of DC link

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

   a) Write differences between HVAC and HVDC and write applications of HVDC system.

   b) Explain the working of working basic power controller using VDCOL (Voltage Dependent Current Order Limiter).

   c) Draw the schematic circuit diagram of a 6-pulse Graetz's circuit and explain its principle of operation.

SECTION – II

3. Attempt **all**.

   a) What are the causes of over voltages and explain type of over voltages in a converter station in details. **8**

   b) Write a note on the following sources of reactive power

      i) Synchronous condensers

      ii) Static VAR system. **9**

   OR

   What are the types of MTDC systems and explain each in detail ?

P.T.O.

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

   a) Discuss the various faults exist in converter station. Explain.

   b) Give a detailed account of design aspects of the following filters

      i) Single tuned filter

      ii) Double tuned filter

   c) Explain the following current control methods of MTDC system :

      i) Current margin method

      ii) Two ACR method

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SLR-PD – 168

Seat No.	

M.E. (Electrical Engineering) (Semester – III) Examination, 2015
(Paper – I) SELF LEANING SUBJECT : SMART GRID

Day and Date : Sunday, 24-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Explain the following terms related to Smart Grid.
   i) Objectives
   ii) Functions
   iii) Challenges. **11**

2. Explain the concept Plug in Hybrid Electric Vehicles. **8**

3. Explain Thyristor-controlled phase shifting transformer. **8**

4. Explain phase measurement unit and its importance in smart grid. **8**

SECTION – II

5. Explain concept of microgrid and its need and application. What are the key differences between a Microgrid and a conventional power plant ? **11**

6. Explain “micro turbine”. **8**

7. Write down the Challenges and disadvantages of Microgrid development. **8**

8. Explain Web based power quality monitoring and objectives of monitoring. **8**

SLR-PD – 169

Seat No.	

M.E. (Mech. Manufacturing Engineering) (Semester – I) Examination, 2015

Paper – I : MATERIAL REMOVAL PROCESSES

Day and Date : Friday, 22-5-2015 Max. Marks : 70

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

Instructions : *1) Solve **any three** questions from Q. **1** to Q. **4**.*

*2) Q. **5** is **compulsory.***

*3) Draw sketches, diagrams, flow charts, etc., **wherever** necessary.*

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

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

1. a) Determine the three components of the machining force when shaping a cast iron block with depth of cut = 4 mm, feed = 0.25 mm/stroke, normal rake angle of tool = 10^0, principal cutting edge angle 30^0, coefficient of friction between the chip and tool 0.6 and ultimate shear stress of cast iron = 340 N/mm^2. **10**

   b) Explain in brief heat generation in metal cutting and its effect on machining. **8**

2. a) During an orthogonal machining operation on mild steel the results obtained are, t_1 = 0.25 mm, t_2 = 0.75 mm, w = 2.5 mm, oe = 0°, F_C = 950 N, F_T = 475 N. **10**

      i) Determine the coefficient of friction between the tool and the chip

      ii) Determine the ultimate shear stress of the work material.

   b) Explain in detail forces acting on the cutting tool and their measurement. **8**

P.T.O.

3. a) Write note on Tool Life and Tool wear. **10**

   b) Explain in brief factors influencing selection of cutting fluids. **8**

4. a) Write in detail effect of grinding conditions on wheel behaviour. **8**

   b) Write short note on the determination of the density of active grains. **10**

5. Write short note on **(any two)** : **(8×2=16)**

   a) Ultrasonic machining

   b) Water-jet machining

   c) Abrasive-jet machining.

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SLR-PD – 17

Seat No.	

M.E. (Mechanical – Design Engg.) (Semester – I) Examination, 2015
(Paper – II) MACHINE DYNAMICS

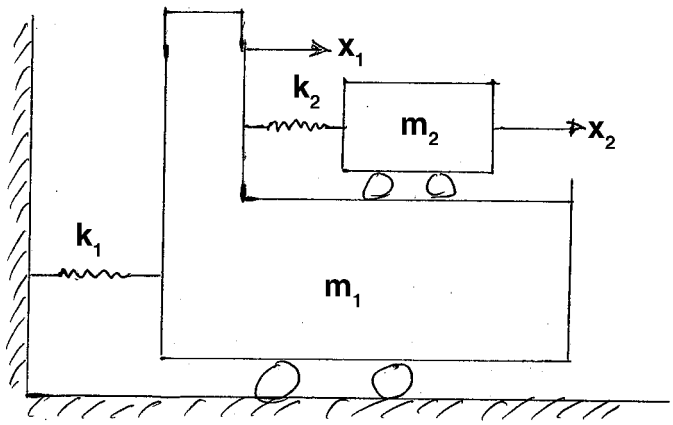
Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Que. No.**1** from section **I** and Que. No.**5** from section **II** are **compulsory**.*
*2) Solve **any two** questions from section **I** and **any two** questions from section **II**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** additional data if **necessary** and state it clearly.*

SECTION – I

1. Explain the terms – generalized coordinates, principle coordinates, normal modes in context of multi degree of freedom vibrating system. **11**

2. Derive equation of motion of vibratory system as shown in figure. Determine natural frequency of vibration. K1 = 98 KN/m, m1 = 196 kg, K2 = 19.6 KN/m, m2 = 49kg. **12**



P.T.O.

3. Set up differential equation of motion for double pendulum having masses of bobs and length of springs equal. Assuming small amplitudes determine the natural frequencies and corresponding mode shapes. **12**

4. Write short notes on (each **6** marks) : **12**

   a) Rayleigh's method for natural frequency

   b) Vibration isolators.

SECTION – II

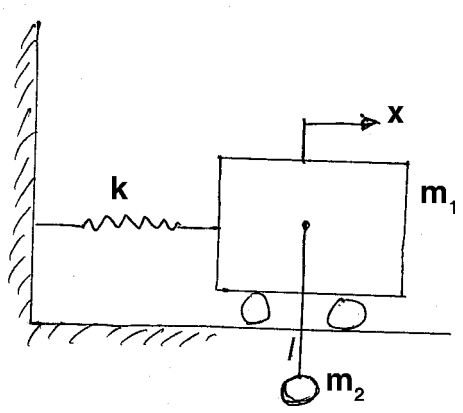
5. What is jump phenomena ? **11**

6. a) Explain torsional vibrations of circular shafts. **6**

   b) What is meant by non linear vibrations ? Explain with examples. **6**

7. Find natural frequency of the following system. When **12**

   a) $K = \infty$ b) $m2 = 0$ c) $I = 0$ d) $k = 0$



8. Write short notes on self excited and parametrically excited vibrations. **12**

SLR-PD – 170

Seat No.	

M.E. (Manufacturing Mechanical) (Semester – I) Examination, 2015
CNC AND ADAPTIVE CONTROL (Paper – II)

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is the purpose of feedback system in a CNC system ? Discuss the different types of control loop systems in CNC. **10**

   b) Discuss the advanced features of a CNC system. **7**

2. a) Discuss the functions of interpolators ? Explain in detail different types of interpolation. **11**

   b) Explain the significance of automatic tool changer in a CNC system. **6**

3. Write short note on **(any three)** : **(3×6=18)**

   1) Types of CNC systems

   2) Drives for CNC

   3) CNC turret punch press

   4) Optical encoders.

SECTION – II

4. a) Explain the part programming procedure in detail. **11**

   b) How will you verify a CNC program ? **6**

P.T.O.

5. a) What is adaptive control ? Discuss the situation where it can be used ? Explain with a suitable example. **10**

   b) Explain the Computer assisted part programming. **7**

6. Write short note on **(any three)** : **(3×6=18)**

   1) Maintenance and installation of a CNC system

   2) Post Processors

   3) Conversational and graphics based software

   4) Role of CNC machine in CIM environment.

SLR-PD – 171

Seat No.	

M.E. Mechanical Manufacturing Engineering (Semester – I) Examination, 2015
Paper – III : ADVANCED JOINING TECHNOLOGY

Day and Date : Monday, 25-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Solve **any three** questions from Q. **1** to Q. **4**.*
*2) Q. **5** is **compulsory**.*
*3) Draw sketches, diagrams, flow charts, etc., **wherever** necessary.*
*4) Figures to the **right** indicate **full** marks.*
*5) **Make** suitable assumptions if required and state them **clearly**.*

1. a) Write short note on DC Rectifier. **8**
   b) Explain Resistance welding with advantages, disadvantages and applications. **10**

2. a) Explain different methods used for welding of Plastics. **10**
   b) Explain USW process with the help of neat sketch and applications. **8**

3. a) Explain various heat treatments carried on welded component. **8**
   b) Explain EBW with it's principle, advantages, disadvantages and applications. **10**

4. a) What are the different welding defects ? Give their reasons and suggest the remedies. **10**
   b) Explain in brief "Testing and Inspection of welded joints" ? **8**

5. Write short note on (**any four**) : **(4×4=16)**
   a) Adhesive bonding
   b) Soldering
   c) Stress relief methods in welded component
   d) Solidification mechanism infusion of weldments
   e) Brazing and Braze welding.

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Seat No.	

M.E. (Mech-Manufacturing Engineering) (Semester – I) Examination, 2015
MACHINE TOOL DESIGN (Elective – I)

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Note *: 1) Answer **any two full** questions in **each** Section.*
*2) **Draw** meaningful sketches **wherever** necessary in pencil only.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Explain kinematics requirements of machine tools. **5**
   b) Explain in detail the criteria for the selection of operating capacity and design parameters. **12**

2. a) Explain the general requirements machine tool drives in detail. **8**
   b) Explain in detail the stepped and step-less drive. **10**

3. a) Explain in detail the design criteria of slide-ways. **7**
   b) Derive an expression for deflection of spindle axis due to compliance of spindle support. **10**

SECTION – II

4. a) Explain design of beds. **8**
   b) State and explain various column sections with their application. Explain design of columns. **10**

5. What are Micro-feeding mechanisms ? Enlist the different Micro-feeding mechanisms. Explain in detail any two Micro-feeding mechanisms. **17**

6. a) Write a note on the CAD techniques used for machine tool design. **8**
   b) Explain machine tool conditioning procedure in details. **10**

SLR-PD – 18

Seat No.	

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

Day and Date : Monday, 25-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain the components of strain with usual notations. **3**

   b) Derive the equation of compatibility for plane stress problem in polar co-ordinates. **8**

2. a) State and explain the St. Venant's principle. **3**

   b) Investigate what problem is solved by the stress function Ø where

   $Ø = A\left[xy^3 - \frac{3}{4}xyh^2\right]$ for the region included by $y = \pm c$ and $0 \leq x \leq 1$. **8**

3. a) Derive the stresses induced in the rotating disc having central hole. **6**

   b) Derive the stresses induced in the thick cylinder subjected to the internal and external pressure. **6**

4 a) Explain the membrane analogy. **6**

   b) Derive the expression for torque and angle of twist of prismatic bar of elliptical cross section. **6**

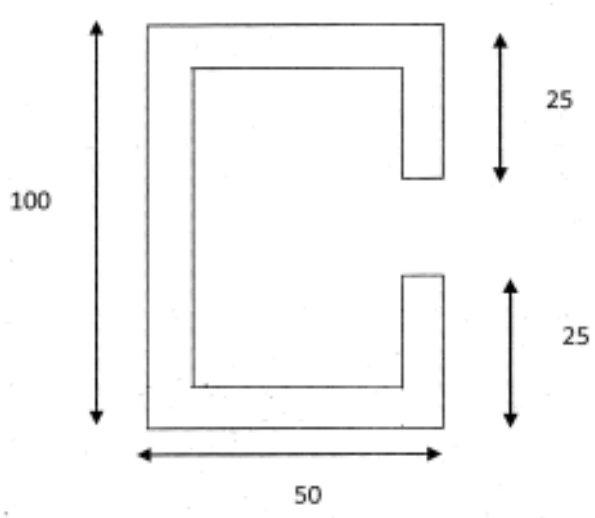
P.T.O.

SECTION – II

5. a) State and explain the basic assumptions made in theory of contact stresses. **3**

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

6. a) Locate a shear centre for a structural cross section (as shown in fig.) of uniform thickness of 5 mm. **8**



   b) Determine the static load rating of ball bearing based on Hertz contact stresses. **4**

7. a) Derive the expression for torsion and angle of twist in case of non circular prismatic bar. **6**

   b) Find the membrane stresses in case of cylindrical vessel with conical bottom end and filled with liquid. **6**

8. Write a note on the following :

   i) Torsion of rolled profiles **6**

   ii) Shell of uniform strength **5**

———————

SLR-PD – 181

Seat No.	

M.E. (Mechanical) (Manufacturing Engineering) (Semester – I) Examination, 2015
Paper – V : MANUFACTURING PLANNING AND CONTROL (Elective – II)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Solve **any five** question.*
*2) **Neat** diagrams must be drawn **whenever** necessary.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data **if necessary**.*
*5) **Use** of logarithmic tables, slide rules, Mollier charts, electronic pocket calculator and steam table is **allowed**.*

1. a) What is continuous production system ? Discuss production planning and control for continuous production system. **7**

   b) Compare Make to stock production with Make to order production. **7**

2. a) Explain the concept of cellular manufacturing. **7**

   b) Explain different layouts in FMS. **7**

3. a) Explain the different methods of part classification in GT. **7**

   b) Discuss - task, cycle time, work station, predecessor task, task time, station time, balance delay in line balance. **7**

4. a) Explain any two manufacturing module of MRP-II. **8**

   b) Explain how the Queuing model is used for maximum utilisation of machine tool. **6**

P.T.O.

5. a) Discuss different ways of reducing scheduling problems. **7**

   b) State and explain the approaches which should be considered in order to optimise the overall efficiency and effectiveness of FMS. **7**

6. a) Discuss various steps to be followed to get quality planning. **7**

   b) Discuss relation between-cost and value, cost and quality. **7**

7. Write short note on following.

   a) Heuristic method for line balance. **7**

   b) State factors favouring overcapacity and under capacity. **7**

SLR-PD – 185

Seat No.	

M.E. (Mechanical – Manufacturing Engg.) (Semester – II) Examination, 2015
METAL FORMING PROCESSES (Paper – VI)

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. A) Explain the Von Mises criteria for isotropic materials with assumptions. **7**
   B) Explain the properties of Hot forming with advantages and limitations. **7**

2. A) State the upper bound theorem and explain the various terms associated with it. **7**
   B) What are velocity relationships along slip lines, derive that relationship. **7**

3. A) What is cold forming ? Explain with suitable example. **7**
   B) Explain the classification of metal forming processes in detail. **7**

4. A) Explain the Roll pass for billet rolling. **7**
   B) What is isothermal forging, explain its significance. **7**

5. A) Write a note on Near Net shape manufacturing. **7**
   B) In detail explain the Hydrostatic Extrusion process. **7**

6. A) How elastic deformation affects cold rolling processes ? **7**
   B) Explain the term barreling and bulging in connection with forging of non circular shapes between two flat dies. **7**

SLR-PD – 186

Seat No.	

M.E. (Mechanical-Manufacturing Engineering) (Semester – II) Examination, 2015

FINITE ELEMENT METHODS (Paper – VII)

Day and Date : Saturday, 30-5-2015 Total Marks : 70

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

***Instructions** : 1) Attempt **any three** questions from e**ach** Section.*

*2) Make suitable assumptions if necessary and state them **clearly.***

SECTION – I

1. a) Explain steps involved in finite element method. **6**

   b) Compare finite element method and exact solution. **6**

2. a) Find the approximate solution of differential equation of cantilever beam subjected to uniform axial load using weighted residual method. **6**

   b) Explain software used in FEM. **5**

3. a) Using potential energy method to derive the element stiffness matrix and element equation for a simple bar element. **6**

   b) Distinguish between Galerkin and Ritz method. **5**

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

   a) Collocation method.

   b) Discritization of finite element problem.

   c) Characteristics of shape function.

P.T.O.

SECTION – II

5. a) Using Lagrangian polynomial find shape function for two noded and three noded bar element. Plot the variation of shape function. **6**

   b) Explain local, global and natural coordinate system. **6**

6. a) Discuss in brief dynamic analysis in finite element method. **6**

   b) Describe 1-D, 2-D and 3-D elements. **5**

7. a) Explain modeling procedure of drilling operations in manufacturing using finite element method along with its application. **6**

   b) Explain different types of elements used in FEM and how to select them for different applications. **5**

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

   a) Structural beam, plate and shell element.

   b) Applications of FEM in axisymmetric field problems.

   c) Formulation of isoparametric elements.

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Seat No.	

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

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Discuss the problems encountered by researchers in our country. **7**
   b) Explain development of creativity. **7**
2. a) What is research proposal ? Explain sponsoring agent's requirements and importance. **7**
   b) What is research design ? Explain research design process. **7**
3. a) What is system simulation ? Explain its importance and various methods of simulation. **7**
   b) List and explain the guidelines for designing experiments. **7**
4. a) Explain group problem solving techniques for idea generation. **7**
   b) What is scope of optimization techniques in experiments ? Discuss various methods. **7**
5. a) Define report. Discuss importance of good report writing skills. Comment on various elements of structure of report. **7**
   b) What is experiment ? What do you mean by factorial experiments, explain with example. **7**
6. a) Explain stages in model building. **7**
   b) Explain importance of oral presentation in research. **7**
7. Write short notes on **any two** : **14**
   a) Field study for research
   b) Numerical Simulation or physical simulation
   c) Analysis of Co-variance (ANOCOVA)
   d) Dissertation and thesis.

SLR-PD – 193

Seat No.	

M.E. (Mechanical) (Manufacturing Engineering) (Semester – II) Examination, 2015
Elective – III : FLEXIBLE MANUFACTURING SYSTEM (Paper – VIII)

Day and Date : Monday 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is FMS ? Give its significance in today's manufacturing scenario. **9**
   b) Classify FMS and discuss the scope. **8**
2. a) Discuss the significance of distributed numerical control in FMS. **9**
   b) Explain different configuration of FMS layout and discuss their significance. **8**
3. Write short notes on **(any three)** : **(3×6=18)**
   1) FMS Vc FMC
   2) FMS software
   3) FMS layout
   4) Benefits and limitations of FMS.

SECTION – II

4. a) Justify economic considerations of FMS. **9**
   b) Discuss palletising in FMS. **8**
5. a) What are various measures used to assess the performance of storage system ? **9**
   b) Explain the ASRS. **8**
6. Write short notes on **(any three)** : **(3×6=18)**
   1) Simulation of FMS.
   2) Tool monitoring of FMS.
   3) Tool specification in FMS.
   4) ATC.

SLR-PD – 195

Seat No.	

M.E. (Mech. Manufacturing Engg.) (Semester – II) Examination, 2015
Paper – IX : QUALITY CONTROL AND RELIABILITY (Elective – IV)

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70

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

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

SECTION – I

1. a) Enumerate the quality documents and systems needed in T.Q.M. **6**
   b) Explain briefly about optimum quality with neat sketch. **6**

2. a) Describe briefly about Deming's fourteen points for managements. **6**
   b) What do you know about Juran's Trilogy and developing a habit of quality ? **6**

3. a) What is innovations how it is differ from KAIZEN'S explain it with at least one example. **6**
   b) Describe briefly Crosby's the fourteen steps of quality improvement. **6**

4. Write a short note on **any 2** :
   a) KAIZEN and Deming.
   b) Crosby's quality vaccine.
   c) T.Q.M. objectives. **12**

SECTION – II

5. a) Define control charts and write formula for central line and upper and lower control limit of various types of charts. **6**
   b) Describe in briefly about process capabilities and tolerance. **4**

P.T.O.

6. a) What do you understand by frequency distribution ? What are the common probability distributions and their applications in S.Q.C ? **6**

   b) What are the statistical quality control tools are available ? **4**

7. a) Explain the following terms clearly bring out difference between them

   Q.C.-Q.A.-T.Q.C.-T.Q.M **8**

   b) Explain the function of reliability analyst in an organization. **4**

8. Write short note on **any two** :

   a) Reliability of single and multi component system.

   b) Quality Functions Development (QFD).

   c) Taguchi's recommended design techniques. **12**

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SLR-PD – 2

Seat No.	

M.E. (Civil Structures) (Semester – I) Examination, 2015
Paper – II : MECHANICS OF STRUCTURES

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. Draw ILD for BM at C and shear force at C of continuous beam as shown in Fig. 1. **12**

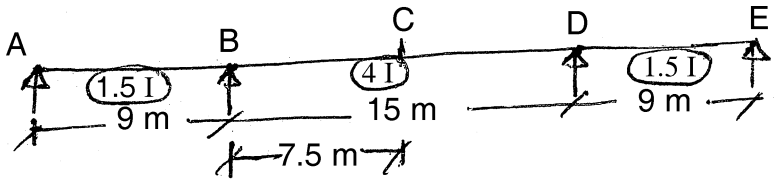

Fig. 1

OR

1. Draw ILD for R_A, M_A and M_B of frame as shown in Fig. 2. **12**

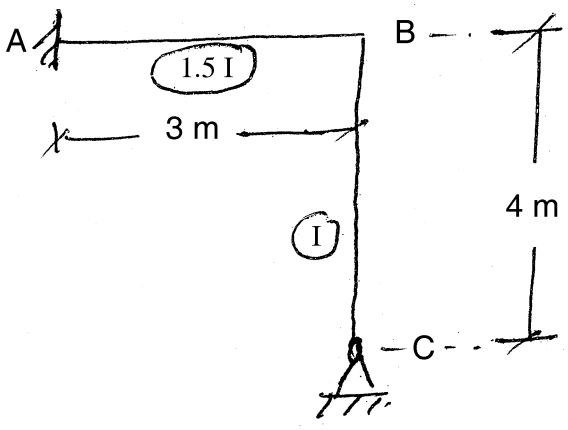

Fig. 2

P.T.O.

2. A semicircular beam curved in plan is supported on 3 columns as shown in Fig. 3. Draw SFD, BMD and TMD if beam is subjected to udl of 'w' throughout its circumference. **12**

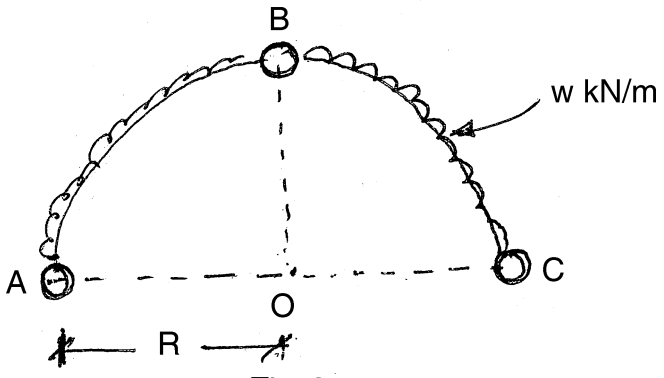

Fig. 3

3. Draw SFD, BMD and pressure diagram for the following infinite beam on elastic foundation refer Fig. 4. **11**

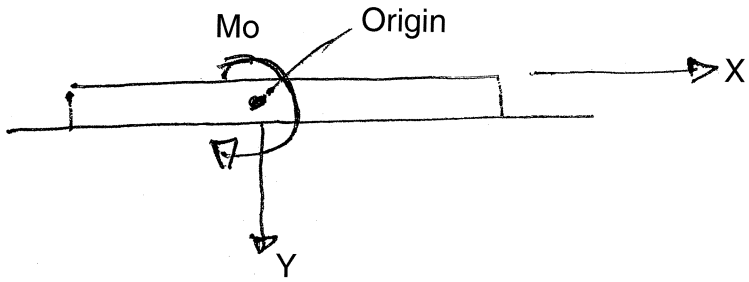

Fig. 4

SECTION – II

4. A propped cantilever beam-column is subjected to an anticlockwise moment 'Mo' at its propped end and an axial compressive force 'P' at both ends. Derive expression for slope at the propped end and the fixed end moment at other end. **12**

5. Draw BMD of continuous beam as shown in Fig. 5 by stiffness method. **12**

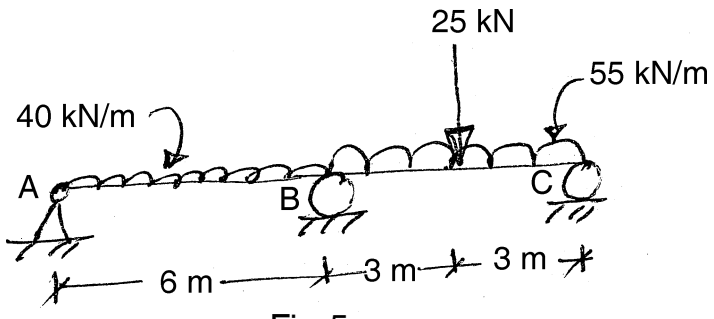

Fig. 5

OR

5. Draw BMD of portal frame as shown in Fig. 6 by stiffness method. **12**

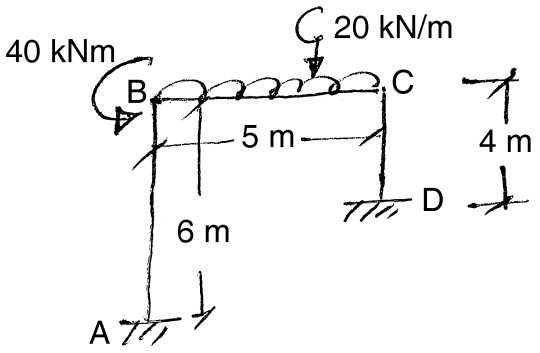

Fig. 6

6. Find forces in all members of a pin jointed truss as shown in Fig. 7 by using member oriented stiffness method. **11**

   Axial rigidity (AE) and length (l) for all members are tabulated below

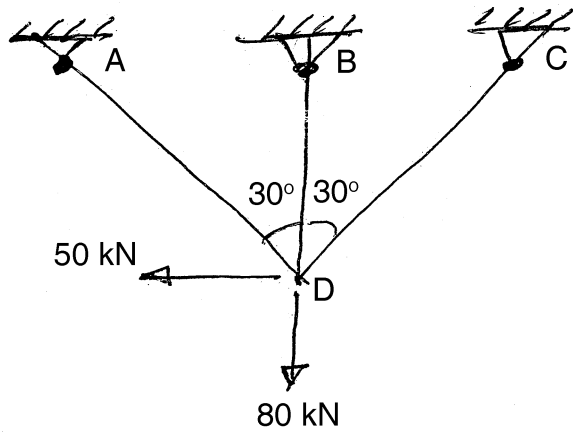

Fig. 7

Member	AE (MN)	l (cm)
AD, CD	300	300
BD	259.8	259.8

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Seat No.	

M.E. (Mech.) Design Eng. (Sem. – I) Examination, 2015
Paper – V : SYNTHESIS AND ANALYSIS OF MECHANISMS AND MACHINES (Elective – I)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Answer **any three** questions from **each** Sections.*
*2) Figures to the **right** indicates **full** marks.*
*3) **Assume** necessary data **if required**.*
*4) **Use** of calculator is **permitted**.*

SECTION – I

1. a) Explain Kutzbach and Grubbler crifsion. **4**

   b) A 4-bar linkage is to generate the function $y = \frac{1}{x}$ over the interval $1 \le x \le 2$.

   The ranges of variation are to be $\Delta\phi = 90^\circ$ and $\Delta\psi = 90^\circ$ with three accuracy point
   having Chebychew spacing. **8**

2. a) Explain mechanical error is four bar linkages. **5**

   b) Derive Frudensteins equation. **7**

3. a) Explain Crank and follower synthesis of five accuracy point. **5**

   b) Explain Robert-Chebychev theorem. **6**

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

   a) Kinematic pairs

   b) 4-bar linkage synthesis for five prescribed positions of a link.

P.T.O.

SECTION – II

5. a) Explain the symmetrical coupler curve. **6**

   b) Explain algebraic method of synthesis using complex number. **6**

6. a) Explain two position synthesis of four bar mechanism. **6**

   b) Discuss the analysis of spatial linkages by matrix method. **6**

7. a) Explain Eulerian rotation transformation and Eulerian angle for spatial mechanism. **5**

   b) Derive the Equation of coupler curve for a four bar linkage by Samueal Robert method. **6**

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

   a) Dynamic analysis of mechanism.

   b) Return circle.

SLR-PD – 200

Seat No.	

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

Day and Date : Saturday, 30-5-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Attempt **any two** : **16**
   a) Explain CPU register of PIC – 16F877.
   b) What is PWM mode ? Explain its applications.
   c) Explain addressing modes of PIC-16F877.

2. a) List CPU code features and peripheral features of 16F877. **8**
   b) Explain AD module with its associated registers. **8**

3. a) Explain compare/capture mode with its applications. **9**
   b) Explain in detail I2C bus in PIC microcontroller. **9**

SECTION – II

4. a) Explain Round-Robin with interrupts architecture. **8**
   b) Explain rules for interrupt routines in RTOS. **8**

5. a) Explain selection of a particular embedded software architecture. **8**
   b) Explain the use of queues, mail boxes and pipes for data sharing. **8**

6. Attempt **any three** : **18**
   a) Linker for embedded software
   b) Debugging techniques
   c) Host and Target machines
   d) Semaphores and shared data.

SLR- PD – 201

Seat No.	

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

Day and Date : Monday, 1-6-2015 Max. Marks :100
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

1. Answer **any two** : **(8×2=16)**

   a) Explain process reaction curve method and write its advantages.

   b) What is feed forward control ? Develop feed forward control design for any process control system.

   c) Explain parallel structure of system.

2. Answer **any two** : **(8×2=16)**

   a) Explain effect of digital control on stability, tuning and performance of feedback control system.

   b) What do you mean by degree of freedom (D-O-F) in process control and explain ?

   c) What is mathematical modeling ? Explain following steps of modelling procedure : i) Defining goal and ii) Preparing information.

3. Answer **any three** : **(6×3=18)**

   a) Explain cascaded control design criteria.

   b) Ziegler-Nichols method.

   c) Empirical model building procedure.

   d) Explain the dynamic behaviour of first order system.

P.T.O.

SECTION – II

4. Answer any two : **(8×2=16)**

   a) Where and why are internal model control is used ? How are they used ?

   b) What is Shewhart Chart ? Where and how it is used ?

   c) Explain different binary logic diagrams used for process operations in PLC.

5. Answer any two : **(8×2=16)**

   a) Explain ladder diagram development with respect to particular application of PLC.

   b) Explain the Dynamic Matrix Control (DMC) approach for single variable control. What are implementation issues ?

   c) Explain relative gain array with a neat diagram and write its advantages.

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

   a) Communication networking using PLC

   b) Multi Loop Control

   c) Automatic Processes Control (APC)

   d) Smith predictor.

SLR-PD – 203

Seat No.	

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

Day and Date : Wednesday, 3-6-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain Fresnel zone geometry and all possible knife edge diffraction geometry. **9**

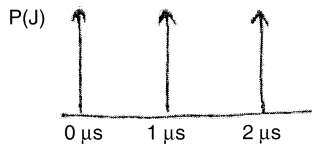
   b) If a 1 mw transmitter at 6 GHz is fed into transmitting horn antenna then the line of sight transmission link limits the separation of transmitter and receiver at about 40 km. The transmitting and receiving antenna has effective area of 4.6 cm × 3.5 cm.

      i) Calculate the free space path loss.

      ii) Find the received signal power at these distance.

      iii) Calculate the rms voltage induced across these terminals by the transmitted signal, if the receiving antenna terminals are matched to a 50 Ω impedance. **9**

2. a) Compute the rms delay spread for the following power delay profile. **8**



      i) Calculate the rms delay spread for the given figure.

      ii) If BPSK modulation is used what is the maximum bit rate that can be sent through the channel without needing an equalizer.

   b) Explain methods of determining the small scale fading effects. **8**

P.T.O.

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

   a) Determine the equation showing the relationship between bandwidth and received power of multipath channel.

   b) Derive and explain the free space propagation model to determine the received power at a distance 'd' and relate this power to electric field.

   c) Explain basic modulation techniques used for mobile communication.

SECTION – II

4. a) Explain signal processing in GSM in detail. **8**

   b) Explain following space diversity : **8**

      i) Selection diversity

      ii) Scanning diversity.

5. a) Explain GSM architecture. Discuss various interfaces used in GSM. **9**

   b) Explain the features of TDMA. **9**

   A normal GSM has 3 start bits and 3 stop bits, 26 training bits for allowing adaptive equalization, 8.25 guard bits and 2 bursts of 58 bits of encrypted data which is transmitted at 270.833 kbps in the channel. Find

      i) Number of overhead bits per frame

      ii) Total number of bits/frame

      iii) Frame rate

      iv) Time duration of slot.

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

   a) With block diagram explain PAC system architecture and its frame structure.

   b) Write a note on North American TDMA.

   c) Why pulse shaping is required ? Explain pulse shaping techniques used in mobile communication.

SLR-PD – 204

Seat No.	

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

Day and Date : Wednesday, 3-6-2015 Total Marks : 100

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

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

SECTION – I

1. Solve following :

   A) Explain in detail types of data fragmentation. **10**

   B) Explain distributed database access primitives. **8**

   OR

   How to design vertical fragmentation for distributed database systems ? **8**

2. Solve following :

   A) Explain distributed grouping and aggregate functions. **10**

   B) Explain integrity constraints in distributed databases. **6**

3. Solve following :

   A) Explain equivalence rules for transformation of relational expressions. **10**

   B) Explain mixed fragmentation. **6**

   OR

   Explain 2PC with failure analysis. **6**

P.T.O.

SECTION – II

4. Solve following :

   A) Explain commitment protocols and network partitions. **10**

   B) Explain catalog management in distributed databases. **8**

   OR

   Explain object identifier management in catalog. **8**

5. Solve following :

   A) Explain special query optimization in MULTIBASE. **10**

   B) Explain checkpoints and cold restart. **6**

6. Solve following :

   A) Explain reliability and concurrency control. **10**

   B) Explain object naming and catalog management with site autonomy. **6**

   OR

   Explain adaptex. **6**

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SLR-PD – 205

Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 100

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

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

SECTION – I

1. Solve **any two** : **(2×8=16)**
   1) What is connectionless and connection oriented data transfer ? Compare between packet and circuit switching. Which different control signaling methods are adopted by circuit networks ?
   2) Draw and explain ISDN architecture in detail. Discuss addressing structure related to ISDN.
   3) Explain error and flow control policy adopted in X. 25 packet communication.

2. Solve **any two** : **(2×8=16)**
   1) Explain in detail different traffic parameters arrival rate, blocking holding time, blocking traffice and offered traffic.
   2) Discuss in detail video traffic characterization.
   3) What is multi-framing in case of ISDN ? Discuss is multi-framing in detail.

3. Solve **any two** : **(2×9=18)**
   1) Explain the concept of rate adaption and multiplexing in case of ISDN.
   2) Draw and explain LAPD frame formates.
   3) Draw and explain various access configurations in case of ISDN.

P.T.O.

SECTION – II

4. Solve **any two** : **(2×8=16)**
   1) What is synchronous and asynchronous multiplexing ? Compare synchronous and asynchronous multiplexing. Explain VCC, VPC, VPI and VCI related to ATM.
   2) Explain various broadband services.
   3) Draw and explain B-ISDN protocol reference model and explain.

5. Solve **any two** : **(2×8=16)**
   1) Draw and explain SONET frame structure used for communication.
   2) Which service categories are supported in ATM ? Discuss AAL-1 protocol in detail.
   3) Explain generic flow control and cell delineation in case of ATM.

6. Solve **any two** : **(2×9=18)**
   1) What is end to end traffic and deterministic and stochastic bounds in ATM ? Discuss ATM congestion control method.
   2) Draw and explain ATM switch element. How ATM cell is processed in ATM switches ?
   3) Draw UNI and NNI ATM cell format and explain each field.

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SLR-PD – 206

Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

1. Solve **any four** : **(5×4=20)**
   a) Explain module level concepts.
   b) Define software. Justify your answer on software is developed/engineered, it is not manufactured in classical sense.
   c) List prescriptive process models. Explain any one with strengths and weakness.
   d) What characteristics of incremental model make them amenable to modern software projects ?
   e) List formal techniques available for assessing software process.

2. Solve the following : **(3×10=30)**
   a) What are software myths ? Explain in detail.
   b) Explain capability Maturity Model (CMM)
   c) Explain Rational Unified process's phases and workflow.

   OR

   c) Define RISK. Explain RISK planning.

3. Solve **any four :** **(5×4=20)**
   a) Discuss objectives of software testing.
   b) Discuss objectives of software quality assurance.
   c) Draw DFD for "Safe Home" security function.
   d) Draw sequence diagram for login to gmail system.
   e) Write a note on CASE.

4. Solve the following : **(3×10=30)**
   a) Understand ATM withdrawal transaction. Draw sequence diagram for the same.
   b) Discuss taxanomy of CASE tools.
   c) Define software testing. Explain levels of testing in detail.

   OR

   c) Discuss manual testing and automatic testing.

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SLR-PD – 207

Seat No.	

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

Day and Date : Saturday, 6-6-2015 Max. Marks : 100

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

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

SECTION – I

1. a) Explain basic pipeline scheduling and loop unrolling. **8**
   b) Explain data, name and control dependencies. **10**

   OR

   c) Explain dynamic scheduling with scoreboard. **10**
2. a) What are problems in implementing pipelines ? **8**
   b) How to reduce pipeline branch penalties ? **8**
3. a) Explain types of exceptions and requirements. **10**
   b) Discuss first three cycles of DLX instructions. **6**

   OR

   c) Explain different ways to classify instruction set. **6**

SECTION – II

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

   OR

   c) Explain vector length control. **8**
5. a) Explain spin lock with exponential back off. **8**
   b) Explain relaxed models for memory consistency. **8**
6. a) Explain multiprocessor cache coherence. **8**
   b) Explain directory protocol. **8**

   OR

   c) Explain implementation of locks using coherence. **8**

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SLR-PD – 208

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) (Old) Examination, 2015
ADVANCED DATABASE DESIGN (Paper – VII)

Day and Date : Saturday, 30-5-2015 Total Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Question **1** and **5** are compulsory.*
*2) Attempt any **two** questions from Question **2** to **4** from Section – **I**.*
*3) Attempt **any two** questions from question **6** to **8** from Section – **II**.*
*4) Figures to the **right** indicate marks to a question.*
*5) **Assume** suitable data **wherever** necessary.*

SECTION – I

1. a) Discuss in detail various design strategies and fragment allocation strategies in distributed database. **15**
   b) Explain reference architecture for distributed database. **5**

2. a) Explain how query processing strategy is selected. **8**
   b) Explain canonical expression of a fragment query with example. **7**

3. a) Explain reference model of distributed transaction recovery. **8**
   b) Explain basic timestamp Mechanism w.r.t. concurrency control. **7**

4. a) Explain cold checkpoints and cold restart in distributed database. **8**
   b) How the catalogs are allocated in distributed database ? **7**

P.T.O.

SECTION – II

5. a) Draw and describe architecture of a multimedia database management system. **10**

   b) Draw and describe mobile database system architecture. **10**

6. a) Explain deep and shallow equality with suitable example. **8**

   b) What do you mean by structured data types ? What kind of operations should be provided for structured data types ? **7**

7. a) What are the benefits of XML ? **5**

   b) What is SOAP and how it is important ? **5**

   c) Give the guidelines for designing web interface. **5**

8. a) What are the design issues in object database management systems ? **8**

   b) Explain R-tree with example. **7**

SLR-PD – 209

Seat No.	

M.E. (Computer Sci. & Engg.) (Semester – II) Examination, 2015
Paper – VIII : ADVANCED COMPUTER ARCHITECTURE (OLD)

Day and Date : Monday, 1-6-2015 Total Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q. No.* ***4*** *and Q. No.* ***8*** *are* ***compulsory****. Answer* ***any two*** *questions from Q. No.* ***1*** *to Q. No.* ***3*** *and* ***any two*** *from Q. No.* ***5*** *to Q. No.* ***7****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume data ***if necessary****.*

SECTION – I

1. A) Distinguish between true and artificial data dependency. What is the resolution method used to get over true data dependency ? **8**

   B) What are the main steps followed, while creating a process ? **8**

2. A) Discuss the different phases involved in evolution of ILP processors. **8**

   B) Compare between VLIM and superscalar processor. **8**

3. A) Discuss the key aspects of general layout of pipeline. **8**

   B) What is the difference in thread and process ? State applications of thread and process separately. Why thread is known as a light weight process ? Draw and explain the cycle of scheduling of process. **8**

4. Write notes on **any two** : **18**

   a) Concurrent and parallel programming language.

   b) Bypassing of data in pipeline.

   c) Flynn's classification scheme.

P.T.O.

SECTION – II

5. A) With a layout, explain briefly specific tasks of superscalar processor. **8**

   B) Why shelving is necessary in superscalar processor ? **8**

6. A) Draw 6-stage CISC pipeline. Show what stages are used for executing. **8**

      i) Reg-reg instruction

      ii) Load instruction.

   B) What is master pipeline ? What are its advantages and disadvantages ? **8**

7. A) Explain basic principle of VLIW. **8**

   B) Explain ROB used in superscalar architecture. **8**

8. Write notes on **any two** : **18**

   a) Preserving sequential consistency

   b) Micro architecture of power PC 620

   c) Micro architecture of R10000.

SLR-PD – 21

Seat No.	

M.E. – Mech. (Design Engineering) Semester – I Examination, 2015
Paper – V INDUSTRIAL INSTRUMENTATION (Elective – I)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70

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

Instructions *: 1) Solve* ***any three*** *questions from* ***each*** *section.*

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

3) ***Draw*** *neat diagrams* ***wherever*** *necessary.*

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

SECTION – I

1. a) Explain basic auxiliary functional elements of a measurement system. **7**

   b) Explain general procedure of calibration. **5**

2. a) Describe types of dynamic inputs with examples. **6**

   b) Explain accuracy, precision and resolution parameters of static performance. **6**

3. a) Derive expression for output voltage of Wheatstone bridge network. Explain temperature compensation. **7**

   b) Explain Piezo-electric transducer. **4**

4. a) Explain absorption type dynamometer. **6**

   b) Write a note on pneumatic load cell. **5**

SECTION – II

5. a) Explain LVDT type and capacitance type pressure transducer. **7**

   b) Explain total radiation pyrometer with neat sketch. **5**

P.T.O.

6. a) Describe Pitot tube. Give its advantages and disadvantages. **5**

   b) Explain principle of working of thermocouple. What are advantages and limitations of thermocouples. **6**

7. a) Explain system analysis by harmonic testing. **5**

   b) Describe wear behavior monitoring. **6**

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

   a) Frequency analysis.

   b) Thermistors.

   c) Data acquisition system.

   d) Sound level meter.

   e) Importance of computers in instrumentation system.

   f) Time compression analyser.

SLR-PD – 210

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II)
Examination, 2015
Elective : III : WEB TECHNOLOGY (Old) (Paper – IX)

Day and Date : Wednesday, 3-6-2015 Total Marks : 100

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

Instructions *: 1) Questions* ***1*** *and* ***8*** *are* ***compulsory****.*

2) Solve ***any five*** *questions from* ***each*** *Section.*

Each *question carries* ***eight*** *marks.*

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

SECTION – I

1. Design a HTML login page for the student to login into Solapur University's online examination portal. Use proper validation and security. **10**

2. Explain various XML schema data types used. **8**

3. Explain 8 CSS text properties. **8**

4. What is function ? Explain how parameters are passed in Java script. **8**

5. Explain Apache web server and its components. **8**

6. Write a program to show content of cookie. **8**

7. Write note on secure server, server features and DHTML. **8**

P.T.O.

SECTION – II

8. Write a servlet program to display the waiting list status, given the PNR number of train. Create a JSP to display the information at the client end. **10**

9. Explain servlet life cycle and methods. **8**

10. List and explain server side risks with examples. **8**

11. Describe various security issues of web servers. **8**

12. Write short note on Mashup and Wiki. **8**

13. List methods in JSP request and response objects. **8**

14. State and explain the JSP elements in detail. **8**

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Seat No.	

M.E. (Computer Science & Engineering) (Semester – II) (Old) Examination, 2015
Elective – IV : NATURAL LANGUAGE PROCESSING (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 100

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

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

SECTION – I

1. Answer briefly : **18**

   a) Mention the steps in creating a Paradigm table.

   b) How is a Karaka Chart drawn ?

   c) What are Parsargs ? Give examples.

   d) Translate the sentence in an Indian language and perform morphological analysis - 'I need a strong comb to comb my hair'.

   e) Generate a Word form table.

   f) What are the goals of natural Language processing ?

2. Attempt **any two** : **16**

   a) What are Karaka relations ? Explain the concerned structures.

   b) Illustrate the working of Anusaraka system.

   c) Give the steps involved in Morphological analysis using a sorted reverse suffix table.

P.T.O.

3. Attempt **any two** : **16**

   a) What are the phases involved in the analysis of sentences using the Panninian approach ? Give illustrations of each.

   b) Illustrate the formation of Kriya-Rupa charts.

   c) Illustrate Word forms in Panninian Theory.

SECTION – II

4. Answer briefly : **18**

   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.

   f) What are the features of Dakshin hindi ?

5. Attempt **any two** : **16**

   a) Illustrate the formation of Kriya Rupa charts.

   b) State the basic levels in GB. How do they co-relate with each other ?

   c) Compare GB with PG.

6. Attempt **any two** : **16**

   a) State and explain the basic properties of LFG.

   b) Compare GB and LFG. Under what situations are each of them used ?

   c) Draw a neat block diagram of a Anusaraka language accessor. Explain its components.

SLR-PD – 218

Seat No.	

M.E. (CSE) (Semester – II) (Old) Examination, 2015
COMPUTER NETWORK ADMINISTRATION (Paper – VI)

Day and Date : Saturday, 6-6-2015 Total Marks : 100
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) From Section – **I** write answer to **any two** questions out of Q. **1** to Q. **3** and Q. **4** is **compulsory**.*
*2) From Section – **II** write answer to **any two** questions out of Q. **5** to Q. **7** and Q. **8** is **compulsory**.*
*3) Assume suitable data **if needed**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) What is the goal of network management ? Describe the functions of network management. **8**

   b) With neat diagram Internet Fabric Model. **8**

2. a) What are the network management standards ? List the salient points of each standard. **8**

   b) What is ASN.1 ? Explain in detail terminology, symbols, keywords and data type conventions of ASN.1. **8**

3. a) With neat diagram explain in detail SNMP network management architecture. **8**

   b) With neat diagram explain MIB Module Structure, Internet MIB-II group. **8**

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

   a) Basic communication architecture for communication between end systems via an intermediate system.

   b) TLV encoding structure.

   c) Two-tier organization model of SNMP management.

   d) System group of Internet standard MIB.

P.T.O.

SECTION – II

5. a) What is SNMP community ? Draw the diagram for SNMP community profile and access policy and explain how communication takes place. **8**

   b) With suitable timeline diagram explain Get-Request Operation and Get-Next-Request SNMP operations for a System Group. **8**

6. a) Write a case study on Internet Traffic using RMON. **8**

   b) What is the relationship between Control and Data Tables of RMON1 MIB. **8**

7. a) Describe the usage of the basic tools for network status-monitoring, network traffic-monitoring, network route-monitoring. **8**

   b) What are the functional requirements for designing NMS server for a large telecom/enterprise network ? Draw a diagram depicting a typical architecture of an NMS server. **8**

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

   a) Encapsulated SNMP Message.

   b) Major changes in SNMPv2.

   c) RMON1 Groups and Functions.

   d) The protocol analyzer.

SLR- PD – 23

Seat No.	

M.E. Mechanical (Design Engineering) (Part – I) (Semester – I) Examination, 2015
Elective – I : MECHANICAL SYSTEM DESIGN

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Qu. **1** and Qu. **5** are **compulsory**.*
*2) Solve **any two** questions from the **remaining** questions in Section – **I** and Section – **II**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Use** of Non-Programmable calculator is **allowed**.*
*5) **Assume** suitable data **if necessary**.*

SECTION – I

1. Solve **any four** : **(5×4=20)**
   a) What is the role of engineer in mechanical system design ?
   b) Explain need statement and nature of engineering problem.
   c) Explain design process approach and state theory approach.
   d) Discuss different types of models, used commonly for mechanical system design. Illustrate your answer suitably.
   e) Briefly explain network flow problems with suitable example.

2. Following data is given for a rope pulley transmitting 24 KW : Diameter of pulley 40 mm; speed = 110 rpm; Angle of groove = 45°, Angle of lap on smaller pulley = 160°, coefficient of friction = 0.28; Number of ropes = 10; Mass in Kg/m length of ropes = $53C^2$ and working tension is limited to $122C^2$ KN, where C is the girth of rope in meter. Determine initial tension and diameter of rope. **8**

3. Explain a case study of compound bar system model. **7**

P.T.O.

4. A truck delivers concrete from the ready mix plant to the construction site. The network in fig. IV represents the available routes between the plant and the site. The distance from node to node is given along the route line in km. What is the best route from plant to site. **7**

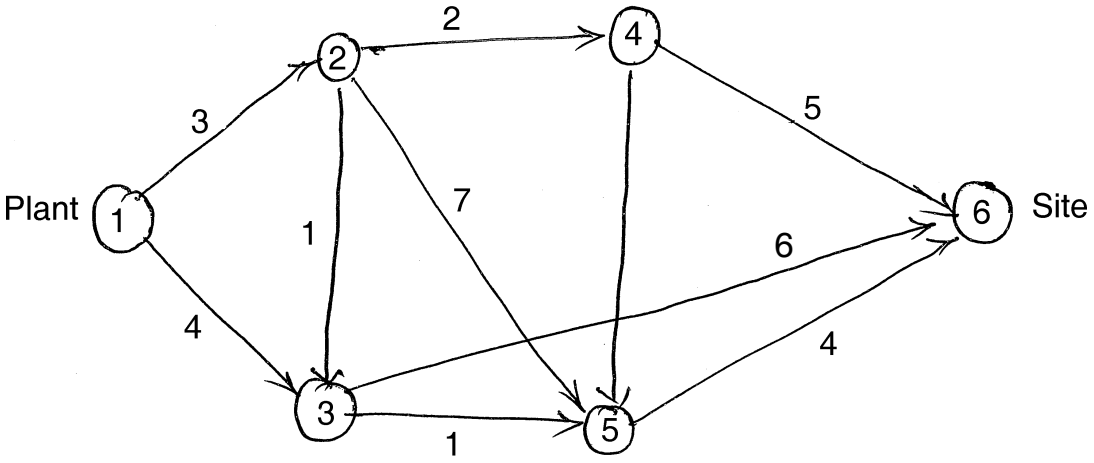


Fig. IV

SECTION – II

5. Solve **any four** : **(5×4=20)**
   a) Explain goal, objective and criteria in the technique of optimization concept.
   b) Explain planning horizon with suitable example.
   c) Explain the model with two decision variable with no constraint.
   d) Explain what is meant by EMV and utility value.
   e) List different advantages and disadvantages of simulation process.

6. a) Find the present value of Rs. 10,000 due in 5 years at 8% interest compounded semi annually. **4**
   b) Find the amount of annuity for Rs. 200 payable monthly for 10 years at 8%. **4**

7. A 10 mm cable is to be laid in atmosphere of 20°C, (h_0 = 8.5 W/m^{2}K). The surface temperature of the cable is likely to be 65°C due to heat generated within. Discuss the effect of insulating the cable with rubber having K = 0.155 W/mK. **7**

8. A speaks truth in 75% cases and B in 80% cases. In what percent of cases are they likely to contradict each other in narrating the same incident. **7**

SLR-PD – 24

Seat No.	

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

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain SVAJ diagram for cycloidal com. **5**

   b) 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 2π rad/sec.

2. a) What is friction ? List various theories of friction and explain any one theory in detail. **5**

   b) Derive from basic principles the two dimensional Reynolds equation for hydrodynamic lubrication. **6**

3. a) The following data is given for a 360° hydrodynamic bearing. **8**
   Radial load = 3.2 KN
   Journal diameter = 50 mm
   Bearing length = 50 mm
   Journal speed = 1490 rpm
   Radial clearance = 50 microns
   Viscosity of lubricant = 25 Cp
   Density of lubricant = 860 kg/m^3
   Sp. heat of lubricant = 1.76 kj/kg °c

P.T.O.

Assuming that the total heat generated in the bearing is carried by the total oil flow in the bearing. Calculate

i) the minimum oil film thickness
ii) the coefficient of friction
iii) power lost in friction
iv) the total flow rate of lubricant in lit/min. Dimensionless parameters for full journal bearings.

l/d	h_0/c	E	S	$(r/c)f$	$\frac{Q}{rc.ns.l}$	$\frac{Q_s}{Q}$
1	0.4	0.6	0.121	3.22	4.33	0.68

b) State the advantages and limitations of hydrostatic bearings. What are the applications of hydrostatic bearings ? **4**

4. a) A vertical shaft carrying 0.5 MN load on step bearing support having 600 mm diameter with a recess of 400 mm diameter. Viscosity of oil film - 50 Cp, film thickness – 0.2 mm. Calculate supply pressure with quantity. What is power loss if rpm-600 ? **8**

b) What is wear ? Explain different types of major wear. **4**

SECTION – II

5. a) Derive the expression $Z(t) = \frac{F(t)}{R(t)}$ **7**

b) In a life test on a sample of 10 bulbs it is found that they fail at the following test hours. Determine MTTF at bulbs.
Failure hours : 802, 852, 901, 940, 993, 1060, 1105, 1137, 1182, 1202. **4**

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

b) Write a note on form constraints and contiguity constraints. **5**

7. a) What are major principles in the design of casting ? **6**

b) Explain the following terms used in reliability analysis. **6**
i) Reliability ii) Failure density iii) Hazard rate

8. Write short note on **any three** of the following. **12**
1) Bath tub curve
2) Design for manufacturing and assembly
3) Weibull distribution
4) Elastohydrodynamic bearings.

SLR-PD – 25

Seat No.	

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

Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

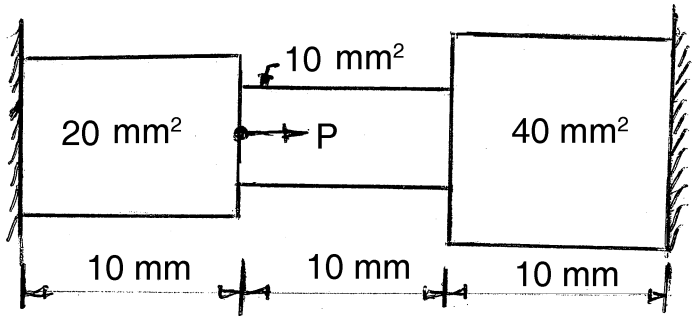
1. a) Explain the procedure involved in finite element analysis. **5**

   b) Explain weighted residual approach applied to finite element analysis. **6**

2. a) Explain principal of minimum potential energy approach. **6**

   b) Compare finite element method and exact solution. **5**

3. Using finite element method calculate the nodal displacement and stresses of given bar as shown figure – I. **12**



P = 10 kN, A_1 = 20 mm^2; A_2 = 10 mm^2; A_3 = 40 mm^2; E = 200 Gpa.

P.T.O.

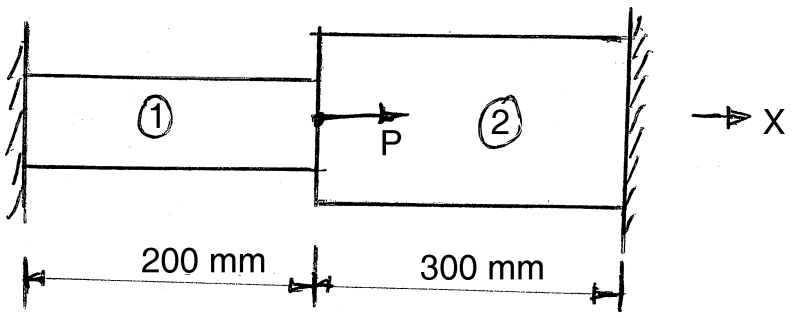
4. Write short note on (attempt **any two**) : **12**
   a) Characteristics of shape function
   b) Advantages of variational formulation
   c) Galerkin method.

SECTION – II

5. a) Explain higher order elements and lower order elements. **6**
   b) Explain Mesh design and Mesh refinement. **5**

6. a) Explain convergence requirement of Isoparametric elements. **6**
   b) Explain plane stress, plain strain and axis symmetric elements. **5**

7. An axial load P = 300 kN is applied at 20°C to the rod as shown in figure – II. The temperature is raised to 60°C. **12**
   a) Assemble the stiffness matrix (K) and Load Vector (F).
   b) Determine nodal displacement and element stresses.



$E_1 = 70 \times 10^9$ N/m^2 ; $E_2 = 200 \times 10^9$ N/m^2

$A_1 = 900$ mm^2; $A_2 = 1200$ mm^2

$\alpha 1 = 23 \times 10^{-6}$ per°C; $\alpha 1 = 11.7 \times 10^{-6}$ per°C.

8. Write short note on (attempt **any two**) : **12**
   a) Structural beam, plate and shell element
   b) Applications of FEM in axis-symmetric field problems
   c) Fatigue analysis.

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Seat No.	

M.E. (Mechanical – Design Engineering) (Semester – II) Examination, 2015
Paper – VIII : EXPERIMENTAL STRESS ANALYSIS

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) The following readings of strain were obtained on a specimen mounted with delta rosette for E = 200 GPa, μ = 0.285. $\epsilon_a = -845\ \mu m/m$, $\epsilon_b = 1220\ \mu m/m$, $\epsilon_c = 710\ \mu m/m$. Determine principal strains, Principal strain directions, principal stresses and maximum shear stress. **8**

   b) Discuss commonly used strain gauge grid materials. **4**

2. a) Explain birefringent coating. **5**

   b) Discuss use of strain gauge for measurement of pressure and vibration. **6**

3. a) Discuss advantages and limitations of various ESA techniques. **5**

   b) Derive the expression for output voltage of two arm sensitive Wheatstone bridge for

      I) Two strains equal in magnitude and opposite in nature.

      II) Two strains equal in magnitude and same in nature. **6**

4. a) Derive expression to calculate the error due to cross sensitivity. **6**

   b) Discuss temperature compensation in Wheatstone bridge. **6**

P.T.O.

SECTION – II

5. a) Derive expression for light intensity observed through analyser when stressed model is kept in plane polariscope. **8**

   b) Distinguish between monochromatic light and white light. **4**

6. a) Derive stress optic law. **5**

   b) Discuss oblique incidence method. **6**

7. a) Discuss Moiré Fringe method. **6**

   b) A loaded two diamensional photoelastic model of 6 mm thickness is observed in circular polariscope. The isochromatic fringe pattern revealed that the point of interest lies between 4^{th} and 5^{th} order fringe. On rotation of analyser through 30°, the 4^{th} order fringe passed through the point of interest. Calculate the fractional fringe order and maximum shear stress if material fringe value is 14.5 N/mm. **6**

8. a) Derive the relation for calibration of photoelastic material by using disc under diametral compression. **6**

   b) Discuss holographic set up. **5**

SLR-PD – 27

Seat No.	

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

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) Explain the importance of industrial design. **7**

   b) Explain maintainability considerations in product 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) Discuss effect of colour with reference to ergonomics of consumer products. **7**

   b) Explain standard and legal requirements of a consumer product. **7**

4. a) Explain the concept of style and environment with reference to aesthetics. **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 'Standardization'. **7**

6. a) Explain use of creativity in product design. **7**

   b) Write a note on selection of material. **7**

7. a) Write a note on components of style. **7**

   b) Write a note on prototype designs. **7**

SLR-PD – 28

Seat No.	

M.E. (Mechanical) (Design Engineering) (Semester – II) Examination, 2015
Paper – X : INDUSTRIAL TRIBOLOGY (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What are the applications of Journal Bearing ? Explain with sketch different positions of a journal inside the bearing as it starts from rest and attains full speed. **8**

   b) Write a note on Petroff's equation. **5**

2. a) Explain Thrust oil bearings. **5**

   b) Derive the Reynolds equation for two dimensional flow in hydrodynamic bearings. **6**

3. a) Explain pressure development mechanism in hydrodynamic bearings. **6**

   b) What is significance of Sommerfield number ? **5**

4. Write a short note on :

   a) Discuss the tribological properties of materials and lubricants. **4**

   b) Describe the mechanism of adhesive wear. **4**

   c) Discuss the factors that affect the boundary friction. **3**

P.T.O.

SECTION – II

5. a) Derive an equation for the load carrying capacity of a squeeze film under a circular plate approaching a flat surface. **8**

   b) Explain the tilting pad bearing and porous bearing. **5**

6. a) Explain the pressure-viscosity in terms of Reynolds equation. **6**

   b) Explain the elasto hydrodynamic lubrication. **5**

7. a) Discuss the tyre road contacts and explain skidding while **6**

      i) Travelling along a straight line

      ii) Taking turn.

   b) Explain Tribological aspects of metal rolling. **5**

8. Write short notes on :

   a) Piston pin lubrication. **3**

   b) Squeeze film lubrication. **4**

   c) Air lubricated hydrostatic and hydrodynamic bearings. **4**

SLR-PD – 29

Seat No.	

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

ENGINEERING FRACTURE MECHANICS (Elective – II) (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70

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

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

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

*3) **Use** of Scientific calculator is **allowed.***

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

SECTION – I

1. a) Enlist stress intensity factor for different problem geometries. **7**

   b) Determine the critical energy release rate of a DCB specimen loaded in a tensile testing machine. The thickness of the DCB specimen is 30 mm depth of each cantilever 12 mm and crack length 50 mm. It is made of hardened steel with the modulus of 207 GPa and crack is about to propagate at 15405 N pulling load. **10**

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

   b) A steel plate with yield stress 350 MPa of width 80 mm and thickness 5 mm has centre crack 2a = 40 mm length. If the far field stress is 150 MPa determine the SIF and length of effective crack using Irwin's correction. **10**

3. Write short note on following **(any three)** : **18**

   i) Resistance curve

   ii) Irwin's Fracture criterion

   iii) Compliance method for evaluating fracture toughness

   iv) Crack closure.

P.T.O.

SECTION – II

4. a) What is difference between safe design and damage tolerance design methodology to predict crack growth life. **7**

   b) 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 100 MPa and maximum value of 180 MPa. Assuming fatigue crack growth rate is governed by equation $\frac{da}{dN} = 0.42 \times 10^{-11}(\Delta k)^3$ (m/cycle)

   i) calculate crack growth rate when crack length has the following values 2a = 8mm, 10 mm. **10**

5. a) Explain S-N diagram related with fatigue mechanics. **7**

   b) Estimate the failure load under the uni-axial tension for a centre cracked panel of aluminum alloy of width W = 500 mm and thickness B = 6 mm for the following values of crack length 2a = 20 mm and 2a = 10 mm. Yield stress $\sigma_y = 350$ MPa and fracture toughness $K_{IC} = 80$ MPa $\sqrt{m}$. **10**

6. Write short note on following **(any three)** : **18**

   i) Paris law

   ii) Types of creep

   iii) J integral

   iv) Load displacement test to measure CMOD.

SLR-PD – 3

Seat No.	

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

Day and Date : Monday, 25-5-2015 Max. 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 circular slab and sketch the reinforcement details by using following data; Diameter of slab 5.6 m; superimposed load 4 kN/m^2; support condition partially fixed; material used M 20 and concrete and Fe 500 steel. **17**

2. Design a combined rectangular footing for columns C1 and C2 located at distance of 4.2 m center to center. Column C1 is 400 mm × 400 mm in size and carries a load of 700 kN. Column C2 is 450 mm × 450 mm in size and carries a load of 850 kN, the safe bearing capacity of the soil is 150 kN/m^2. Use M 20 concrete and Fe 500 steel. **18**

3. Design a circular tank of capacity 12 lakh litres. The depth of water tank including free board is restricted to 3.5 m. The joint between floor and wall of the tank is rigid . I.S. code method of design. Use M 25 concrete and Fe 500 steel. **17**

SECTION – II

4. a) A PSC beam provided with parabolic profile tendon has a simply supported span of 6.25 m. The beam has a rectangular cross section of 230 mm × 600 mm. The total external load on the beam is 42 kN/m on whole span and the tendon carries a prestressing force of 1300 kN. The parabolic tendon has 130 mm eccentricity at mid span. Calculate the extreme fibre stresses for mid span section using stress concept, strength concept and load balancing concept. **11**

P.T.O.

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

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

b) The end block of a port tensioned member is 250 mm wide and 600 mm deep is subjected to an axial pretress force 1200 kN. Design the end block by Guyon's method. **8**

6. a) Design a past tentioned continuous beam consisting of two span each 19 m long. The external loading other dead load of beam is 25 kN/m^2. **14**

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

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SLR-PD – 30

Seat No.	

M.E. (Mech. - Design Engineering) (Semester – II) Examination, 2015
Paper – X : THEORY AND ANALYSIS OF COMPOSITE MATERIALS
(Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. a) What are the matrix and Fiber factors that contribute to the mechanical performance of composites ? Explain. **7**

   b) Enumerate six primary material selection parameters that are used in evaluating the use of a particular composite material. **7**

2. a) With the help of neat sketch explain the Resin Transfer Molding technique for composite manufacturing. **7**

   b) What is Filament winding ? With a neat sketch explain the process. What are the limitations of lament winding ? **7**

3. a) Show that for an orthotropic material $Q_{11} \neq C_{11}$. Explain why. Also, show $Q_{66} = C_{66}$. Explain why. **7**

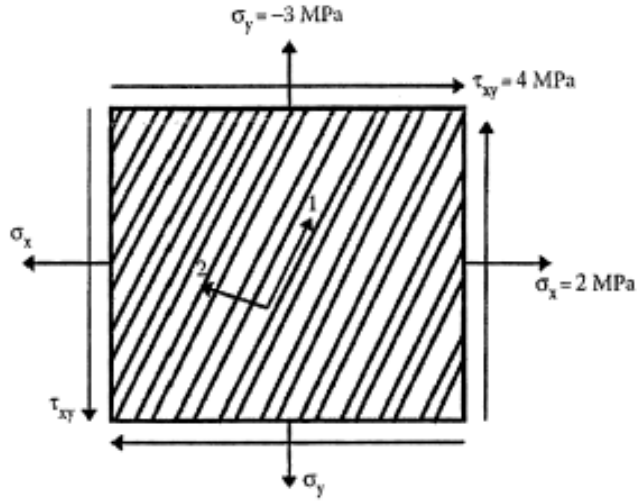
   b) Find the following for a 60° angle lamina (Figure) of graphite/epoxy. **7**
      1) Transformed compliance matrix
      2) Transformed reduced stiffness matrix

P.T.O.

$\sigma_1 = 2MPa, \sigma_2 = -3MPa, \tau_{12} = 4MPa$

Engineering elastic constants of the unidirectional graphite/epoxy lamina are

E_1 = 181 GPa, E_2 = 10.3 GPa, ν_{12} = 0.28, G_{12} = 7.17 Gpa.



4. a) Explain the Tsai-Wu tensor theory failure criteria for biaxial orthotropic materials. **7**

   b) Find the elastic moduli of a glass/epoxy unidirectional lamina with 40% fiber volume fraction. For glass/epoxy unidirectional lamina

   E_f = 85 GPa, E_m = 3.4 GPa, ϑ_f = 0.2, ϑ_m = 0.3,

   G_f = 35.42 GPa & G_m = 1.308 Gpa. **7**

5. a) Explain the assumptions made in the classical lamination theory and Kirchoff hypothesis. **6**

   b) Write short note on :

   - Special cases of laminates
   - Inter-laminar stresses. **8**

6. a) Derive the governing vibration equilibrium equation for laminated plates. **7**

   b) Explain the restriction, assumptions and consequences in deriving the governing equations for buckling of laminated plates. **7**

7. a) Explain the basic principles of fracture mechanics. **7**

   b) Explain in detail the effect of discontinuity in Laminates. **7**

8. a) Explain in detail the material selection factors in structural design. **7**

   b) Explain in detail the steps in the structural design process. **7**

SLR-PD – 31

Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is optimization ? Give engineering applications of optimization. **5**
   b) Explain with suitable examples design constraints and objective function. **6**

2. a) A beam of uniform rectangular cross-section is to be cut from a log having a circular cross section of diameter 2a. The beam has to be used as a cantilever beam (the length is fixed) to carry a concentrated load at the free end. Find the dimensions of the beam that correspond to the maximum tensile stress carrying capacity. **8**
   b) Define a saddle point and indicate its significance. **3**

3. a) Explain applications of linear programming. **6**
   b) Define the following : **6**
      i) Point in n-dimensional space.
      ii) Line segment in n-Dimensions
      iii) Hyperplane.

4. a) Explain unrestricted search method. **6**
   b) Explain Golden section method. **6**

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 random walk method. **5**

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

   b) Explain the algorithm of SLP method. **6**

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

   b) What are the characteristics of mechanical systems ? **6**

8. a) Explain the principle on which Genetic Algorithms are based and how Genetic Algorithms differ from the traditional methods of optimization. **6**

   b) Explain the procedure of weighted sum method. **6**

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Seat No.	

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

Day and Date : Friday, 22-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Draw physical structure of NMOS transistor and explain accumulation, depletion and inversion modes. **6**
   b) What is technology scaling for MOS transistor ? **5**
2. a) Draw and explain VTC of CMOS inverter. **6**
   b) Explain dynamic power dissipation of CMOS inverter. **6**
3. a) What is CMOS logic ? **4**
   b) Design full adder using CMOS logic. **8**
4. a) Explain basic principle of dynamic CMOS logic. **4**
   b) Design universal gates using pass transistor logic. **8**

SECTION – II

5. a) Explain Master-slave Edge triggered register. **6**
   b) Explain static SR flip flop. **5**
6. a) Explain dynamic transmission gate edge triggered Registers. **6**
   b) Explain timing classification of digital systems. **6**
7. a) What is clock skew and clock jitter ? **6**
   b) What are sources of clock skew and jitter ? **6**
8. a) Explain designing of fast adders. **6**
   b) Explain designing of ROMS. **6**

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SLR-PD – 33

Seat No.	

M.E. (Electronics Engg.) (Semester – I) Examination, 2015
(Paper – II) ADVANCED DIGITAL SIGNAL PROCESSING

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. 1) Explain the Levinson Durbin algorithm for computation of LPC's. **6**
   2) Draw the block diagram of backward linear predictor. Derive the equation for backward prediction error. **6**

2. 1) Explain the relationship between auto correlation and model parameter interms of variance. **6**
   2) Explain the auto regressive (AR) process. Derive the equation MA (q). **5**

3. 1) Derive the equation for Type I and Type II symmetrical Linear phase FIR filters. **6**
   2) Explain the design of linear phase FIR filters by using frequency sampling method with Type I design. **6**

SECTION – II

4. 1) What is Harr wavelet transform ? Discuss at least two properties of Harr wavelet transform. **5**
   2) Explain the use scaling function in wavelet transform. **6**

5. 1) Explain the method of sampling rate conversion by a factor I/D. Explain the design of interpolator and decimator filter. **6**
   2) Explain polyphone structures in detail. **6**

6. 1) Explain digital IIR filter design in time domain using pade approximation method. **6**
   2) Explain with equation frequency transformation in designing IIR filters. **6**

SLR-PD – 34

Seat No.	

M.E. (Electronics Engineering) (Semester – I) Examination, 2015
ADVANCED NETWORK ENGINEERING (Paper – III)

Day and Date : Monday, 25-5-2015 Max. Marks : 70

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

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

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

SECTION – I

1. Answer following questions : **(3×4=12)**
   1) What is CIDR notation ? Explain extension header in case of IPv6.
   2) What is TCP connection ? Explain transmission policy in case of TCP.
   3) Discuss terms MSS, fragmentation and TTL. Define all the TCP timers.

2. Answer **any two** from following questions : **(2×6=12)**
   1) Draw RARP frame and explain neatly.
   2) What is encapsulation of ICMP packet ? Draw and explain message formats of redirection and source quench.
   3) What are different cryptography components ? Discuss symmetrical key cryptography.

3. Answer following questions :
   1) Draw and explain IPsec authentication header. **5**
   2) What is the concept of manager and agent in SNMP ? Specify SNMP message format. **6**

   OR

   2) What are different MIB categories and MIB variables ? Specify various MIB variables and categories. **6**

P.T.O.

SECTION – II

4. Answer following questions : **(3×4=12)**
   1) What is streaming audio ? What are different audio compression techniques ? Explain the concept of voice over IP in brief.
   2) Explain CIF video format in brief. What is GOP related to MPEG ?
   3) What is DVMRP ? Explain physical and tunnel interface in DVMRP.

5. Answer **any two** from following questions : **(2×6=12)**
   1) What are the video specifications of MPEG-4 ? Explain visual decoding and de-multiplexing in MEG-4.
   2) Explain digital video service over IP.
   3) Why MPEG-21 standard is proposed ? Discuss MPEG-21 frame work in detail.

6. Answer following questions :
   1) What is video buffer ? Draw and explain RTP header format and explain it. **6**
   2) What is network QoS and application QoS ? Discuss RSVP. **5**

   OR

   3) Explain spatial and temporal scalability of MPEG-4. **5**

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SLR-PD – 35

Seat No.	

M.E. (Electronics Engineering) (Sem. – I) Examination, 2015
RANDOM SIGNALS AND PROCESSES (Paper – IV)

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Attempt following :

   a) State the Axioms of probability :

   Prove following for the events A and B using Axioms

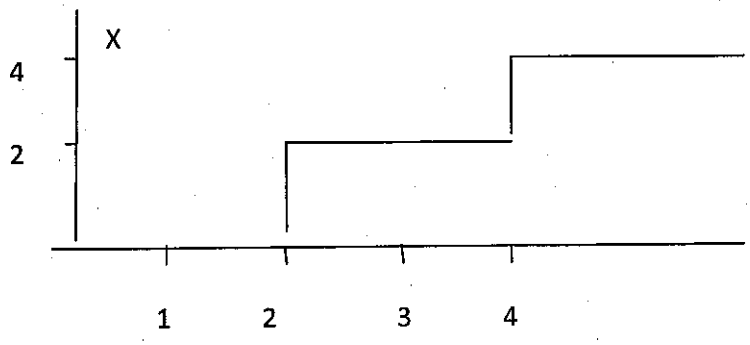
   $Pr(A \cup B) = Pr(A) + Pr(B) - Pr(A \cap B)$

   $Pr(A) = 1 - Pr(A)$. **6**

   b) A box contains 5 red and 4 white balls. Two balls are drawn successively from the box without replacement and it is noted that the second is white. Determine the probability that the first is also white ? **5**

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

   a) An analog to digital converter samples a continuous random voltage V and converts it into a discrete random variable X in accordance with the transformation shown in the following sketch :



   If V has an exponential PDF with a mean value of 2. Write the PDF of X and find the mean value of X.

P.T.O.

b) Define and explain :

i) Gaussian distribution

ii) Exponential

Obtain the mean and variance of these distributions.

c) A certain random variable has a probability density function of the form $fx(x) = ce^{-3x}u(x)$. Find the following :

i) The constant c

ii) Pr(X > 2)

iii) Pr(X < 1)

iv) Pr(X < 3| X > 2).

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

a) Define and explain the following statistical properties of jointly distributed random variables :

i) Correlation

ii) Covariance

iii) Correlation coefficient.

Give the significance of correlation coefficient.

b) If X and Y are independent random variables with density functions :

$fx(x) = e^{-x} \quad x \geq 0$

$fy(y) = 2e^{-2y} \quad y \geq 0$

Find the probability density function of Z = X + Y.

c) For positive constants a and b, a pair of random variable has a joint PDF specified by

$f_{X, Y}(x, y) = (ab)e^{-(ax + by)}\, u(x)\, (y)$.

i) Find the joint CDF, FX, Y(x, y).

ii) Find the marginal PDFs, fX(x) and fY(y).

iii) Find Pr(X > Y).

SECTION – II

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

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

   b) If $X(t) = R\cos(\omega t + \theta)$ where R and θ are independent random variables and θ is uniformly distributed in $(-\pi, \pi)$ and R has the mean value 1 and variance 4, then obtain the autocorrelation function.

   c) A sample function from an ergodic random process is sampled at 10 widely separated times with the following results :

   {6, 4, 8, 1, 1, 5, 4, 6, 5, 7}

   Estimate the mean and the variance of this process.

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

   a) Explain estimation of autocorrelation function using frequency domain techniques.

   b) Find the power spectral density for a process for which $RXX(\tau) = 1$ for all τ.

   c) For the following functions of ω, state whether it is a valid expression for the spectral density of a random process. If it is not valid, state the reason :

   i) $\dfrac{\omega^2 + 4}{\omega^4 + 10\omega^2 + 9}$

   ii) $\dfrac{1 - \cos 2\omega}{2\omega^2}$.

6. Attempt following :

   a) Explain the properties of a linear system with random process as input. Obtain the relation for the power spectral density of the output of linear system. **6**

   b) Define Poisson Process. Obtain the mean and variance of Poisson Process. **5**

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SLR-PD – 36

Seat No.	

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

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70

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

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

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

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

SECTION – I

1. a) Design a wideband feedback RF amplifier with bandwidth of 430 to 930 MHz. **6**

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

2. a) Explain diplexer filters. **6**

   b) Explain SAW filters and issues associated with it. **6**

   OR

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

3. a) Explain how forward S parameters can be measured. **5**

   b) Design a discrete LC BJT oscillator for 400 MHz. Assume suitable parameters. **5**

   OR

   c) Design a discrete crystal BJT oscillator for 22 MHz. Assume suitable parameters. **5**

P.T.O.

SECTION – II

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

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

5. a) Draw and explain in brief – a log amplifier, with integrator and buffer amplifier, used in a receiver's AGC circuit. **6**

   b) Draw and explain a full duplex FDD radio. **6**

   OR

   c) Give a brief overview of methodology used for communication system simulation. **6**

6. a) Discuss RF link budget. **5**

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

   OR

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

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SLR-PD – 38

Seat No.	

M.E. Electronics (Semester – I) Examination, 2015
IMAGE AND VIDEO PROCESSING (Paper – V) (Elective – I)

Day and Date : Wednesday, 27-5-2015 Total Marks : 70

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

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

SECTION – I

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

   i) What is need of sampling in image processing ? Explain 2-D sampling theory.

   ii) Define DCT and Explain its properties.

2. Solve **any two**. **(2×6=12)**

   i) Explain the singular value decomposition transform. Including its properties and Application.

   ii) Explain details Algorithm of K-L transform.

   iii) Explain details image Point Operation.

3. Solve **any two**. **(2×6=12)**

   i) With reference to following example, Explain histogram equalization.

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

Fig (a) Image 4 × 4

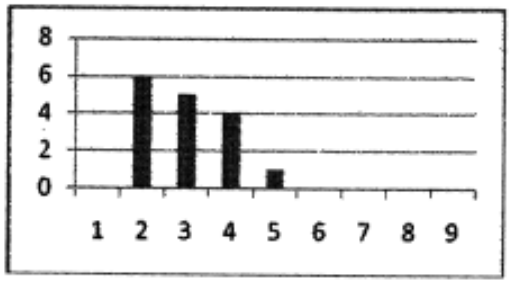

Fig (b) Histogram

   ii) Explain inverse and Pseudo-inverse filtering.

   iii) Explain 2 × 2 Harr Transform.

P.T.O.

SECTION – II

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

   i) Explain any two method of edge detection.

   ii) Explain details chain code for boundary detection.

5. Solve **any two**. **(2×6=12)**

   i) What is image compression, explain transform coding technique.

   ii) Explain Huffman coding for given below example and find out efficiency of Huffman coding.

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

   iii) Explain details JPEG

6. Solve **any two**. **(2×6=12)**

   i) Explain fundamental concept of video processing.

   ii) Explain details MPEG 1, MPEG 2.

   iii) Explain video compression technique.

SLR-PD – 4

Seat No.	

M.E. (Civil – Structure) (Sem. – I) Examination, 2015
Paper – IV : DYNAMICS OF STRUCTURES

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

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

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

3. A structure modelled as a damped spring mass system with mass 1130 kg, k = 1548461.81 N/m and C = 17.83 N.sec/mm is subject to a harmonic exciting force. Determine :
   a) The natural frequency
   b) The damping ratio
   c) The amplitude of the existing force when the amplitude of the vibrating mass is measured to be 8.398 mm and
   d) The amplitude of the existing force when the amplitude measured is at the peak frequency assumed to be the resonant frequency. **17**

P.T.O.

SECTION – II

4. Differentiate between proportional damping and non proportional damping. Further explain concept of Rayleigh damping. **17**

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

6. Write short note on **any three** :
   i) Dunkerly's Method
   ii) Rayleign-Ritz Method
   iii) Structural modeling with distributed properties
   iv) Model analysis of damped system. **18**

SLR-PD – 40

Seat No.	

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

Day and Date : Thursday, 28-5-2015 Max. Marks : 70

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

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

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

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

SECTION – I

1. a) Discuss static and dynamic system models. **6**

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

2. a) Discuss Monte Carlo simulation. **5**

   b) What are the techniques of mathematical modeling ? **5**

   OR

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

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

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

   OR

   c) With suitable example explain conceptual Vs empirical research. **6**

P.T.O.

SECTION – II

4. a) With suitable application explain any three statistical distributions. **6**

   b) Discuss hypothesis testing used in statistical output analysis. **6**

5. a) Discuss confidence interval used in statistical output analysis. **5**

   b) Discuss virtual lab concept. **5**

   OR

   c) Discuss any five applications of experimental design. **5**

6. a) Discuss guidelines for design of experiments. **7**

   b) Discuss a typical technical project report structure. **6**

   OR

   c) Discuss a typical technical research paper structure. **6**

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SLR-PD – 41

Seat No.	

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

Day and Date : Saturday, 30-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Explain the following instruction **(any five)** : **(5×3=15)**
   1) CDPEQ p2,5,c1,c2,c3,2
   2) MCR p6,0,R4,c5,c6 ;
   3) MRCEQ p3,9,R3,c5,c6,2 ;
   4) LDR R1,[R2,R3,LSL#2]
   5) UMULL R1,R4,R2,R3 ;
   6) UMLALS R1,R5,R2,R3

2. Draw diagram for interfacing of LCD display (2 lines and 16 characters) and display "COLLEGE SOLAPUR" using ARM 9 and write programme in C. **10**

3. What are the challenges in embedded computing system design ? **10**

   OR

   Explain serial transmission techniques and standards in ARM 9 architecture. **10**

SECTION – II

4. Explain queues and stacks used in C/C++. **10**

5. Explain process, deadlocks, memory management, input/output files, security in real time operating system. **10**

6. Explain system design example of data base application in CCD camera. **15**

SLR-PD – 42

Seat No.	

M.E. (Electronics Engineering) (Semester – II) Examination, 2015
Paper – VIII : PERIPHERAL SYSTEM DESIGN AND INTERFACING

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

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

   1) Compare between RS 232, RS 422 and RS 485 standards.

   2) What are the functions and performance enhancement provided by EISA over ISA ? Explain briefly structure of EISA bus.

   3) What are the characteristics of GPIB ? Draw and explain briefly structure of GPIB interface.

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

   1) Explain need of proper termination in (balanced mode) RS 485. Show proper grounding arrangements in case of balanced interconnect cable pair and explain it in detail.

   2) What is ST-100 bus ? Explain different types of signals and their characteristics in ST-100 bus.

   3) What is the purpose of bus expansion ? Draw and explain I/O read and write operation in case of ISA bus cycle.

3. Answer following questions.

   1) Explain transmission modes, message framing format related to MODBUS for data transmission over RS 485. **6**

   2) Explain PCI system in detail. Draw and explain typical read transaction over PCI bus. **5**

   OR

   2) Discuss RS-232 D centronics interface in detail. **5**

P.T.O.

SECTION – II

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

   1) Describe basic DMA operation in PC.

   2) With neat sketch explain construction and working of PLC used in process control.

   3) What are different configurations of data acquisition ?

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

   1) Draw block diagram of automatic controller and explain it. Also explain different modes of control actions used in controllers.

   2) What are different methods of sampling used in multiplexed input DAQ ? Calculate memory size required to store samples of transient signal that lasts for 10 msec. Assume sampling rate of 100 K samples/sec and output size of 8 bits.

   3) Explain the terms receiver buffer register, transmitter holding register, divisor latch register, interrupt latch enable register and interrupt enable identification register in case of universal transmitter/ receiver. Calculate the 16 bit value of divisor to be loaded into latches to communicate at 9600 baud rate using UART PC 16550D, assume clock input frequency of 1.8432 MHz.

6. Answer following questions.

   1) What are the characteristics of physical layer in DeviceNet ? Draw and explain message format in case of DeviceNet. **6**

   2) Draw and explain ControlNet message format. Discuss media access in case of ControlNet. **5**

   OR

   2) Explain Ethernet/IP and high-speed Ethernet foundation field bus. **5**

SLR-PD – 43

Seat No.	

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

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Attempt **any two** : **(6×2=12)**

   a) Discuss the design procedure for designing lead compensator by frequency response method.

   b) Derive the state variable representation of the system with following transfer function. $\frac{Y(s)}{U(s)} = \frac{s+3}{(s+1)(s+2)}$

   c) Examine the stability of following characteristic equation
   $P(z) = Z^3 - 1.1Z^2 - 0.1Z + 0.2$

2. Attempt **any two** : **(6×2=12)**

   a) Determine the contalability and observability properties for following system : $A = \begin{bmatrix} 0 & 1 & 0 \\ 1 & 0 & 1 \\ 0 & -12 & -7 \end{bmatrix}$ $B = \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix}$ $C = [2\ 3\ 1]$.

   b) Explain properties of Z transform.

   c) Explain state space model for R – L – C series circuit with. Give R = 1000 Ω, L = 1 mH and C = 0.001 Microfarad.

3. a) Obtain Eigen values for following matrix $A = \begin{bmatrix} 1 & 4 \\ -2 & -5 \end{bmatrix}$. **5**

   b) Prove that the sequences $x_{1(n)} = a^n u(n)$ and $x_2(n) = -a^n u(-n-1)$ have the same Z-transform and differ only in ROC. Also plot ROC. **6**

P.T.O.

SECTION – II

4. 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 to ω = 1 rad/sec.

   b) Explain main requirements in robust control system.

   c) Explain role of decoupler in MIMO.

5. Attempt **any two** : **(6×2=12)**

   a) Consider the system with transfer function $\frac{Y(s)}{U(s)} = \frac{9}{s^2+9}$. Find matrices A, B, C in observable canonical form.

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

   c) Explain robust internal model control system.

6. a) Write short note on Matrics Fraction Descriptions. (MFD's) **5**

   b) Explain robust performance and robust stability. **6**

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Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

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

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

SECTION – I

1. a) Explain GSM protocol interfaces. **7**

   b) Describe functional groups and its functions of GPRS. **7**

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

   a) With diagram explain international call setup procedure.

   b) Explain a WAP network configuration.

   c) Explain GPRS attach and detach procedures.

3. a) Briefly explain any two GPRS interfaces. **5**

   b) Describe failure restoration for the VLR. **4**

   OR

   b) Explain any two WAP protocols. **4**

P.T.O.

SECTION – II

4. a) Explain downlink, scrambling and modulation procedures for the air interface of UMTS service. **7**

   b) Describe forward and Reverse link for EVDO. **7**

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

   a) Explain the architecture of UTRAN.

   b) Briefly discuss on the evolution of CDMA 2000.

   c) Describe different components of information security.

6. a) Explain the types of attacks observed in mobile computing. **5**

   b) Briefly explain Iu-PS interface protocol architecture. **4**

   OR

   b) What different types of handover, UMTS supports ? **4**

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SLR-PD – 45

Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. A) Explain Rate Monotonic Scheduling algorithm. **6**

   B) Explain focussed addressing and Bidding (FAB) algorithm. **6**

2. A) Explain the desired characteristic of Real Time language. **6**

   B) With respect to programming language explain Hierachical decomposition reference to blocks, procedure and function. **5**

3. A) Explain key tools used in Real Time Support. **6**

   B) Explain the concept of programming environments. **6**

SECTION – II

4. A) Explain adaptive earliest deadline algorithm. **6**

   B) Explain databases for Hard Real Time Systems. **5**

5. A) Explain Round Robin protocol used in Real Time communication. **6**

   B) Explain in detail fault types in Real Time Systems. **6**

6. A) Explain completely connected zero propagation time system. **6**

   B) Explain in detail Interactive convergence averaging algorithm. (CAI). **6**

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Seat No.	

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

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

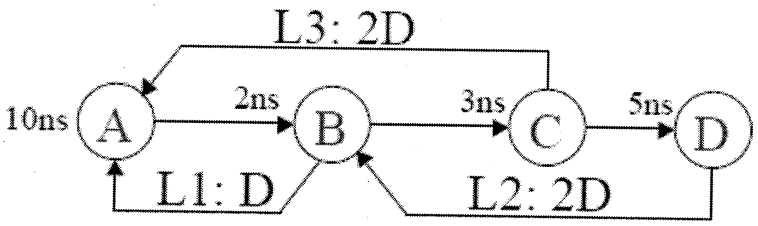
SECTION – I

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

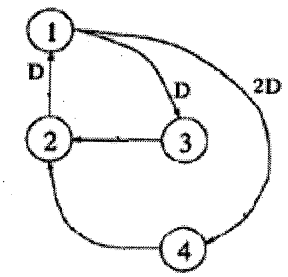
a) Draw the Block diagram, SFG and DFG for $y(n) = ax(n) + bx(n-1) + cx(n-2)$.

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

c) Compute the loop bounds for the following loops.



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

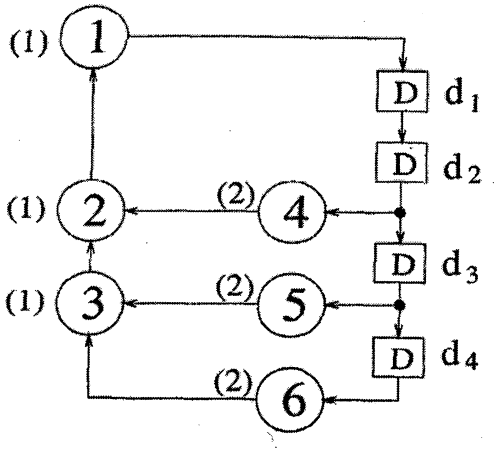


e) What is retiming of DFG ? Explain properties of retiming.

P.T.O.

2. Solve the following :

a) For DFG shown below find iteration bound using LPM 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. **7**

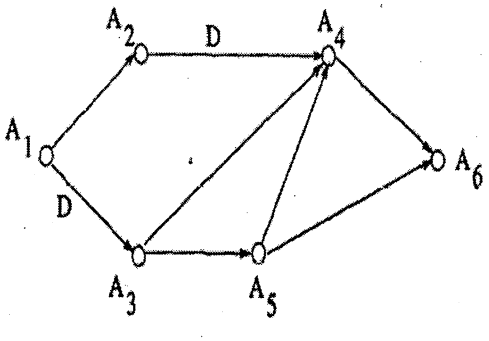


Fig. a

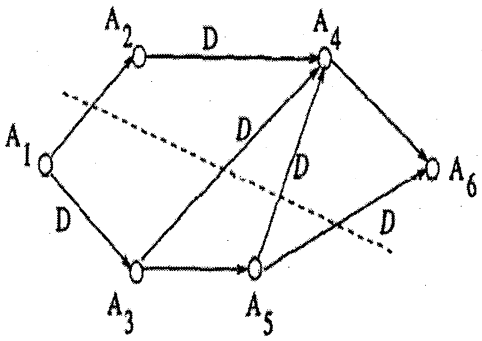


Fig. b

OR

b) Write a note on retiming for register minimization and retiming for clock period minimization. **7**

SECTION – II

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

a) Write a note on folding transformations.

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

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

d) State the properties of unfolding.

e) Explain parallel carry ripple array multipliers.

4. Solve the following :

a) Design R1 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

SLR-PD – 48A

Seat No.	

M.E. (Electronics Engineering) (Semester – III) Examination, 2015
Self Learning Module
Paper – I : NETWORK AND INTERNET SECURITY

Day and Date : Sunday, 24-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain federated identity management. **7**
   b) Explain biometric techniques for security and identification. **6**

2. Solve **any two** : **(2×6=12)**
   a) Explain wireless transport layer security.
   b) Explain WAP end to end security.
   c) Explain mobile device security strategy.

3. Solve **any two** : **(2×5=10)**
   a) Explain IEEE 802 protocol architecture.
   b) Explain authentication phase of IEEE 802.11i
   c) Explain key management phase of IEEE 802.11i.

SECTION – II

4. a) Explain password protection system. **7**
   b) Explain taxonomy of Malicious programs. **6**

P.T.O.

5. Solve **any two** : **(2×6=12)**

   a) What are firewall design principles ?

   b) Explain data access control.

   c) Explain IP security architecture.

6. Solve **any two** : **(2×5=10)**

   a) Explain SSL record protocol.

   b) Explain RFC 5322.

   c) Explain DKIM strategy.

SLR- PD – 48B

Seat No.	

M.E. (Electronics) (Sem. – III) Examination, 2015
SELF-LEARNING SUBJECT
Paper – I : Advanced Signal and Image Processing
(Specialization-Signal Processing)

Day and Date : Sunday, 24-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

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

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

   OR

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

SECTION – II

3. Solve **any four** of the following : **20**
   a) Explain with the help of equations effect of scaling on power consumption.
   b) What are the various power reduction techniques ? Explain in brief.
   c) Explain how the power is estimated in sequential circuits.
   d) Mention the various features of DSP processors.
   e) Explain multiplexer based Manchester adder.

P.T.O.

4. Solve the following :

a) Explain with the help of equations effect of scaling on power consumption. **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**

SLR- PD – 49

Seat No.	

M.E. (C.S.E.) (Semester – I) Examination, 2015
Paper – I : THEORY OF COMPUTATION

Day and Date : Friday, 22-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

SECTION – I

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

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

   b) What are decidable languages ? Prove that A_{DFA} is decidable language.

   c) Define a relation and an equivalence relation with proper examples.

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

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

2. Answer the following : **6**

   Design a TM for a language of palindromes for $\Sigma = \{0, 1\}$ and give its formal definition with example strings.

3. Answer the following : **5**

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

SECTION – II

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

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

P.T.O.

b) Illustrate PCP problem and prove that PCP is undecidable.

c) State base functions and strategy sets of primitive recursive functions.

d) Explain tractable and intractable problems.

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

5. Answer the following : **6**

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

6. Answer the following : **5**

What is the terminology of a recursion theorem ? Elaborate with its applications.

SLR-PD – 5

Seat No.	

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

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. A) Explain various types of shear failure of soil ? **4**

   B) A square footing 2.2 m × 2.2 m is built in a homogenous bed of sand of unit weight 19.5 kN/m^3 and having an angle of shearing resistance of 36°. The depth of the foundation is 1.6 m below the ground surface. Calculate the safe load that can carried by a footing with factor of safety of 3 against complete shear failure. Use Terzaghi's analysis. **8**

2. A) Write note on importance of combined footings. **4**

   B) A RCC column of size 600 × 600 mm and 500 × 500 mm are carrying axial load of 1000 kN and 900 kN respectively. These columns are spaced 4 m apart. The SBC of soil is 220 kN/m^2. Use M-20 concrete and Fe-415 Steel. Design combined rectangular footing. The cantilever portion available from centre line of column 600 × 600 mm upto property line is 1.3 m. **8**

3. A) Explain various considerations in the design of raft foundations. **4**

   B) With neat sketches describe various types of raft foundations. **7**

P.T.O.

SECTION – II

4. A) Explain load carrying capacity of pile using static formulate. **4**

   B) A column load of 1000 kN is supported by two under-reamed piles of 450 mm dia. Design suitable pile cap, Spacing of pile is 1.4 m. Assume M-20 concrete and Fe-415 steel. **8**

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

   B) What do you understand by scour depth and grip length ? What is its importance in well foundation ? **6**

6. A) Describe various types of machine foundation. **4**

   B) Discuss the criteria for satisfactory performance of machine foundation. **3**

   C) Draw the sketch of block foundation with all 6 degrees of freedom. (3 translation and 3 rotation) **4**

SLR-PD – 50

Seat No.	

M.E. (Computer Science & Engg.) (Semester – I) Examination, 2015
(Paper – II) ADVANCED OPERATING SYSTEMS

Day and Date : Saturday, 23-5-2015 Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Q. **4** from Section – **I** and Q. **5** from Section – **II** are **compulsory**.*
*2) Attempt **any 2** from remaining questions from **each** Section.*
*3) Figures to the **right** indicate **full** marks.*

SECTION – I

1. a) Explain workstation-server model and processor-pool model of distributed computing systems and compare them. **6**

   b) Why distributed computing systems are gaining popularity ? Give any four reasons. **6**

2. a) How do we achieve performance in distributed systems ? Explain the design principles for achieving it. **6**

   b) Explain the format of IPC message. **6**

3. a) Describe a mechanism for implementing consistent ordering of messages in each of the following cases. **6**

      i) One-to-many communication

      ii) Many-to-one communication

      iii) Many-to-many communication

P.T.O.

b) Suggest whether at-least once or exactly once semantics should be used for each of the following applications (give reasons for your answer). **6**

i) For making a request to a file server to read a file.

ii) For making a request to a file server to append some data to an existing file.

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

iv) For making a request to a database server to update a bank account.

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

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

4. a) Explain the types or RPC servers based on the time duration for which RPC servers survive. **6**

b) What are the different approaches for structuring the shared-memory space of a DSM system ? **5**

SECTION – II

5. a) What are the different techniques used for process scheduling in a distributed system ? **6**

b) What is a cutset ? Explain with example how it is used to find the optimal assignment of tasks in task assignment approach. **5**

6. a) Explain the dynamic load balancing algorithms and its types. **6**

b) What is the concept of slab layer allocation and high level memory mappings ? **6**

7. a) Explain thread scheduling techniques. **6**

b) Explain message forwarding mechanisms. **6**

8. a) Explain the various models for organizing threads. **6**

b) Explain the steps of process migration. **6**

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Seat No.	

M.E. (CSE) (Semester – I) Examination, 2015
ANALYSIS OF ALGORITHMS (Paper – III)

Day and Date : Monday, 25-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. A) Explain asymptotic notations O, Ω and θ. Show that if $F(n) = a_m n^m + ... + a_1 n + a_0$, then $f(n) = O(n^m)$. **6**

   B) Compare two functions n^2 and $2^n/4$ for various values of n. Determine their behavior. **6**

2. A) What is recurrence equation ? Explain the types of recurrence equations. **5**

   B) Compute all pairs shortest path lengths for the following graph in fig. 1 **6**

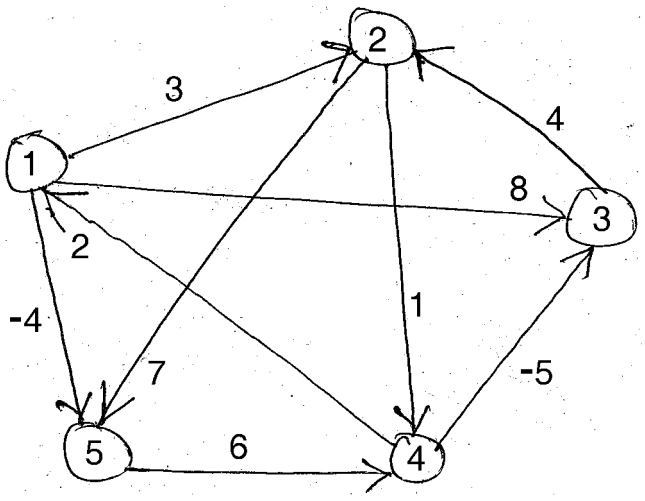


Fig 1

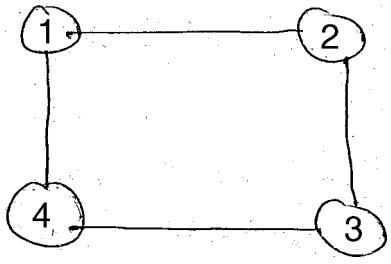
P.T.O.

3. A) Consider the travelling salesperson instance defined by the cost matrix given bellow. Obtain a reduced cost matrix using branch and bound method. **6**

$$\begin{bmatrix} \infty & 20 & 30 & 10 & 11 \\ 15 & \infty & 16 & 4 & 2 \\ 3 & 5 & \infty & 2 & 4 \\ 19 & 6 & 18 & \infty & 3 \\ 16 & 4 & 7 & 16 & \infty \end{bmatrix}$$

B) Write an algorithm for N-Queen problem and explain algorithm for N = 4. **6**

4. A) What is graph coloring problem ? Draw the state space tree for a 4-Nodes graph with 3-colors. **6**



B) Explain flow-shop scheduling with suitable example. **6**

SECTION – II

5. A) Prove that Hamiltonian cycle is in NP. **6**

B) State and explain Cook's theorem. **6**

6. A) Explain how to compute the convex Hull in MESH. **6**

B) Explain fundamental techniques and algorithms with respect to PRAM. **6**

7. A) Explain AND/OR graph decision problem (AOG) with example. **6**

B) Explain odd-even merge algorithm with example for PRAM. **6**

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

A) Point location.

B) Arrangements applications.

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SLR-PD – 52

Seat No.	

M.E. (Computer Sci. and Engineering) (Semester – I) Examination, 2015
(Paper – IV) RESEARCH METHODOLOGY

Day and Date : Tuesday, 26-5-2015 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 descriptive and analytical research with suitable example. **6**
   b) List objectives of research and what are the motivations in research. **6**

2. a) Describe some of the important research designs used in experimental hypothesis-testing research study. **6**
   b) Explain the meaning of the following in context of Research design.
   – Extraneous variables
   – Confounded relationship. **6**

3. a) List methods of collecting primary data and explain any one in detail with suitable example. **6**
   b) Explain and illustrate the following research designs
   – Two group simple randomized design
   – Latin square design. **6**

4. Draw Research Process flow Chart and Explain Design Research process in detail with suitable example. **11**

P.T.O.

SECTION – II

5. a) Describe the procedure for Hypothesis Testing along with Flow Diagram. **6**

   b) Define and explain in short the different types of analysis. **6**

6. a) Write a short on Patents and Copyrights. **6**

   b) Explain the structure of a survey. **6**

7. a) Explain which type of technical paper should be considered in the research process. **6**

   b) Explain the difference between Journal Paper and Conference Paper. **6**

8. List documentation and presentation tools used for report writing and explain any one in detail with suitable example. **11**

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SLR-PD – 53

Seat No.	

M.E. (Computer Science and Engineering) (Semester – I) Examination, 2015
(Paper – V) : DATA MINING (Elective – I)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Question **1** and **8** are **compulsory**.*
*2) Attempt **any four** questions from remaining questions in **each** Section.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assume suitable data if **necessary**.*

SECTION – I

1. Explain Bayes Theorem. **7**
2. Discuss the major distinguishing features between OLAP and OLTP. **7**
3. Explain the uses of star and snowflake schema. **7**
4. What do you mean by information retrieval ? **7**
5. Explain k-means algorithm. **7**
6. Explain the various clustering method in Data Mining. **7**

SECTION – II

7. Write short note on Temporal mining. **7**
8. What do you mean by Web usage mining ? Explain rule with examples. **7**
9. What do you mean by “Harvest system” ? **7**
10. Explain spatial data mining primitives. **7**
11. Give some algorithms used in Web Mining. **7**
12. With a suitable example, explain characterization based on data generalization and summarization. **7**

SLR-PD – 54

Seat No.	

M.E. (Computer Science and Engg.) (Part – I) (Semester – I) Examination, 2015

Elective – I : MOBILE COMPUTING (Paper – V)

Day and Date : Wednesday, 27-5-2015 Total Marks : 70

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

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

SECTION – I

1. Solve **any two** : **12**

   a) Explain in detail FHSS.

   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) Explain MTC and MOC in GSM.

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

   OR

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

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

P.T.O.

SECTION – II

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

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

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

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

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

   a) Explain agent solicitation and agent advertisement in agent discovery phase.

   b) What is HIPERLAN ? How EYNPMA is implemented ?

   c) Explain mobile TCP.

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

   OR

   Write a note on WML script.

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

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SLR- PD – 57

Seat No.	

Master of Engineering (Part – I) (Semester – II) (CSE) Examination, 2015
INTERNET ROUTING ALGORITHM (Paper – VI)

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) ***Wherever*** *required* ***draw*** *appropriate and* ***neat*** *diagrams.*
4) If data/network topology is ***not given*** *then* ***assume*** *suitably.*

SECTION – I

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

   A) Draw the diagram of IP reference model and briefly explain functions of each layer.

   B) What is TLV ?

   C) Write a short note on service architecture of a router.

   D) Consider IP address 10.22.8.92 that is given to be part of a /14 address block. Determine the IP prefix it belongs to in the CIDR notation.

   E) Using mathematical notations write the distance vector algorithm (computed at node i) and explain the hop-based cost computation in terms of discrete time windows.

   F) What are the main differences between shortest path routing and widest path routing ?

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

   A) Draw the diagram depicting the schematic view of router's network management architecture and explain it.

   B) Briefly explain the different states in the BGP finite state machine.

3. Draw only a diagram depicting the format of IPv6 packet. **5**

P.T.O.

SECTION – II

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

   A) Distinguish between pushing and pulling of routing information.

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

   C) What are the possible factors that can cause instability in Internet routing ?

   D) Write a short note on allocation of IP prefixes and AS number.

   E) Identity issues faced in a distance vector protocol that are addressed by a path vector protocol.

   F) Explain IP header processing operation of fast path functions.

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

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

   B) List the broad classification of the router architectures. Explain with block diagram the shared CPU architecture of router, state its main advantages. In which type of routers this class of architecture is still used ?

6. List the router bottlenecks and its cause. **5**

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Seat No.	

M.E. (CSE) (Semester – II) Examination, 2015
ADVANCED DATABASE CONCEPTS (Paper – VII)

Day and Date : Saturday, 30-5-2015 Total Marks : 70

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

***Instructions**: 1) Question No. **4** from Section – **I** and Question No. **8** from Section – **II** are **compulsory**.*

*2) Attempt **any two** remaining questions from **each** Section.*

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

SECTION – I

1. A) Explain the types of data fragmentation with suitable examples. **6**

   B) Explain the framework for query optimization. **6**

2. A) Explain the reference model of distributed transaction recovery. **6**

   B) What are the goals of transaction management ? Explain 2-phase commit protocol to implement primitive for distributed transaction. **6**

3. A) Discuss in detail intraoperation parallelism. **6**

   B) Explain the approaches for handling of skew due to data partitioning in I/O parallelism. **6**

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

   A) Reliability of distributed transaction.

   B) Levels of distribution transparency.

P.T.O.

SECTION – II

5. A) Explain in detail following types of spatial data with examples and applications : **6**
   1) Geometric data
   2) CAD data
   3) Geographic data.

   B) What are the advantages of using structured data types ? Write and explain the query involving overriding method with suitable example. **6**

6. A) What is MDBMS ? Explain the issues involved in the design of multimedia database. **6**

   B) Explain the physical storage and retrieval of data in MDBMS. **6**

7. A) Explain how to implement arrays and multiset types in SQL with example. **6**

   B) Explain object-based RDBMS and persistent C++ system. **6**

8. Write short note on : **11**
   A) Space filling curve
   B) Temporal database.

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SLR-PD – 59

Seat No.	

M.E. (Computer Sci. and Engg.) (Semester – II) Examination, 2015
Paper – VIII : PARALLEL COMPUTER ARCHITECTURE

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) **All** questions from Section – **I** and **II** are **compulsory**.*
*2) Figures to the **right** indicate **full** marks.*
*3) Assume data **if necessary**.*

SECTION – I

1. Answer the following questions (**any five**) : **15**

   A) What is Instruction Level Parallelism ? How can we exploit ILP ?

   B) Give the different types of dependences and explain each with the help of example.

   C) Why are control dependences barriers for extracting more parallelism and performance ?

   D) How can you construct Control Dependency Graph (CDG) explain with example.

   E) What is branch predication ? Give impact of branches.

   F) What is pipelining ? How the pipelining of array processor is different from pipelining ?

   G) Explain Define – use and load-use dependencies, latencies and delays.

2. Describe in detail Logical layout of FX Pipelines (RISC and CISC pipelines). **10**

3. Write in detail the working of Superscalar Instruction Issue. **10**

P.T.O.

SECTION – II

4. Answer the following questions (**any five**) : **15**

   A) Explain the concepts of superscalar processing and out-of-order execution ?

   B) What is the fundamental difference between dependencies through registers and dependencies through memory ?

   C) Provide three reasons why a VLIW micro architecture is simpler than a same-width superscalar micro architecture.

   D) Give examples of two different types of speculative execution.

   E) Explain why delayed branch may give a performance benefit in a pipelined system and why delayed branch does not give the same benefit in a superscalar system.

   F) List main features of the R10000.

   G) Draw the layout of the rename buffers. List the types of rename buffers.

5. Describe in detail core part of the micro architecture of the PentiumPro and draw layout of the FX and load pipelines of the PentiumPro. **10**

6. Write in detail about the Memory Consistency Models. **10**

SLR-PD – 6

Seat No.	

M.E. (Civil Structures) (Semester – I) Examination, 2015
ADVANCES IN CONCRETE COMPOSITES (Elective – I)
(Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. a) State and explain the factors affecting Workability of Ferro cement concrete. **9**
   b) Explain the behaviour of FRC under tensile load. **9**

2. a) Name the different non-steel fibers that are used in FRC ?
   b) Why should FRC be used only with regular reinforcement ?
   c) What are differences between FRC and RCC ? **(6×3)**

3. State and explain :
   a) Properties of freshly mixed FRC.
   b) Advantages and disadvantages of open mould method of construction of Ferro cement construction. **(9×2)**

SECTION – II

4. a) Explain the Silica Fume Concrete with respect to durability of concrete. **5**
   b) State the applications of Silica Fume Concrete. **6**
   c) Explain the reaction mechanism of Silica Fume Concrete. **6**

5. a) State the influence of Silica Fume on properties of Concrete. **9**
   b) Explain the comparison of important properties of normal concrete with those of polymer concrete. **8**

6. a) What are the applications of polymer impregnated concrete and polymer concrete ? **9**
   b) Briefly explain the following : **(4×2)**
      i) Classification of Polymer Concrete
      ii) Advantages of Silica Fume Concrete.

SLR- PD – 60

Seat No.	

Master of Engineering (Part – I) (Semester – II) (CSE) Examination, 2015
Elective – II : GRID COMPUTING (Paper – IX)

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. t0 2.00 p.m.

Instructions *: 1) All questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*
*3) **Wherever** required draw appropriate and **neat** diagrams.*
*4) If data/network topology is **not** given then assume **suitably**.*

SECTION – I

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

   A) Compare an electrical power grid with computing grid.

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

   C) What is the Worldwide LHC Computing Grid ?

   D) Summarize and write critique on some alternative Grid perspectives.

   E) Compare Grid Computing and Cloud Computing environments.

   F) Write a short note on service-oriented view of the Semantic Grid.

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

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

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

3. List the key research issues that remain for exploiting knowledge services in the Semantic Grid. **5**

P.T.O.

SECTION – II

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

   A) Write a short note on applications of GARUDA Grid.

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

   C) Write a short note on VOTable.

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

   E) How security in GARUDA Grid is facilitated ?

   F) Outline the data processing by pipeline of applications in Encyclopedia of Life (EOL) project.

5. 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 three-layered architecture adopted at San Diego Supercomputer Center (SDSC) in developing next generation Grid portals.

6. Write a short note on parallel computing technique used for image stretching (resampling) in virtual sky application of Grid computing. **5**

SLR-PD – 61

Seat No.	

M.E. (CSE) (Part – I) (Semester – II) Examination, 2015
Elective – II
REAL TIME OPERATING SYSTEM (Paper – IX)

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. What is real-time system ? Describe with examples. Describe concept of events and determinism. **7**

2. A) Explain non-temporal transitions in the software life cycle, with the help of diagram. **7**
   B) Describe Warnier-orr notation for patient monitoring system. **7**

3. A) Describe polled-loop systems in detail. **7**
   B) Explain the use of mailboxes by describing mailbox implementation, operations on mailboxes and queues. **7**

4. A) Describe process stack management in detail. **7**
   B) Describe MFT and MVT dynamic allocation methods. **7**

SECTION – II

5. How response-time is calculated for polled loops, coroutine/phase-driven code and interrupt systems ? Explain. **7**

6. A) Write a note on – Reducing memory – Loading. **7**
   B) Describe basic buffer size calculations in dueueing models. **7**

7. A) List and explain different techniques used for calculating system reliability. **7**
   B) Describe unit-level testing, system-level testing and clean room testing. **7**

8. A) Describe the software Heisenberg uncertainty principle. **7**
   B) Write a note on – Real-time image processing. **7**

SLR-PD – 62

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2015
Elective – II : NATURAL LANGUAGE PROCESSING (Paper – IX)

Day and Date : Wednesday, 3-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Answer briefly : **15**

   a) How is Karaka sharing dealt with ?

   b) Generate a word form table.

   c) Compare between Chart parser and link parser.

   d) Comment on free word order and Vibhakti.

   e) Translate a sentence in English into an Indian Language and analyze it.

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

   a) Explain the semantic model of Panninian framework.

   b) What is an Augmented Transition Network ? How does it work ?

   c) Demonstrate Constraint Parser working with an illustration.

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

   a) How is a default Karaka chart drawn ?

   b) Illustrate the formation of Kriya Rupa charts.

   c) How is Vibhakti essential in Indian Languages ?

P.T.O.

SECTION – II

4. Answer briefly : **15**

   a) Give the language bridges in Hindi.

   b) Compare GB with PG.

   c) Define the term locality and illustrate.

   d) Give the components of Anusaraka system.

   e) Why is machine translation difficult ?

5. Attempt **any two** : **10**

   a) Give the basic properties of LFG.

   b) How does LFG handle Wh movements in questions ?

   c) Compare TAG and TSG.

6. Attempt **any two** : **10**

   a) What is the Theta Theory ? How is it different from the Case theory ?

   b) PG performs better than TAG. Justify.

   c) Give the characteristics of Indian languages. How do they become candidates for PG representation ?

SLR-PD – 64

Seat No.	

M.E. (Computer Science and Engineering) (Sem. – II) Examination, 2015
Elective – IV : WEB TECHNOLOGY (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70

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

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

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

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

SECTION – I

1. Write an ASP code to display different image each time user visits a page. **7**
2. How is XML defined ? Write down the XML syntax and structure rules. What is DTD, XPATH and schema. Discuss its application. **7**
3. Explain clinet side scripting and server side scripting. **7**
4. Explain ADO. Net architecture with diagram. **7**
5. Explain Apache Web server and its components. **7**
6. Explain e-commerce business model and e-marketing. **7**

SECTION – II

7. Create JSP web application for login form with login and extend that with password (password should be minimum 5 characters). **7**
8. Explain servelet operation in detail with sample servlet program. **7**
9. What is session and how client state is maintained using session ? Explain session tracking and management. **7**
10. Describe the servlet architecture and the various interfaces invoked by the servlet container. **7**
11. Write a short note on RSS and Blog. **7**
12. Explain difference between web 2.0 and web 3.0 with examples. **7**

SLR- PD – 65

Seat No.	

M.E. (CSE) (Semester – II) Examination, 2015
Elective – III : BUSINESS INTELLIGENT SYSTEM (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1)* ***All*** *questions from Section –* ***I*** *and* ***II*** *are* ***compulsory****.*
2) Figures to the ***right*** *indicate* ***full*** *marks.*
3) Assume data ***if necessary****.*

SECTION – I

1. Answer the following questions **(any five)** : **15**

   A) Define Business Performance Management (BPM). And compare BPM and BI.

   B) Explain the Framework of BI.

   C) Explain Balanced Scorecard (BSC).

   D) Which are the different text mining tools ?

   E) What is BIS ? Explain Architecture of BI.

   F) Enlist the methods of text mining ? And explain in detail.

   G) Explain six sigma.

2. Enlist and describe the major tools and techniques of Business Intelligence. **10**

3. Describe in detail Business Performance Management (BPM) cycle. **10**

SECTION – II

4. Answer the following questions **(any five)** : **15**

   A) Explain On-Demand BI.

   B) How to connect BI Systems to Databases in business ? Explain it.

   C) Which are the forecasting methods in business ? Explain it.

P.T.O.

D) Write a note on Explanatory versus Predictive modeling.

E) Which are the issues related to BI Implementation ?

F) Which are the combining methods and Time series components ?

G) Explain reality mining.

5. Explain Social Networks and BI ? What is Collaborative Decision making ? **10**

6. Explain in detail the BI Implementation factors. **10**

SLR-PD – 66

Seat No.	

M.E. (Computer Science and Engineering) (Semester – II) Examination, 2015

Elective – III : Object Oriented Software Engineering and Design Patterns (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70

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

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

*2) Answer **any three** questions in **each** Section.*

*3) Make suitable assumptions if necessary and state them **clearly.***

SECTION – I

1. Answer briefly : **15**

   a) List and explain the different software architectures.

   b) Explain the need of common language.

   c) Explain the life cycle of domain object.

2. a) Explain the Software Architecture and its relationships to other disciplines. **5**

   b) Write a short note on Architectural Styles. **5**

3. a) Illustrate the overall software life cycle with a case study of ATM. **5**

   b) When are Sequence diagrams used ? **5**

4. Draw a use case and activity diagram related to a Banking system. **10**

P.T.O.

SECTION – II

5. Write a short note on : **15**

   a) Conceptual Architecture View.

   b) Code Architecture View

   c) Execution Architecture View.

6. a) Explain IS2000 : The Advanced Imaging Solution. **5**

   b) What is the Literate Modeling ? **5**

7. a) What is Customer Relationship Management (CRM) archetype pattern ? **5**

   b) Explain allocation view type and styles. **5**

8. What are frameworks ? How they are related to different design patterns ? **10**

SLR-PD – 67

Seat No.	

M.E. (Semester – II) (Computer Science and Engineering) Examination, 2015
(Elective – III) (WIRELESS AD-HOC NETWORK) Paper – X

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Question **1** and **5** are **compulsory**.*
*2) Answer **any two** questions from remaining Section.*
*3) Figures to **right** indicates marks.*

SECTION – I

1. A) Explain following characteristics of Channel . **5**

   i) Path Loss ii) Fading

   B) Explain in details IEEE 802 11 DCF and RTS-CTS mechanism. **6**

2. A) What is Packet Radio Network ? Explain the Technical Challenges. **6**

   B) Draw schematic diagram of ad-hoc wireless internet and discuss its major issues. **6**

3. A) Differentiate between Cellular Network and Ad-Hoc WLAN. **6**

   B) What is wireless sensor network ? Explain different issues involved in WSN. **5**

4. A) Explain Optimization incorporated in Basic DSR and what are the advantages ? **6**

   B) Give the classification of routing protocol and also list the characteristics of ideal routing protocol in WAN. **6**

SECTION – II

5. A) What are the performance challenges for TCP in Ad-hoc WANs ? **5**

   B) Give the comparison of various TCP solutions for ad-hoc wireless networks. **6**

P.T.O.

6. A) Explain with diagram the routing layer and it module in Multicast routing Reference model. **6**

   B) Explain issues in secure routing in ad-hoc wireless networks. **6**

7. A) Explain key management for Cryptography algorithms in ad-hoc wireless networks. **6**

   B) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **6**

8. A) Explain in details Dynamic Core-Based Multicast Routing Protocol (Mesh Based). **6**

   B) Compare tree based and mesh based multicast routing protocols. **6**

SLR-PD – 68A

Seat No.	

M.E. (Computer Sci. and Engg.) (Semester – III) Examination, 2015
(Paper – I) : SELF LEARNING
(COMPUTER NETWORK ADMINISTRATION)

Day and Date : Sunday, 24-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Q.* ***1*** *from Section –* ***I*** *and Q.* ***5*** *from Section –* ***II*** *are compulsory.*

2) Attempt ***any two*** *questions from Q.* ***2*** *to Q.* ***4*** *for Section –* ***I*** *and* ***any two*** *questions from Q. 6 to Q. 8 for Section –* ***II***

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

SECTION – I

1. With suitable diagram, explain TCP/IP based Internet and Intranet. **7**

2. A) Describe Distributed Computing Environment with suitable diagrams. **7**

   B) How and why NMS are used ? Explain data and telecommunication Networks with neat diagram. **7**

3. A) What is ASN.1 ? Explain encoding structures used in ASN.1. **7**

   B) What are the Network Management standards ? List the salient points of each standard. **7**

4. A) Describe Two-Tier Organisation model of SNMP with diagram. **7**

   B) Describe elements of system group in MIB. **7**

P.T.O.

SECTION – II

5. Describe SNMP GetRequest PDU and GetNextRequest PDU Operations for System Group. **7**

6. A) Describe Functional model of SNMP v1 network management. **7**

   B) Describe major changes in SNMP v2. **7**

7. A) What is Remote Monitoring ? Explain with diagram. **7**

   B) Explain ATM Remote monitoring with help of ATM RMON MIB. **7**

8. A) Describe Traffic Load Monitoring. **7**

   B) Explain any two Enterprise Management Solutions. **7**

SLR-PD – 68B

Seat No.	

M.E. (Computer Science and Engineering) (Semester – III) Examination, 2015

(Paper – I) SELF LEARNING : BIG DATA

Day and Date : Sunday, 24-5-2015 Total Marks : 70

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

***Instructions** : 1) Solve **any five** questions from **each** Section. **Each** question carried **seven** marks.*

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

SECTION – I

1. What are Big Data types ? How are they managed in Big Data Ecosystem ? **7**
2. Explain creating manageable data structure. **7**
3. What are the peculiar characteristics of cloud, which make it is technology foundation for Big Data ? Explain with examples. **7**
4. Define unstructured data. **7**
5. Explain the importance of virtualisation to Big Data. **7**
6. Explain NEO4J graph database. **7**

SECTION – II

7. Explain MapReduce. **7**
8. Explain computing selections by MapReduce. **7**
9. Explain how business processes with the help of big data analytic. **7**
10. Explain four elements of Big data ethics : **7**

    i) identity ii) privacy iii) ownership and iv) deputation
11. Explain alignment methodology framework for ethics. **7**
12. Explain basic fundamentals of MapReduce and state techniques to reliability. **7**

SLR-PD – 69

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – I) Examination, 2015

(Paper – I) ADVANCED LIGHT WAVE COMMUNICATION

Day and Date : Friday, 22-5-2015 Total Marks : 70

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

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

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

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

SECTION – I

1. Solve **any one** question : **(7×1=7)**

   a) Explain different scattering losses in optical fiber.

   b) Explain different types of optical fibers.

2. Solve **any two** questions : **(5×2=10)**

   a) State the different types of LED. Explain any one type.

   b) With neat diagram explain semiconductor injection LASER.

   c) Explain the mechanism of transmission of light through optical fiber with the help of ray theory of light.

3. Write a short note **(any three)** : **(6×3=18)**

   a) Optical amplifiers

   b) Dispersion in fiber

   c) Working principle of LASER

   d) Power budget calculation in optical fiber.

P.T.O.

SECTION – II

4. Attempt the following **(any one)** : **(7×1=7)**

   a) Explain with suitable diagram how can WDM wavelength spectrum be generated by tunable sources.

   b) Discuss design consideration for long haul high bandwidth system.

5. Attempt the following **(any two)** : **(5×2=10)**

   a) Explain different passive components required in WDM system.

   b) State important characteristics of a photo detector. With a neat schematic explain the physical principle of PIN photo detector.

   c) Explain the design considerations for long haul, high bandwidth system.

6. Write a note on **(any three)** : **(6×3=18)**

   a) PIN photo detector

   b) Optical LAN

   c) Hybrid and Planar waveguide devices

   d) Soliton system

   e) BER and Cut-off wavelength.

SLR-PD – 70

Seat No.	

M.E. (Electronics and Telecommunication) (Semester – I) Examination, 2015
(Paper – II) LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

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

   a) Prove that there exists a basis for each finite dimensional vector space.

   b) Define linear dependence and linear independence of vectors prove that
      i) If the set $\{\alpha_1, \alpha_2, ... \alpha_n\}$ of vectors of V(F) is linearly independent then none of the vectors $\alpha_1, \alpha_2, ... \alpha_n$ can be a zero vector.
      ii) If two vectors are linearly dependent then one of them is a scalar multiple of other.

   c) Define basis of vector space. Show that the vectors (1, 2, 1), (2, 1, 0) (1, – 1, 2) form a basis for R^3.

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

   a) Let U and V be vector spaces over the field F and let T is a linear transformation from U into V. Suppose that U is finite dimensional, then prove that rank (T) + nullify(T) = dim U.

   b) Consider the basis $S = \{\alpha_1, \alpha_2, \alpha_3\}$ of R^3 where $\alpha_1 = (1, 1, 1)$, $\alpha_2 = (1, 1, 0)$, $\alpha_3 = (1, 0, 0)$. Express (2, 3, –5) in terms of basis $\alpha_1, \alpha_2, \alpha_3$.

   c) If W_1 and W_2 are subspaces of a vector space V(F), then prove that $W_1 + W_2$ is subspace of a vector space V(F).

P.T.O.

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

a) Define an inner-product space. Show that if $\alpha = \{a_1, a_2, ... a_n\}$, $\beta = \{b_1, b_2, ... b_n\} \in V_n(C)$ then $(\alpha, \beta) = a_1\bar{b}_1 + a_2\bar{b}_2 + ... + a_n\bar{b}_n$ defines an inner product on $V_n(C)$.

b) Prove Schwarz's inequality $|(\alpha, \beta)| \leq \|\alpha\| \cdot \|\beta\|$ Hence prove that $\|\alpha + \beta\| \leq \|\alpha\| + \|\beta\|$

c) The function f(t) is defined as

$f(t) = 1$ for $0 \leq t \leq \pi$

-1 for $\pi \leq t \leq 2\pi$

Show that above function is orthogonal to signals cost, cos2t, ...
cosnt for all non zero integer values of n over the interval 0 to 2π.

SECTION – II

4. Attempt **any two** : **15**

a) For a convolutional encoder, rate = $\frac{1}{2}$, generator sequences are $g_1 = 111$ and $g_2 = 110$.

i) Draw state diagram.

ii) Draw encoder trellis diagram.

iii) Draw the disjoint cells which would be implemented in ACS algorithm.

b) The generator polynomial for a (15, 7) cyclic code is $g(x) = 1 + x^4 + x^6 + x^7 + x^8$. Find code vector for message polynomial $D(x) = x^2 + x^3 + x^4$ in systematic form. Assume that first and last bits of this code vector corrupted. Find the syndrome.

c) The parity check matrix for (7, 4) block code is given by

$$H = \begin{bmatrix} 1 & 0 & 1 & 1 & 1 & 0 & 0 \\ 1 & 1 & 0 & 1 & 0 & 1 & 0 \\ 1 & 1 & 1 & 0 & 0 & 0 & 1 \end{bmatrix}$$

Decode the following received codewords :

i) 1011111

ii) 1010101

iii) 1111111

5. Attempt **any two** : **10**

a) The received polynomial for R-S code is

$r(x) = \alpha^0 + \alpha^2 x + \alpha^4 x^2 + \alpha^0 x^3 + \alpha^6 x^4 + \alpha^3 x^5 + \alpha^5 x^6$. Check whether it contains error or not.Use primitive polynomial as $f(x) = 1 + x + x^3$.

b) If minimal polynomial of BCH code are

$\Phi_1(x) = 1 + x + x^4,\ \Phi_3(x) = 1 + x + x^2 + x^3 + x^4,\ \Phi_5(x) = 1 + x + x^2$

Find the generator polynomial for triple error correcting BCH code.

c) For convolutional encoder, whose generator sequences are g1 = 111, g2 = 101

i) Draw state diagram representing starting state and ending state separately.

ii) Write state equations.

6. Attempt **any two** : **10**

a) Check the given polynomial $f(x) = 1 + x + x^3$ is primitive or not.

b) Explain decoding used in Reed Muller codes. The message is encoded using R(1, 3). If received message is 10111100, find original message.

c) Explain Viterbi decoding algorithm used in convolutional codes.

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SLR-PD – 71

Seat No.	

M.E. (E and TC) (Semester – I) Examination, 2015
Paper – III : ADVANCED NETWORK SYSTEM

Day and Date : Monday, 25-5-2015 Total Marks : 70

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

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

1. Attempt **any two** : **10**
   a) What is DHCP ? Draw and explain packet format.
   b) What is address resolution problem ? How is it resolved through dynamic mapping ?
   c) Draw and explain three way handshaking and four way handshaking used in TCP.

2. Attempt **any two** : **10**
   a) What is FTP ? Explain FTP process model.
   b) Draw TCP segment format and explain the fields.
   c) Explain recursive and iterative domain name resolution. Comment on caching.

3. Write short notes on (**any three**) : **15**
   a) MIME
   b) UDP
   c) SMTP
   d) IPv6.

4. Attempt **any two** : **10**
   a) What are different functions of ATM layer ? Explain.
   b) What is firewall ? What are its types ? Explain packet filtering firewall.
   c) Draw and explain Gigabit Ethernet architecture.

P.T.O.

5. Write short notes on (**any three**) : **10**

   a) With respect to internet security explain :

      i) Benefits of IP security

      ii) IP security applications.

   b) What is PNNI ? Explain PNNI ATM network.

   c) Explain MPLS in detail.

6. Write short notes on (**any three**) : **15**

   a) ATM cell format

   b) RSVP

   c) IEEE802.3z standard

   d) ATM signaling.

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SLR-PD – 72

Seat No.	

M.E. (E and TC) (Semester – I) Examination, 2015
RANDOM PROCESSES (Paper – IV)

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. Attempt the following :

a) A manufacturer of inexpensive stereo amplifiers buys Integrated Circuits (IC) units from three different suppliers. One IC unit is used in each amplifier. 10% of the units from supplier A are bad, 5% of those from supplier B and 1% of those from supplier C are bad. The manufacturer obtains 50% of all units from A, 30% from B and 20% from C.

i) What is the probability that a randomly selected amplifier will contain a faulty IC ?

ii) If an amplifier is found to have a faulty IC, what is the probability that it was obtained from supplier C. **5**

b) Given that P(A) = 0.9, P(B) = 0.8 and $P(A \cap B) = 0.75$, find :

a) $P(A \cup B)$;
b) $P(\overline{A} \cap B)$; and
e) $P(\overline{A} \cap \overline{B})$. **5**

c) Show that the mean and variance of Poisson random variable X are same. **4**

2. a) Consider the switching network shown in the Fig. 1. It is equally likely that a switch will or will not work. Find the probability that a closed path will exist between terminals a and b. **7**

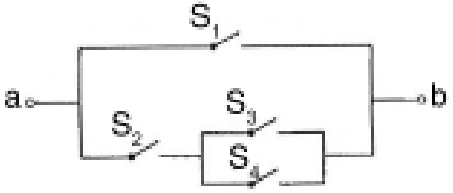

Fig. 1

b) Let X be a continuous random variable with PDF $f_X(x) = \begin{cases} kx & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$

Find the mean and variance of the r.v.X. **7**

P.T.O.

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

$$f_{xy}(x, y) = \begin{cases} k(x+y) & 0 < x < 2, 0 < y < 2 \\ 0 & \text{otherwise} \end{cases}$$

Where k is constant.

i) Find the value of k

ii) Find the marginal pdf's of X and Y

iii) Are X and Y are independent ? **7**

b) Let X and Y be defined by $X = \cos\theta \quad Y = \sin\theta$

Where θ is a random variable uniformly distributed over $(0, 2\pi)$.

i) Show that X and Y are uncorrelated

ii) Show that X and Y are not independent. **7**

4. a) Define cross spectral density between two random process. Explain the properties of cross spectral density. **7**

b) Consider a random process X(t) defined by

$X(t) = A \cos(\omega t + \theta) \qquad -\infty < t < +\infty$

Where A and ω are constants and θ is a uniform random variable over $(-\pi, \pi)$. Show that X(t) is WSS. **7**

5. a) Two random processes X(t) and Y(t) are given by

$X(t) = A \cos(\omega t + \theta) \qquad Y(t) = A \sin(\omega t + \theta)$

Where A and ω are constants and θ is a uniform r.v. over $(0, 2\pi)$. Find the cross-correlation function of X(t) and Y(t) and verify $R_{xy}(-\tau) = R_{xy}(\tau)$. **7**

b) Explain the transition probability matrix and transition diagram in case of Markov chains with the help of a suitable example. **7**

6. a) Customers arrive at the express checkout lane in a supermarket in a Poisson process with a rate of 15 per hour. The time to check out a customer is an exponential r.v. with mean of 2 minutes.

i) Find the average number of customers present.

ii) What is the expected idle delay time experienced by a customer ?

iii) What is the expected time for a customer to clear a system ? **7**

b) For M/M/1/∞ queuing system find the steady state probability for number of customers presents in to the system (P_n) and probability that no customer present in to the system (P_o). Also derive the expression for average waiting of customer in to the system (W_s). **7**

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SLR-PD – 74

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – I) Examination, 2015
Elective – I : DIGITAL DATA COMPRESSION (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Attempt **any one** : **8**

   a) Compare Shano-Fano algorithm with Huffman algorithm with the help of one example.

   b) State approaches of modeling. Explain probability model and Markov model.

2. Attempt **any one** : **9**

   a) Apply adaptive Huffman coding to code English lowercase alphabet message (b b m d a).

   b) Explain higher order modeling, finite context modeling and adaptive modeling.

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 compression ratio, entropy, relative data redundancy.

   c) Explain how tag is generated in Arithmetic coding.

P.T.O.

SECTION – II

4. Attempt **any one** : **8**

   a) With reference to compression of sound, explain Lossy compression and Silence compression.

   b) Explain motion compensation with one example.

5. Attempt **any one** : **9**

   a) Explain rate distortion theory. How it is utilized for coding ?

   b) Explain channel vocoder with reference to speech compression.

6. Attempt **any two** : **18**

   a) With the help of block diagram explain H.261 encoder used for video compression.

   b) With the help of block diagram explain MPEG audio coding algorithm. Also explain Layer II coding.

   c) Explain fractal compression with one example.

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SLR-PD – 75

Seat No.	

M.E. (Electronics and Telecommunication. Engg.) (Semester – II) Examination, 2015

Paper – VI : RF AND MICROWAVE CIRCUIT DESIGN

Day and Date : Thursday, 28-5-2015 Total Marks : 70

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

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

SECTION – I

1. Solve **any two** questions. **(5×2=10)**

   a) Derive the equation for transmission line with the help of uniformly distributed circuit theory in case of lossy and lossless lines.

   b) ZL = (75 + j50) Ω connected to a transmission line with Characteristic impedance of 50Ω. Find the corresponding reflection coefficients and transmission coefficients.

   c) Explain the construction and characteristics of GaAs MESFET.

2. Solve **any one** question. **(7×1=7)**

   a) Explain the construction of smith chart with resistance and reactance circles.

   b) Explain the different types of interconnecting networks.

3. Attempt **any three** questions. **(6×3=18)**

   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) A GaAs MESFET with a gold gate fabricated to be 1.0 μm in length and 200 μm in width and d = 0.5 μm in depth. the following electric characteristics are known $\in_r$ = 13.1, $N_D = 10^{16}$ cm^{-3} and μ_n = 8500 cm^2/ V.S.Find the cut-off frequency at room temperature.

   c) Discuss in brief about RF filters configurations and design parameters.

   d) Write a note on linear and non-linear mixer operation.

P.T.O.

SECTION – II

4. Solve **any two** questions. **(5×2=10)**

   a) Derive expression for conversion between S parameters and Z parameters.

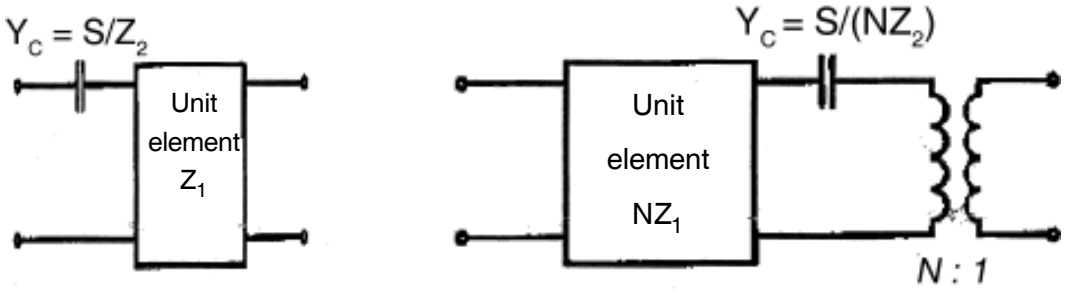
   b) Explain about active and passive phase shifters.

   c) Write short notes on constant VSWR circles in case of microwave amplifiers.

5. Solve **any one** questions. **(7×1=7)**

   a) Write a note on oscillator design by using the small signal scattering matrix parameters.

   b) Prove kuroda's third identity stated below with the help of ABCD parameters calculate the value of N.



6. Attempt **any three** questions. **(6×3=18)**

   a) Write a note on Frequency transformation.

   b) Explain Class A RF transistor amplifier design.

   c) Discuss in brief about RF filter configuarations and design parameters.

   d) Design a T-type matching network that transforms load impedance $Z_L = (60\text{-}j30)\Omega$ into a $Z_{in} = (10 + j\ 20)\Omega$ input impedance and that has maximum nodal quality factor of 3. Compute the values for the matching network components, assuming that the Matching is required at f = 1 GHz.

SLR-PD – 76

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2015
WIRELESS COMMUNICATION (Paper – VII)

Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Q.**1** is **compulsory**.*
*2) Solve **any four** questions from Q. **2** to Q. **6**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** suitable data if necessary.*

1. Attempt the following.
   a) Explain impulse response model of a multipath fading channel. **5**
   b) Explain basic propagation mechanism in mobile radio propagation. **5**
   c) Compute the BER of a wireless communication system at SNR 20dB. **4**
2. a) Explain co-channel interference and adjuscent channel interference and their effect on cellular mobile communication. **7**
   b) An automobile moves with velocity v(t) show in fig. a. The received mobile signal experiences multipath Rayleigh fading on a 900 MHz CW carrier. What is the average crossing rate and fade duration over the 100 second interval ? Assume p = 0.1 and ignore large scale fading effect. **7**

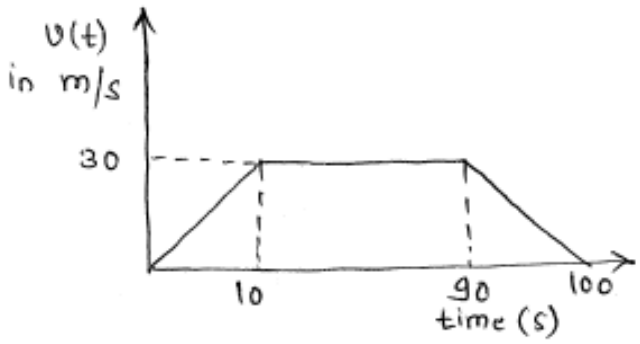


fig. a

3. a) What is small scale fading ? Enlist the factors influencing small scale fading. **7**
   b) Enumerate upgrade options for GSM and explain EDGE. **7**

P.T.O.

4. a) Determine the maximum throughput that can be achieved by using ALOHA and slotted ALOHA protocols. **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. **7**

      i) the normalized throughput of the system, and

      ii) the number of bits per packet that will maximize the throughput.

5. a) Discuss the traffic routing mechanism in wireless networks. **7**

   b) Explain Digital European Cordless Telephone (DECT) architecture. **7**

6. a) Explain in detail Universal Mobile Telecommunication System (UMTS). **7**

   b) Explain the multiple access techniques for wireless communication. **7**

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SLR-PD – 77

Seat No.	

M.E. (Electronics and Telecommunication) (Semester – II) Examination, 2015
ADAPTIVE SIGNAL PROCESSING (Paper – VIII)

Day and Date : Monday, 1-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. Solve **any two** : **15**
   a) Define correlation matrix. State and prove properties of correlation matrix.
   b) Explain different stochastic models.
   c) Derive performance function and draw performance surface for adaptive linear combiner.

2. Solve **any two** : **10**
   a) Explain properties of eigenvalues and eigenvectors.
   b) Find circular convolution of
      $x(n) = \{ 2, 1, 3, 4\}$
      $y(n) = \{1, 2, 1, 3, 6\}$
      Use concentric circle method.
   c) Explain WOLD decomposition theorem.

3. Solve **any two** : **10**
   a) Explain in detail gradient search algorithm by Newton's method.
   b) Explain Gaussian moment factoring theorem.
   c) State different characteristics of adaptive signal processing.

P.T.O.

4. Solve **any two** : **15**

   a) With the help of signal flow graph explain RLS algorithm.

   b) Explain in detail Laguerre transversal filters.

   c) Explain self orthogonalised adaptive filters for LMS algorithm.

5. Solve **any two** : **10**

   a) Define matrix inversion lemma. How it is useful in RLS algorithm ?

   b) Explain IIR filters used for system identification using output error method.

   c) Explain upper bounds on step size parameter for various scenarios in LMS algorithm.

6. Solve **any two** : **10**

   a) Find relation between :

      i) $\phi_{xx}(z)$ and $\phi_{yy}(z)$

      ii) $\phi_{xx}(z)$ and $\phi_{xy}(z)$.

   b) Explain application of adaptive signal processing in inverse adaptive modelling.

   c) Define the problem statement used for linear optimum filtering.

SLR-PD – 79

Seat No.	

M.E. (E and TC) (Semester – II) Examination, 2015
Paper – IX : CRYPTOGRAPHY AND NETWORK SECURITY (Elective – II)

Day and Date : Wednesday, 3-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

1. Attempt **any two** : **12**

   a) Explain what is network security attack. Discuss types.

   b) Discuss with suitable example substitution technique of cryptography.

   c) Draw and explain DES and triple DES.

2. Attempt **any two** : **12**

   a) Explain linear and differential cryptanalysis.

   b) Discuss various techniques of random number generation.

   c) Illustrate diagrammatically basic uses of hash function to encrypt.

3. Attempt **any two** : **12**

   a) Compare block versus stream cipher.

   b) Discuss on rotor machines.

   c) Compare conventional encryption with public key encryption.

4. Attempt **any two** : **12**

   a) Discuss various public key distribution techniques.

   b) Write a note on virus related threats.

   c) List IP security application and services.

P.T.O.

5. Attempt **any two** : **12**

   a) Draw and explain x.509 certificate format.

   b) Explain with diagram Kerberos.

   c) Draw public key encryption for authentication and signature.

6. Attempt **any two** : **10**

   a) Draw and explain general format of PGP messages.

   b) Write a note on malicious software.

   c) Draw and explain X.509 certificate and certificate revocation list.

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SLR-PD – 8

Seat No.	

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

Day and Date : Thursday, 28-5-2015 Total Marks : 70
Time : 11.00 a.m. to 3.00 p.m.

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

SECTION – I

1. a) Give significance of study of Theory of Plates. **5**

   b) Derive relation between bending moments and Curvature in Pure bending of rectangular Plates. **12**

2. a) Obtain Fourth order Governing Differential Equation for the deflection surface of a laterally loaded rectangular plates. **12**

   b) Describe Navier's solution for analysis of rectangular plates. **6**

3. a) Obtain differential equation for symmetrical bending of laterally loaded circular plates. **12**

   b) Differentiate between rectangular and circular plates in terms of :

      i) stresses and strains produced

      ii) boundary conditions. **6**

P.T.O.

SECTION – II

4. a) i) Define Shell. Give classification of shells. **6**

   ii) Differentiate between behavior of plates and shells under external loading. **5**

   b) Enlist the advantages due to which shell structures are widely used in engineering. **7**

5. a) Obtain the equations for different stress resultants for thin shells without bending. **7**

   b) Using Pucher stress function calculate Membrane forces of shells. **10**

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

   a) General theory of cylindrical shells

   b) Finsterwalder's theory

   c) Membrane theory.

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SLR-PD – 81

Seat No.	

M.E. (E & TC) (Semester – II) Examination, 2015
MOBILE COMPUTING (Elective – III) (Paper – X)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Solve **any three** : **(8×3=24)**
   a) Explain IS-95 architecture model of CDMA.
   b) Explain route establishment and route maintenance in dynamic source routing.
   c) With the help of figure, explain location management in IBM proposal.
   d) Draw I-TCP connection setup and explain I-TCP protocol.

2. a) Draw GSM system hierarchy diagram. **3**
   b) Draw and explain location management in Columbia Mobile IP proposal. **8**

   OR

   b) With one example, explain zone routing protocol. **8**

SECTION – II

3. Solve **any three** : **(8×3=24)**
   a) Explain quality of service support mechanism of IEEE 802.11e.
   b) What is symmetric key Cryptography ?
   c) Explain security models.
   d) Explain applications for symbian.

4. a) What is non-repudiation ? **3**
   b) Explain security protocols with the help of figure for secure communication. **8**

   OR

   b) Explain security architecture of symbian OS. **8**

SLR-PD – 83

Seat No.	

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2015
Elective – III : COMMUNICATION SYSTEM DESIGN (Paper – X)

Day and Date : Friday, 5-6-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Q. **1** is **compulsory**.*
*2) Solve **any four** questions from Q. **2** to Q. **6**.*
*3) Figures to the **right** indicate **full** marks.*
*4) **Assume** suitable data **if necessary**.*

1. a) Derive an expression for probability of error for BPSK. **5**

   b) Explain the lumped parameter and the distributed parameter design approaches of a Low Noise Amplifier. **5**

   c) Explain the concept of a switched capacitor filter. **4**

2. a) Write a note on harmonic distortion due to non-linearity. **7**

   b) Derive an expression for the low frequency small signal voltage gain of wideband core amplifier. Comment on the trans-conductances of the devices used in the amplifier. **7**

3. a) Prove that the input impedance of narrowband Low Noise Amplifier is given as **7**

   $$Rs = \frac{gmL_2}{c}.$$

   b) Derive an expression for the output of the unbalanced mixer. What is the drawback of the unbalanced mixer ? **7**

P.T.O.

4. a) Assume that a Gillbert Mixer operates under the following conditions : **7**

$Y_{GS} - V_T = 0.387$ V

$A_{RF} = A_{Interference} = 0.316$ V

$= 0$dBm

Evaluate the following for the Gillbert Mixer :

i) third order harmonic distortion

ii) third order intermodulation distortion

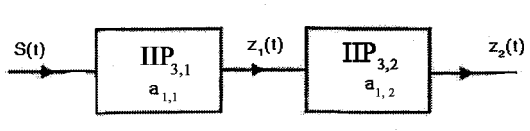
iii) third order input intercept point.

b) Derive an expression for the rms noise power of second order Sigma Delta modulator in terms of Over Sampling Rate (OSR). **7**

5. a) Prove that third order intermodulation distortion is related to third order harmonic distortion as $IM_3 = 3\ HD_3$. **7**

b) Derive an expression for the noise transfer function and the signal transfer function of a first order Sigma Delta modulator. Also plot the frequency spectra of the transfer functions and comment on them. **7**

6. a) Two non-linear stages are cascaded as shown below. Derive an expression for the third order intercept point of the cascaded system. **7**



b) For a Gillbert Mixer derive an expression for third order harmonic distortion. **7**

SLR- PD – 85

Seat No.	

M.E. (Electronics and Telecommunication Engineering)
(Semester – III) Examination, 2015
SELF LEARNING SUBJECT
Paper – I : Modeling and Simulation of Communication System

Day and Date : Sunday, 24-5-2015 Total Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. Solve **any two** questions : **(5×2=10)**

   a) Explain multi-disciplinary aspects of simulation.

   b) What is performance estimation ?

   c) Explain methodology problems solving for simulation.

2. Solve **any one question** : **(7×1=7)**

   a) Explain basic concepts of modeling in detail.

   b) Explain classification of system properties for performance evaluation technique.

3. Attempt **any three** questions : **(6×3=18)**

   a) Write a note on validation process.

   b) Explain the role of simulation in communication engineering system.

   c) Explain the process of quantization.

   d) With block diagram explain models for the FM modulation process.

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) Explain continuous time and discrete time signals with examples.

5. Solve **any one question** : **(7×1=7)**

   a) Define linear congruence and explain mixed congruence algorithm.

   b) Explain frequency domain representations of periodic continuous signals.

6. Attempt **any three** questions : **(6×3=18)**

   a) Explain block diagram representation of systems.

   b) Describe about base band signals.

   c) Explain relative frequency.

   d) Write a note on Monte Carlo estimation.

SLR-PD – 86

Seat No.	

M.E. Mechanical (CAD/CAM) Semester – I Examination, 2015
(Paper – I) ADVANCED MACHINE DESIGN

Day and Date : Friday, 22-5-2015 Total 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. For the given stress matrix, determine the principal stresses. **13**

$$[T_{ij}] = \begin{bmatrix} 18 & 0 & 24 \\ 0 & -50 & 0 \\ 24 & 0 & 32 \end{bmatrix}$$

2. The displacement field for body is given by

   $u_x = pxy$, $u_y = pxy$, $u_z = 2p(x + y)z$; where p is constant for small deformation.

   Determine strain matrix and find out strain in the direction $n_x = n_y = n_z = \frac{1}{\sqrt{3}}$. **11**

3. a) Write a note on :

   i) State of stress at a point ii) State of strain at a point **6**

   b) Explain the Mohr's circle for three dimensional state of stress. **5**

P.T.O.

4. a) Explain the relationship between various elastic constants in the terms of rectangular stress-strain components. **5**

   b) Compute the Lame's coefficients for the material with modulus of elasticity 104×10^6 Kpa and poisons ratio equal to 0.3. **6**

SECTION – II

5. A composite is made by inserting material 'B' between two plates of material 'M'. Neglecting friction, if material 'B' is subjected to compressive stresses in X and Y direction, determine the stress in Z direction and strains in all directions in the terms of poison ratio ν . **13**

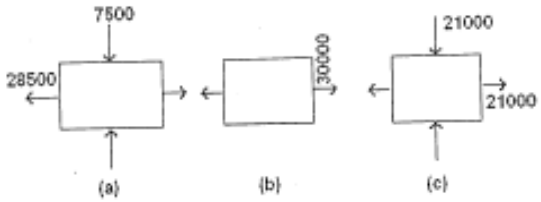
6. a) What is endurance limit ? Explain the significance of modified Goodman diagram in the analysis. **6**

   b) Explain the significance of Notch sensitivity in the design. **5**

7. a) Explain the concept of thin walled and thick walled cylinder. **6**

   b) Explain the theory of strain energy due to pure shear stresses. **5**

8. Which one of the below three blocks will yield first according to maximum stress theory, maximum strain theory and maximum shear stress theory. (Ref. Figure a, b & c) **11**



SLR-PD – 87

Seat No.	

M.E. (Mechanical-CAD/CAM) (Semester – I) Examination, 2015
Paper – II : COMPUTER AIDED MANUFACTURING

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions**: 1) Q. No. **4** and Q. No. **8** are **compulsory**. Solve **any two** questions from remaining **three** questions from **each** Section.*
*2) Figure to **right** indicate **full** marks.*
*3) Assume **suitable** data if required and state clearly.*

SECTION – I

1. a) Explain with the help of sketch principle of operation of CNC system. **5**
   b) Explain tool and work holding features of CNC machining center. **5**

2. a) Explain thermal aspects of metal cutting. **5**
   b) Explain role of cutting fluid. **5**

3. a) Explain routine and canned cycle with example. **5**
   b) Explain cutter compensation and tool length compensation. **5**

4. Write short note on : **(5×3=15)**
   a) ISO nomenclature of tools.
   b) Cutting tool material.
   c) Effect of heat treatment on machining operations.

SECTION – II

5. a) Explain working principle of wire cut EDM. **5**
   b) Discuss different types of chip in metal cutting. **5**

6. a) How straightness and hardness are measured on CMM ? **5**
   b) Explain the term 'Design for assembly'. **5**

7. a) Explain process planning with suitable example. **5**
   b) Explain the use of pallets in CNC machining. **5**

8. Write short note on : **(5×3=15)**
   a) Importance of various types of fits.
   b) Abrasive water jet machining.
   c) Tool path generation.

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SLR-PD – 88

Seat No.	

M.E. (Mechanical) (CAD/CAM) (Semester – I) Examination, 2015
Paper – III : FINITE ELEMENT ANALYSIS

Day and Date : Monday, 25-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Explain CST and LST elements. **6**

   b) Explain Hermite shape function of beam elements. **5**

2. a) Explain weighted residual approach applied to finite element analysis. **6**

   b) Explain general procedure for finite element analysis. **5**

3. a) Explain principal of minimum potential energy approach. **6**

   b) Explain in brief consistence and lumped mass formulation. **6**

4. Write short note on : **12**
   a) Principal of virtual work
   b) Formulation of Isoparametric elements.

SECTION – II

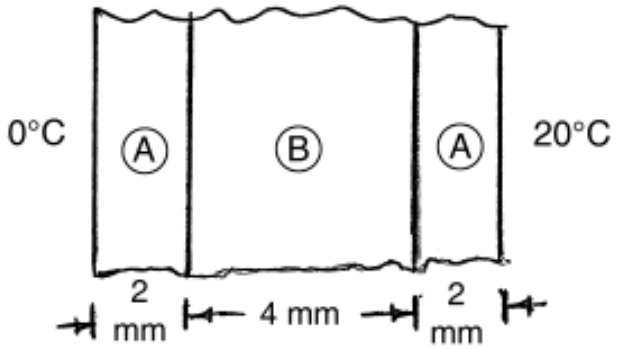
5. a) Explain refinement in finite element solution. **6**

   b) Explain Model validity and Model accuracy using approximation of geometry and material property. **5**

P.T.O.

6. Using finite element method determine the temperature distribution in the wall as shown in figure-I and calculate the heat flow through composite wall thickness; where A : steel and B : Insulation

   $K_A = 55\times10^{-3}$ W/mm°c $K_B = 0.1\times10^{-3}$ W/mm°c A = 1 mm^2. **12**



7. a) Discuss in brief dynamic analysis in finite element method. **6**

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

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

   a) Software used in FEM

   b) Transient Response Analysis.

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Seat No.	

M.E. (Mechanical) (CAD/CAM) (Semester – I) Examination, 2015
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY (Paper – IV)

Day and Date : Tuesday, 26-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) What is research ? Explain in detail the steps involved in research with flow chart. **9**
   b) Explain sponsoring agent's requirements for a research proposal. **8**
2. a) What is literature review in research ? Explain its importance and methods. **8**
   b) Explain research problem formulation with suitable example. **9**
3. Write short notes on **(any three)** : **(3×6=18)**
   1) Field study to research.
   2) Selection of samples.
   3) Creativity.
   4) Process of simulation.

SECTION – II

4. a) Explain concept of robust design with suitable example. **9**
   b) What is modelling ? Explain principles of modelling. **8**
5. a) What is Two factor factorial design ? Explain with suitable examples. **9**
   b) Explain writing research paper for publication. **8**
6. Write short note on **(any three)** : **(3×6=18)**
   1) Formats of report writing.
   2) Parametric and non-parametric tests.
   3) Use of computational tools and soft wares.
   4) Concept of design of experiments.

SLR-PD – 9

Seat No.	

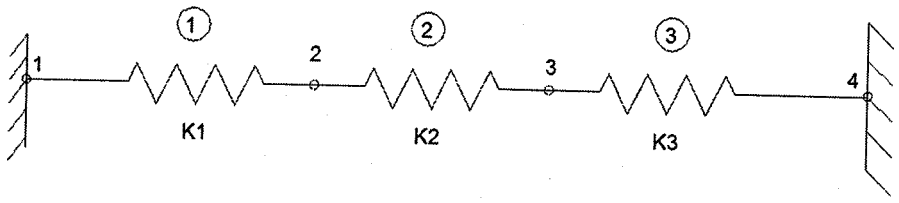
M.E. (Civil-Structures) (Semester – II) Examination, 2015
Paper – VII : FINITE ELEMENT METHOD

Day and Date : Saturday, 30-5-2015 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 a spring assemble shown in figure 1. K1 = 980 N/mm, K2 = 1080 N/mm and K3 = 2940 N/mm, A point load of 800 N (rightward) is acting at node 3, obtain :
   i) Assemble the stiffness matrix
   ii) Displacement of node 2 and 3
   iii) The reaction forces at node 1 and 4
   iv) The forces in each spring



18

Figure 1

2. a) Write a note on variational principle. **7**
   b) Develop a shape function for three noded prismatic bar having nodes $1\left(-\frac{3l}{2},0\right)$, $2\left(-\frac{-l}{2},0\right)3\left(\frac{1}{2},0\right)$, Find the element K_{11}, K_{22} and K_{33} of element stiffness matrix. **10**

P.T.O.

3. a) Derive stiffness matrix for a 2-noded bar element with its diameter varying form 300 mm at one end to 100 mm at other end. Consider the length of bar as 2 m, E = 210 GPa. **9**

   b) Explain the terms : **8**

      i) Local co-ordinates

      ii) Global co-ordinates

      iii) Natural co-ordinates

      iv) Area co-ordinates.

SECTION – II

4. The four noded rectangular element has base 400 mm and height 300 mm, find numerically element K_{11} and K_{22} of the stiffness matrix at sampling point $\left(-\frac{1}{\sqrt{3}}, \frac{1}{\sqrt{3}}\right)$ of 2 × @ 2 rule, take thickness of element 200 mm, E = 200 GPa, v = 0.25. **18**

5. a) Discuss about discrete krichoff triangle element for plate bending problem. **6**

   b) What are the convergence criteria of the displacement function ? **6**

   c) Explain patch test for plate bending element. **5**

6. a) Discuss any one shell element used in FEM. **6**

   b) What do you mean by lumped mass and consistent mass matrices ?How do you obtain the same ? Discuss their merits and demerits. **6**

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

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SLR-PD – 90

Seat No.	

M.E. (Mech. – CAD/CAM) (Semester – I) Examination, 2015
Elective – I : ADVANCED MATERIALS AND PROCESSING (Paper – V)

Day and Date : Wednesday, 27-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions *: 1) Attend* ***any three*** *questions from* ***each*** *Section.*
2) Draw ***neat*** *sketches* ***wherever*** *necessary.*

SECTION – I

1. A) What is Heat Treatment ? Explain the objectives of Normalizing heat treatment. **6**

   B) Give classification of materials and compare ferrous and non ferrous alloys. **5**

2. Answer the following questions (**any three**) : **12**

   a) What are the applications of Thermosets and thermoplasts ?

   b) Write a note on Semi conductors and super conductors.

   c) Compare between smart materials and shape memory alloys.

   d) What are the advantages of composite over other materials ? Enlist few applications.

   e) Write a note on Polymers.

3. A) What are the important techniques used for manufacturing of fibers and foams ? **6**

   B) Explain the different types of composite materials with their use. **5**

4. A) Explain any one case study in detail with respect to selection of material in automobile application. **6**

   B) Explain in detail properties of Nano materials and bio materials. **6**

P.T.O.

SECTION – II

5. A) What are the merits and demerits of nontraditional manufacturing techniques over conventional processes ? **6**

   B) Discuss any one case study with respect to micro machining of automobile components. **6**

6. Write short notes on **any three** : **12**

   a) Types of Prototypes

   b) Electochemical machining

   c) Physical vapour deposition technique

   d) Stereolithography

   e) Advanced Rolling mills.

7. A) What is the principle of Non conventional machining ? Explain advantages and disadvantages and applications of Ultrasonic Machining. **6**

   B) What are the advantages, limitations and applications of EDM process ? **5**

8. A) Explain the principle of operation of magnetic abrasive machining operation. **6**

   B) What is significance of MRR ? Explain the principle of Theory of Material removal rate. **5**

SLR-PD – 91

Seat No.	

M.E. (Mechanical CAD-CAM) (Semester – II) Examination, 2015
MANUFACTURING SYSTEM DESIGN (Paper – VI)

Day and Date : Thursday, 28-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N.B. *: 1) Question **4** and question **8** are **compulsory**.*
*2) Answer **two** questions from **each** Section.*
*3) Figure to **right** indicate **full** marks.*
*4) Assume suitable data **if required**.*

SECTION – I

1. a) Discuss the types of systems in manufacturing environment with suitable examples. **5**

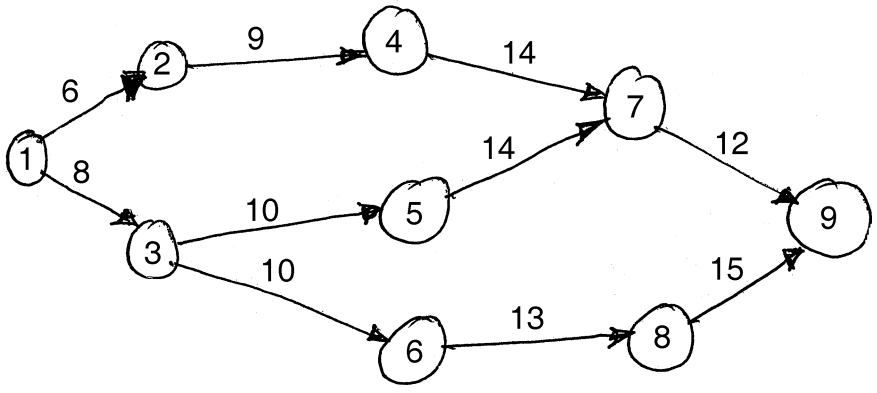
   b) Explain the rational decision making process and the types of decision. **5**

2. a) Explain the concept of product life cycle and the system for planning a new product. **5**

   b) Explain the importance of design cost. Discuss concurrent engineering and value analysis. **5**

3. a) Derive the expression for unit production time, production rate, unit production cost, unit profit and profit rate in single stage manufacturing. **5**

   b) The figure shows the alternative process routes for a part. Using shortest path method (network technique) find the critical path. **5**



P.T.O.

4. Write short note on **any three** : **15**
   a) Project scheduling – PERT and CPM
   b) General procedure of MRP
   c) Industrial cost estimation practices
   d) Product diversification.

SECTION – II

5. a) Explain the various data structures in database system. Discuss how the relational database can be useful for monitoring the production status on the shop floor. **5**
   b) Discuss shop floor data collection. **5**

6. a) What is MRP ? Explain general procedure of MRP. **5**
   b) Write types of simulation model and what is mean by simulation validity. **5**

7. a) Discuss the phases in general framework of manufacturing system design and explain evaluation and decision in process of manufacturing system design. **5**
   b) Explain following principles of agile manufacturing : **5**
      i) Leverage the impact of people and information
      ii) Enrich the customer.

8. Write notes on **any three** : **15**
   a) Flexible manufacturing system
   b) Just in time technique
   c) On line and off line data collection method
   d) Reorganising the manufacturing system for agility.

SLR-PD – 92

Seat No.	

M.E. Mech. (CAD/CAM) (Semester – II) Examination, 2015
PRODUCT LIFE CYCLE MANAGEMENT (Paper – VII)

Day and Date : Saturday, 30-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Question No. **1** from Section – **I** is **compulsory**. Solve **any two** questions out of remaining **three** questions from Section – **I**.*
*2) Solve **any three** questions from Section – **II**.*
*3) Make **suitable** assumptions, **if necessary**.*
*4) Figures to the **right** indicate **full** marks.*

SECTION – I

1. Assume any suitable product assembly of your choice with minimum three components and discuss in detail the following product development phases :
   i) Product concept
   ii) Product Engineering
   iii) Product Manufacturing
   iv) Time and Cost Estimations.

   Make suitable assumptions like product demand, process time and cost, etc. for your working. **13**

2. a) Discuss in details the elements of PLM. **6**
   b) With the help of block diagram, compare PLM with ERP. **5**

3. a) Elaborate in brief the importance of PLM in dynamic business conditions. **6**
   b) Brief about Product Structure. Explain with the help of neat block diagram the product structure of a rotating wheel chair. **5**

4. a) Discuss how modular design helps to enhance production rate. **6**
   b) Interpret the term “product and process systemisation”. **5**

P.T.O.

SECTION – II

5. a) Define product Modeling. Discuss various types of product models. **6**

   b) Elaborate how model standardisation increases the customer satisfaction. **5**

6. a) Discuss the various reasons for implementing a PDM system. **6**

   b) Explain the concept and benefits of PDM. **5**

7. With the help of neat diagram explain the application of Technique of QFD for a suitable product having at least seven customer voices and six technical requirements. **13**

8. a) Discuss the concept of knowledge based product and process model. **6**

   b) Elaborate upon the "Advanced Database Design for Integrated Manufacturing. **5**

SLR-PD – 93

Seat No.	

M.E. (Mech.) (CAD/CAM) (Semester – II) Examination, 2015
Paper – VIII : INDUSTRIAL AUTOMATION AND ROBOTICS

Day and Date : Monday, 1-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

Instructions : *1) Answer **any three** questions from **each** Sections.*
*2) Answers to **both** the Sections are to be written in a **single** answer book.*
*3) Figures to the **right** indicate **full** marks.*
*4) Assuming missing data **if any**, suitable and state if **clearly**.*
*5) Draw **neat** sketches / figures **wherever** necessary.*

SECTION – I

1. a) Discuss the basic elements of an automated system. Also briefly explain the levels of automation. **6**

   b) What are the reasons for automation ? Explain fixed, flexible and programmable automation. **6**

2. a) Explain in-line, segmented in-line, rotary configurations of automated production lines in details. **6**

   b) With the help of neat block diagrams explain the in-line, segmented and rotary, configuration of automated production lines and their application. **6**

3. a) With the help of schematic sketches, explain the various robot configurations and the types of joints used in each of them. **6**

   b) Derive the expression for ideal and realistics cycle times and uptime efficiency for a single station assembly machine. **5**

P.T.O.

4. Write a short notes : **11**

   a) Configuration of automated assembly lines.

   b) Application of industrial robots.

   c) Product design for assembly.

SECTION – II

5. a) Explain consideration in grippes selection and design. **6**

   b) With the help of neat sketches explain the micro-switches **6**

      i) Limit switches

      ii) Read switches

      iii) Pressure switches with Normally Open (NO) and Normally Closed (NC) configuration.

6. a) What is robotic compliance ? Explain active and passive compliance with the help of neat sketches. **6**

   b) Explain the types of motion and path control for robots. **6**

7. a) Explain various drives used in robots. **6**

   b) Explain motion interpolation and its type in robots. **5**

8. Write short notes : **11**

   1) Process tool as end effecter of robots.

   2) Slip sensor and force sensors for robots.

   3) Robot programming method.

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SLR-PD – 94

Seat No.	

M.E. (Mechanical Engineering-CAD/CAM) (Semester – II) Examination, 2015

Paper – IX : OPTIMIZATION TECHNIQUES

Day and Date : Wednesday, 3-6-2015 Total Marks : 70

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

Instructions : *1) **All** questions are **compulsory**.*
*2) Figures to **right** indicate **full** marks.*
*3) Draw neat sketches **wherever** necessary.*
*4) Make suitable assumptions if required and state them **clearly**.*

SECTION – I

1. Solve **any three**. **15**

   i) Write standard form of optimization problem and give five applications.

   ii) Write details of necessary and sufficient conditions.

   iii) Explain Hessian Matrix.

   iv) Find the maxima and minima, if any, of the function $f(x) = 4x^3 - 18x^2 + 27x - 7$.

2. Solve **any two**. **10**

   i) Explain Dichotomous Search Method.

   ii) Explain Quasi-Newton Method.

   iii) Find the minimum of $f = x(x - 1.5)$ in the interval (0.0, 1.00) to within 10% of the exact value using exhaustive search method.

3. Solve **any two**. **10**

   i) Explain Pattern Search Method.

   ii) Explain Davidon-Fletcher-Powell Method.

   iii) Explain Steepest Descent Method.

P.T.O.

SECTION – II

4. a) Write detailed note on Interior and Exterior Penalty Function Methods. **10**

   b) Write Five Focusing Steps. **5**

5. Solve **any one**. **10**

   i) Write Detailed Note on Genetic Algorithm

   ii) Write Detailed Note on Simulated Annealing.

6. Solve **any two**. **10**

   i) Explain theory of constraints.

   ii) Explain nine principles of optimized production technology.

   iii) Explain Artificial Neural Network for optimization.

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Seat No.	

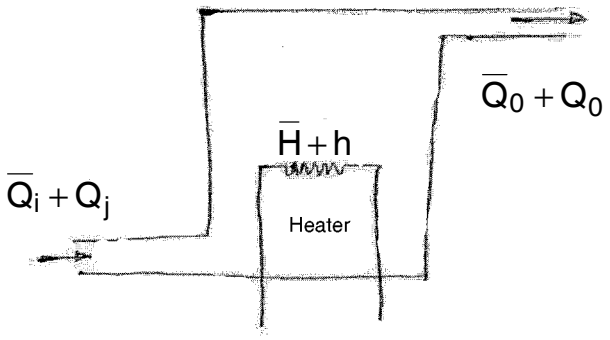
M.E. (Mech.) (CAD/CAM) (Semester – II) Examination, 2015
AUTOMATIC CONTROL ENGG. (Paper – X) (Elective – II)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N. B. : *i) Answer **any five** full questions.*
*ii) Figures to the **right** indicate **full** marks.*
*iii) Make suitable assumptions, if required and state them **clearly**.*
*iv) Use of Non-programmable calculator is **allowed**.*

1. a) Explain the advantages and disadvantages of pneumatic system. **4**

   b) Considering small deviation from steady state operation, draw a block diagram of the air heating system show in fig. Assume that heat loss to the surrounding and heat capacitance of the metal ports of the heats are negligible. **10**



2. a) Describe PI, PD, PID control action in details. **8**

   b) Explain the effect of feedback on control system. **6**

P.T.O.

3. a) Explain hydraulic servo motor and draw the block diagram for the same. **7**

   b) Explain disturbance in the forward path. **7**

4. Write short notes : **14**

   a) Optimal control system

   b) Thermal system

   c) Electro-hydraulic valves.

5. a) What are the advantages of root locus and bode plots ? State practical application for both system. **6**

   b) Draw the root-locus for $G(s) \times H(s) = \frac{K(s+1)}{6(s+2)(s+6)}$. Also comment on system stability. **8**

6. a) Write short note on angle condition and magnitude condition of root locus. **6**

   b) For bode plot, define the following terms : **8**

      a) Gain margin

      b) Phase margin

      c) Gain cross over frequency

      d) Phase cross over frequency.

7. a) Explain characteristics of lag compensator. **7**

   b) Explain any four theorem of z-transforms. **7**

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Seat No.	

M.E. (Mechanical) (CAD-CAM) (Semester – II) Examination, 2015
Elective – II : CAD/CAM/CAE PRACTICES IN METAL FORMING
(Paper – X)

Day and Date : Friday, 5-6-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

N. B. *: 1) Write **any three** question from **each** Sections.*
*2) Question No. **4** and Question No. **8** are **compulsory**.*
*3) Assume suitable data **if required**.*

SECTION – I

1. A) Explain metal forming in FEM. **5**
   B) With block diagram explain process modelling. **5**

2. A) Explain spinning operation. **5**
   B) Explain objectives of forging analysis of metal forming process. **5**

3. A) Explain Hill's general method of analysis in metal forming. **5**
   B) Explain Yield criteria for metal forming. **5**

4. Write short note on (solve **any three**) : **(5×3=15)**
   A) Basic steps of FEM
   B) Rotary tube piercing
   C) Equilibrium and virtual work-rate principle
   D) Defects in sheet metal forming
   E) Hot extrusion of rod and sheet.

SECTION – II

5. A) Explain boundary conditions in FEM analysis in metal forming. **5**
   B) Explain closed die forging with flash. **5**

6. A) Explain sheet rolling and plate bending. **5**
   B) Ring compression and FEM. **5**

P.T.O.

7. A) Explain bar extrusion in FEM analysis. **5**

   B) Explain free form design procedure in axially symmetric forging. **5**

8. Write short note on (solve **any three**) : **(5×3=15)**

   A) Forging and cavvagging process

   B) Components of good gating system

   C) Direct extrusion

   D) Strip rolling

   E) Rolling process defects.

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Seat No.	

M.E. (Mechanical Engg.) (Semester – I) Examination, 2015
COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING
(Paper – I)

Day and Date : Friday, 22-5-2015 Max. Marks : 70
Time : 11.00 a.m to 2.00 p.m.

N.B. : *1) Attempt **any two** questions from **each** Section.*
*2) Figures to the **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) For the given values of x and y find the value of sin (4.6) using cubic spline interpolation. **9**

x	**:**	4	5	6
y = sin(x)	**:**	0.069	0.087	0.10

b) The temp 'θ' of a vessel of cooling water and time 't' in minutes since the beginning of observation are connected by the law of the form $\theta = ae^{bt} + C$. The corresponding values of θ and t are given by

t	**:**	0	1	2	3	5	7	10	15	20
θ	**:**	52.2	48.8	46	43.5	39.7	36.5	33	28.7	26

Find the best values of a, b, c. **9**

2. a) In a spring mass system, three blocks are supported by three springs. When they are released, the blocks gets displaced downwards. Find out the displacement of each block by Gauss-Seidel iterative method. The governing eq^{ns} are

$3k_1x_1 - 2k_2x_2 = w_1$
$-2k_1x_1 + 3k_2x_2 - k_3x_3 = w_2$
$-k_2x_2 + k_3x_3 = w_3$
where k_1, k_2, k_3 = stiffness of springs in N/mm
x_1, x_2, x_3 = displacement in mm
w_1, w_2, w_3 = weight of block in N
Consider w_1 = 20 N, w_2 = 30N and w_3 = 25N
$k_1 = k_2 = k_3$ = 10N/mm. **9**

P.T.O.

b) Gas is expanded according to law $PV^{1.3} = C$ from pressure of 10 N/m^2. Assuming initial volume of gas is 1m^3 and final volume 7 m^3. Calculate work done suing Simpson's $\frac{1}{3}$ rule. Divide volume in 6 equal strips. The work done is given as $\int_{V_0}^{V_n} PdV$. **8**

3. a) The table below gives the results of an observation. 'θ' is the observed temperature in degrees centigrade of a vessel of cooling water, 't' is time in minutes from the beginning of observation :

"t" :	1	3	5	7	9
"θ" :	85.3	74.5	67	60.5	54.3

Find the approximate rate of cooling at t = 3 and t = 3.5. **9**

b) Find eigen values and eigen vectors of $A = \begin{bmatrix} 2 & 0 & 1 \\ 0 & 2 & 0 \\ 1 & 0 & 2 \end{bmatrix}$ by using Jacobi method. **8**

SECTION – II

4. a) The temp. of slab at one end is 1000°C. The ambient temp. is 45°C heat flow from one end to other end of the slab is 20.4 kW for area of 1m^2. The thermal conductivity of slab is given by K = 0.8 [1 + 0.025T] where T = temp. at other end. If thickness of slab is 40 mm, find the temp. at other end ? Use Euler's method. Take h = 0.01 mm. The heat flow through slab is given as $q = -KA\frac{dT}{dx}$ where q = heat flow, k = thermal conductivity, A = area. **9**

b) The deflection of beam is governed by the equation $\frac{d^4y}{dx^4} + 81y = \phi(x)$ where $\phi(x)$ is given by table

x :	$\frac{1}{3}$	$\frac{2}{3}$	1
$\phi(x)$:	81	162	243

and boundary condition $y(0) = y'(0) = y''(1) = 0$. Also, $y'''(1) = 0$. Evaluate the deflection at the pivoted points of the beam using three sub-intervals. **9**

5. a) The population growth based on assumption that the rate of change of population 'P' is proportional to the existing population at time 't' is given by $\frac{dp}{dt} = KP$ where

k = growth rate per year. From a certain date at time t = 6 years a population of village is 8000 for the next 3 years population is

Time (years) :	7	8	9
Papulation (average) :	8410.16	8841.36	9294.67

If k = 0.05/year, calculate the population at t = 10 years using Adams Bashforth method with step size of 1 year. **9**

b) Explain steps used in FEM and applications of FEM. **8**

6. a) Write short note on mathematical modeling. **6**

b) Using Crank-Nicholson's parabolic equation, solve $u_{xx} = 16u_t$, $0 < x < 1$, $t > 0$ given that u(x, 0), = 0, u (0, t) = 0, u (1, t) = 100t. Compute u for one step in 't' direction taking h = $\frac{1}{4}$. **6**

c) Explain Rayleigh-Ritz method. **5**

SLR-PD – 98

Seat No.	

M.E. (Mechanical Engineering) (Semester – I) Examination, 2015
Paper – II : INDUSTRIAL INSTRUMENTATION

Day and Date : Saturday, 23-5-2015 Max. Marks : 70
Time : 11.00 a.m. to 2.00 p.m.

***Instructions** : 1) Attempt **any three** questions from Section – I and Section – II.*
*2) Figures to the **right** indicate **full** marks.*
*3) Draw neat sketches **wherever** necessary.*

SECTION – I

1. Define the following :
   i) Accuracy
   ii) Precision
   iii) Hysteresis
   iv) Time lag
   v) Dead zone
   vi) Repeatability. **12**

2. a) What are the advantages of microprocessor based instrumentation system. **6**
   b) Explain with neat sketch bonded and unbounded strain gauges. **6**

3. a) Explain with neat sketch Mc Leod gauge. **6**
   b) Explain with neat sketch Ultrasonic Flow Meter. **5**

4. a) Explain with neat sketch Belt-Transmission Dynamometer. **6**
   b) Explain with neat sketch Galvanometric Recorders. **5**

P.T.O.

SECTION – II

5. a) Explain advantages an disadvantages of Thermocouple Sensors. **6**

   b) Draw a neat sketch of typical values of sound power levels of common sounds with reference to sound pressure of 0.002 micro bar. **6**

6. a) Explain Time Compression Analyser with neat sketch. **6**

   b) Explain seismic instrument with neat sketch. **5**

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

   b) Explain emission spectrometer with neat sketch. **5**

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

   a) Electromagnetic Microphone

   b) Data display and storage

   c) Loudness.

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SLR-PD – 99

Seat No.	

M.E. (Mechanical Engineering) (Semester – I) Examination, 2015
SOLID MECHANICS (Paper – III)

Day and Date : Monday, 25-5-2015 Max. Marks : 70

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

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

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

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

SECTION – I

1. a) Explain the plane stress and plane strain with suitable practical examples. **4**

   b) Derive the equation of compatibility for plane stress problem in Cartesian co-ordinates. **7**

2. a) Prove that, the Airy's stress function ϕ' satisfies the equilibrium equations as well the compatibility equations for plane stress problems. **6**

   b) Derive the equation of equilibrium for plane stress problem in polar co-ordinates. **6**

3. a) Derive the stresses in solid rotating disk of uniform thickness. **6**

   b) A hollow circular disk of uniform thickness has inner and outer radii of 50 mm and 200 mm respectively. It is rotated at an angular speed of 30 radians per second. Determine the maximum circumferential and radial stresses. Also sketch the stress variation along the radius. Assume Poisson's ratio = 0.3 and density of material as 7800 Kg/m^3. **5**

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

   i) Torsion of rolled profiles

   ii) Shell of uniform strength

   iii) Bending of curved bar.

P.T.O.

SECTION – II

5. a) Write a note on hydrodynamic analogy. **4**

   b) Derive the expression for torsion and angle of twist for elliptical cross section of prismatic bar. **8**

6. a) Define the shear centre and explain its practical importance. **3**

   b) Locate the shear centre for the 'C' channel having uniform thickness of 5 mm.

   Width of flanges = 50 mm

   Total height = 100. **8**

7. a) Derive the equation for cylindrical rollers for area of contact and pressure distribution over the contact surfaces. **6**

   b) Find the membrane stresses for cylindrical pressure vessel partially filled with liquid and having conical ends. **5**

8. a) Explain the membrane analogy used in solving torsion problems. **6**

   b) Derive the expression for the stresses in thick cylinder. **6**

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