Seat No.

M.E. (Civil-Structures) (Semester – I) Examination, 2014
THEORY OF ELASTICITY AND PLASTICITY (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Define and describe skeletal members. Show forces acting on skeletal members with a neat sketch. **7**

   b) Derive differential equations of force equilibrium for 3-D problems in Rectangular Coordinate system. **11**

2. a) Investigate what problem is solved by, $\phi = Px^2 + Q\,xy + Ry^2$ defined on $x \geq 0, -d \leq y \leq 0$. **12**

   b) Explain where Polar and Cylindrical coordinate systems are used. Write equations of equilibrium in polar coordinate system. **6**

3. a) Write six strain compatibility equations for a 3-D problem of elasticity. **6**

   b) Obtain differential equations of equilibrium in cylindrical coordinate system. **11**

SECTION – II

4. a) i) Write a note on idealized material behaviour in plasticity. **7**

   ii) Derive condition for neck formation in a member, subjected to unidirectional tension, made up of ductile material. **7**

   b) Distinguish between upper bound and lower bound approach. **4**

P.T.O.

5. i) Define and explain – partial collapse, complete collapse and over complete collapse. **6**

   ii) The frame is supported and loaded with ultimate loads as shown in fig. Find the plastic moment. The members of the frame are of constant Mp. **11**
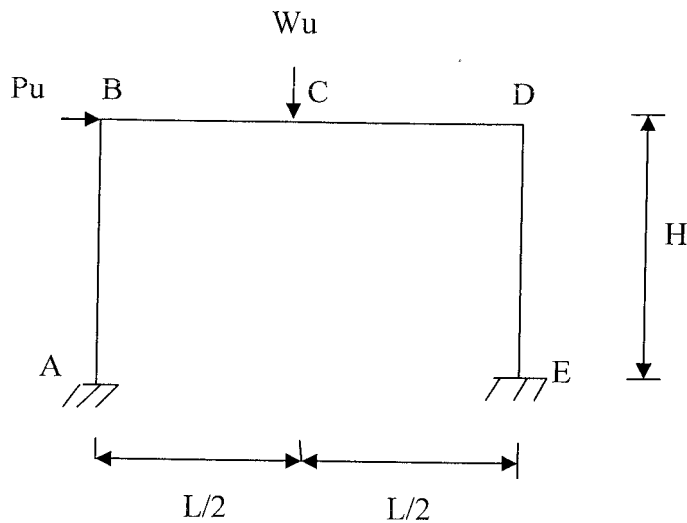
6. a) Give comparison between elastic design and plastic design. **6**

   b) Write note on : **11**

   i) Drucker's postulate

   ii) Membrane analogy

   iii) Shape factor.

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Seat No.	

M.E. (Civil-Structure) (Semester – II) Examination, 2014
Paper – VIII : EARTHQUAKE ENGINEERING

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 2.00 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) What are seismic waves propagates after earthquake ?   **10**

   b) Landslide is cause as well as effect of an earthquake. Justify the statement in detail.   **7**

2. What are the characteristics of response spectrum ? Explain the construction of combined response spectrum.   **17**

3. From first principle derive the governing differential equation for two storied building subjected to ground acceleration ÿg. Idealize and prepare the conceptual model and explain the modal analysis method to solve differential equation.   **18**

SECTION – II

4. a) Write note on nonlinear properties of materials that are useful for earthquake resistant design.   **10**

   b) What are planning aspects for vertical layout of building to make the building earthquake resistant ?   **7**

5. A five storey building 4 m × 4 m in plan is supported by four columns at the corners. Each storey is 3.35 m heigh. Slab of each floor is 120 mm thick and the beams are 230 mm × 530 mm in size. All the columns are 300 mm × 300 mm and walls are of 230 mm thick brick masonry. However, the lumped dead weight of each floor is 12 kN/m^2. The building is to construct in Solapur city. Assuming live load category 2 kN/m^2 over the slab, evaluate the lateral forces and storey shear in both direction of building.   **18**

6. a) Explain the concept of structural health monitoring. What are the systems available for structural health monitoring ?   **12**

   b) What is response reduction factor ?   **5**

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1. a) Explain the types of fading experienced by a transmitted signal as a function of transmitted symbol period. **5**

   b) For a Wideband Low Noise Amplifier, explain how the RF signal is prevented from being injected into the current bias chains. **5**

   c) For a switched capacitor, prove that the equivalent resistance is dependent on the switching frequency. **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) For a narrowband core amplifier, prove that the quality factor of a resonant circuit can be interpreted as voltage gain of matching network. **7**

   b) Derive an expression for the output of the unbalanced mixer. What is the drawback of the unbalanced mixer ? **7**

4. a) With a neat circuit diagram, explain the operation of a Gilbert Mixer. What are the advantages of a Gilbert Mixer ? **7**

   b) Derive an expression for the noise power of a first order Sigma Delta Modulator in terms of oversampling rate. **7**

5. a) Define the term Noise Figure. Derive an expression for overall Noise Figure of k cascaded stages. **7**

   b) Derive an expression for dynamic range of a second order ADC. What is the effect on the dynamic range if the oversampling rate is increased ? **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**
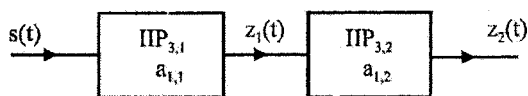
   b) For a Gilbert Mixer derive an expression for third order intermodulation distortion. **7**

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Seat No.

M.E. (Mechanical) (CAD/CAM) (Semester – I) Examination, 2014
ADVANCED MACHINE DESIGN (Paper – I)

Day and Date : Monday, 29-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. A cantilever bar (dia = 31.63 mm) is subjected to tensile force of 10 kN and torque of 5000 N-cm. Find the principal stresses and maximum shearing stresses at any point on the surface.   **13**

2. The displacement field for body is given by

   $u_x = p(x^2 + 2z)$, $u_y = p(4x + 2y^2 + z)$, $u_z = 4pz^2$; where p is constant for small deformation. Determine strain at (2, 2, 3) in the direction

   $n_x = 0$, $n_y = n_z = \dfrac{1}{\sqrt{2}}$ and $n_x = 0.6$, $n_y = 0$, $n_z = 0.8$.   **11**

3. a) Write a note on generalized statement of Hook's law and write the mathematical expression for the same.   **6**

   b) Explain the state of stress at a point.   **5**

4. a) Explain the relationship between various elastic constants in the terms of rectangular stress-strain components.   **6**

   b) Compute the Lame's coefficients for the material with modulus of elasticity 'E' Kpa and poisons ratio equal to 0.3.   **5**

P.T.O.

SECTION – II

5. Using maximum shear stress theory, determine the diameter of bar subjected to tensile load of 35 kN and torsional moment T = 1.8 kN–m. Use 207×10^6 Kpa, $\sigma_{yp} = 207 \times 10^3$ Kpa and FOS = 1.5. **13**

6. a) Explain the concept of endurance limit for ferrous and nonferrous material with S-N diagram. **6**

   b) Explain the significance of factor of safety in the design. **5**

7. What are the different theories of failure ? Explain the statements of all theories of failure in detail. **11**

8. Write a note on :

   a) Thin walled and thick walled cylinder. **4**

   b) Low cycle fatigue and high cycle fatigue. **4**

   c) Finite life and infinite life. **3**

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Seat No.

M.E. (Mechanical) (CAD/CAM) (Semester – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY
(Paper – IV)

Day and Date : Monday, 5-1-2015
Max. Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What is research ? Explain in detail the steps involved in research with flow chart. **9**

   b) What are different types of research ? Explain any two with suitable examples. **8**

2. a) What is literature review in research ? Explain its importance and methods. **9**

   b) What is research design ? Explain research design process. **8**

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

   1) Error in research

   2) Selection of samples

   3) Creative problem solving method

   4) Types of data.

P.T.O.

SECTION – II

4. a) Explain concept of design of experiments with suitable example. **8**

   b) Explain Taguchi method in detail. **9**

5. a) What is analysis of variance ? Give its types with suitable examples. **9**

   b) Give the significance of report writing and explain the layout of research report. **8**

6. Write short note on (**any three**) : **(3×6=18)**

   1) Writing research paper for publication

   2) Parametric and non-parametric tests

   3) Two factor factorial design

   4) Concept of robust design.

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Seat
No.

M.E. (Mech. – CAD/CAM) (Semester – I) Examination, 2014
Paper – V : ADVANCED MATERIALS AND PROCESSING (Elective – I)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction : Attempt **any three** questions from **each** Section.

SECTION – I

1. A) What are the important ferrous alloys ? Briefly describe their structure and
      applications.   **6**

   B) What are the important heat treatment processes used to modify structure
      and properties of non-ferrous alloys ?   **5**

2. Differentiate clearly between **any three** :   **13**

   a) Smart materials and shape memory alloys

   b) Semi conductors and super conductors

   c) Paramagnetic and ferromagnetic materials

   d) Thermoplastic and thermosetting polymers

   e) Metal matrix and polymer matrix composites.

3. A) What are composites ? How are they significant ? What are the important
      types and their areas of application ?   **6**

   B) What are the important manufacturing techniques used to fabricate polymer
      matrix polymers – explain in brief?   **5**

4. A) Explain in detail the tensile strength properties of ceramics, concrete and
      polymers.   **6**

   B) Explain in detail the materials selection with reference to airframes. **5**

P.T.O.

SECTION – II

5. A) What are the cost and service requirements for materials selection ? **6**

   B) What is the relationship between materials selection and processing ? **5**

6. Write short notes on **any three** : **13**

   a) Transducers used in USB machine.

   b) Effect of amplitude of vibration, frequency of vibration and grain size.

   c) Function of slurry, horn and oscillator.

   d) Types of abrasives used in USM.

7. A) Define Rapid Prototyping (RP). List out the advantages and disadvantages of Rapid Prototyping. **6**

   B) Explain the working of Selective Laser Sintering (SLS) with a neat sketch. **5**

8. A) Explain the principle of operation of metal removal in electro discharge machining operation. **6**

   B) What are the advantages and applications of EDM process ? **5**

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Seat No.	

M.E. Mechanical (CAD/CAM) (Semester – II) Examination, 2014
Paper – VII : PRODUCT LIFE CYCLE MANAGEMENT

Day and Date : Thursday, 1-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) *Question No.* **1** *from Section –* **I** *is* **compulsory** *solve*
              any two *questions out of* **remaining**.
       2) *Solve* **any three** *questions from Section –* **II**.
       3) **Make** *suitable assumptions* **where** *necessary.*

SECTION – I

1. Consider a suitable product assembly having at least six parts and discuss in details the following product development phases.   **13**
   a) Product concept
   b) Product engineering
   c) Product manufacturing
   d) Time and cost estimations.

2. A) Enumerate on the process model and evolution model.   **6**

   B) Discuss the comparative analysis of PLM information model with the any conventional information model.   **5**

3. A) Explain the concept of PDM and its benefits.   **5**

   B) Define digital manufacturing and what are its benefits.   **6**

4. A) Explain the concept of FMECA along with its application take suitable example. **6**

   B) Explain control factors, noise factors and performance metrics considered for Robust design procedure.   **5**

SECTION – II

5. A) Discuss in brief the method of deploying Design For Manufacturing (DFM).   **6**

   B) Enumerate on the advanced data base design for the integrated manufacturing. **6**

6. A) Enumerate the Taguchi method for design experiments. **6**

   B) With the help of block diagram explain the quality functions deployment. **6**

7. A) Discuss in brief the concept and benefits of product data management. **6**

   B) What is product architecture ? Explain with suitable example. **5**

8. A) Explain in brief the concept of product model. What are different types of models used for product design and development ? **6**

   B) Elaborate on the procedure of estimation of product manufacturing cost. **5**

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Seat No.	

M.E. (Civil-Structures) (Semester – II) Examination, 2014
ADVANCED DESIGN OF STEEL STRUCTURES (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

N.B. : i) Answer **any two** questions from **each** Section.
ii) **Use** of IS 800, IS 801, IS 811, **Steel table** and **calculator** are **allowed**.
iii) **Assume** suitable data, if necessary.
iv) **Draw** neat sketches **wherever** necessary.

SECTION – I

1. The effective span of a deck type Pratt girder railway bridge is 47 m. The cross girders are spaced 4.7 m apart. The wt of stock rails are 0.6 kN/m and wt of check rail are 0.5 kN/m. Sleeper of size 2.5 m × 0.25 m × 0.25 m are spaced at 0.45 m c/c. Weight of PSC sleepers is 25 kN/m³. The main girders are provided at 7 m apart. Determine the design forces in top, bottom, vertical and diagonal members of control panel. Design top and diagonal members of control panel. Also design the joint where top chord, vertical and diagonal members meet. The bridge is to carry a equivalent U.D.L. line load of 4180 kN for B.M. and 4484 kN for S.F. **17**

2. Determine the shears and moments in columns and beams of a building frame with moment resisting joints as shown in fig. 1 by factor method : **18**
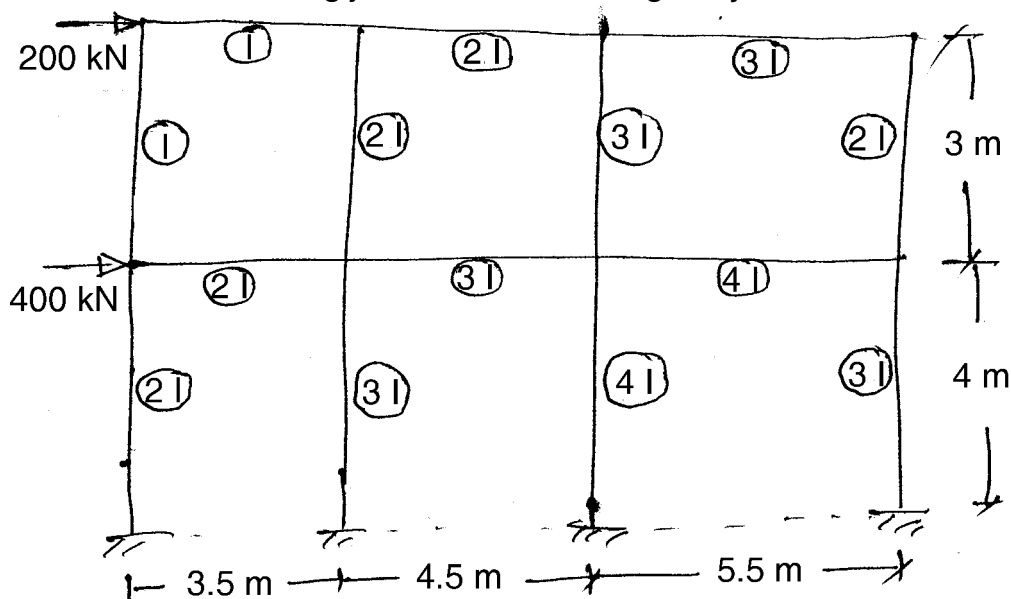

Figure 1

3. a) Two channel section without bent lip 200 mm × 50 mm are connected with webs to act as beam. The thickness of channel is 2.5 mm. The effective span of simply supported beam is 3.65 m. Determine the maximum u.d.l. inclusive of self weight which can be supported by the beam. The beam is laterally supported throughout its length. **9**

   b) A light gauge steel rectangular box section 200 mm × 100 mm × 2mm is used as column. The effective length of column is 3.5 m. Determine the safe local carrying capacity of the section. Take basic design stress as 125 N/mm^2. **8**

SECTION – II

4. a) Define shape factor and determine the shape factor for rectangular and triangular section. **8**

   b) A continuous beams ABCD is loaded with 50 kN/m over AB, 60 kN/m over BC and 70 kN/m over CD portions. The span AB = 4 m, BC = 5 m and CD = 6 m. Determine the collapse load in case the beam is of uniform section. **9**

5. a) Explain with neat sketches the different collapse mechanisms. **8**

   b) Determine the value of fully plastic moment of the frame, when loaded upto collapse. The portal frame has verticals AB = 2.5 m and CD = 5 m and horizontal portion BC = 6 m. The end A in fixed and D is also fixed. A horizontal load of 25 kN towards B is acting at B and a vertical load of 50 kN acting downwards at 2 m from B on BC portion. The plastic moment of the frame is uniform throughout. Draw B.M.D. **10**

6. a) Design a cased column to carry a load of 1200 kN. The effective length of column is 3.65 m. **8**

   b) Design a composite foot bridge having clear width of 3 m and effective span of 15 m. The bridge is to be designed for a live load of 3 kN/m². Assume kerb 400 mm × 300 mm and two steel girders at 2.5 m c/c are provided. **9**

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Seat No.

M.E. (Mechanical – CAD/CAM) (Semester – II) Examination, 2014
OPTIMIZATION TECHNIQUES (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Solve **any two** :   **11**
   a) Necessary and sufficient conditions
   b) Hessian Matrix and Saddle Point
   c) Lagrange multipliers method.

2. Solve **any two** :   **(6×2=12)**
   a) Exhaustive Search Method
   b) Interval-halving method
   c) Secant Method.

3. Solve **any two** :   **(6×2=12)**
   a) Pattern Search Method
   b) Conjugate Direction Method
   c) Davidon-Fletcher-Powell Method.

SECTION – II

4. Write note on Interior and Exterior Penalty Function Methods.   **11**

5. Solve **any two** :   **(6×2=12)**
   a) Operations in Genetic Algorithm
   b) Simulated Annealing
   c) Neural Networks.

6. Solve **any two** :   **(6×2=12)**
   a) Introduction to TOC
   b) Nine Principles of OPT
   c) Five Focusing Steps.

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Seat No.

M.E. Mechanical (CAD/CAM) (Semester – II) Examination, 2014
Paper – X : AUTOMATIC CONTROL ENGINEERING (Elective – II)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. : 1) Answer **any five full** questions.
2) Figures to the **right** indicate **full** marks.
3) **Make** suitable assumptions, **if required** and state them **clearly**.
4) **Use** of non-programmable calculator is **allowed**.

1. a) With suitable examples explain modern feedback control systems.   **4**

   b) Fig. 1 shows a tension regulating system used in paper industry. The torque control arm of the motor provides change in torque of $t_m = K_m.e/(1+\tau D)$. For wind up roll $F_c = T_m/R$. Determine the overall block diagram relating a variation f_r of the reference or desired tension to the variation of the controlled tension f_c.   **10**
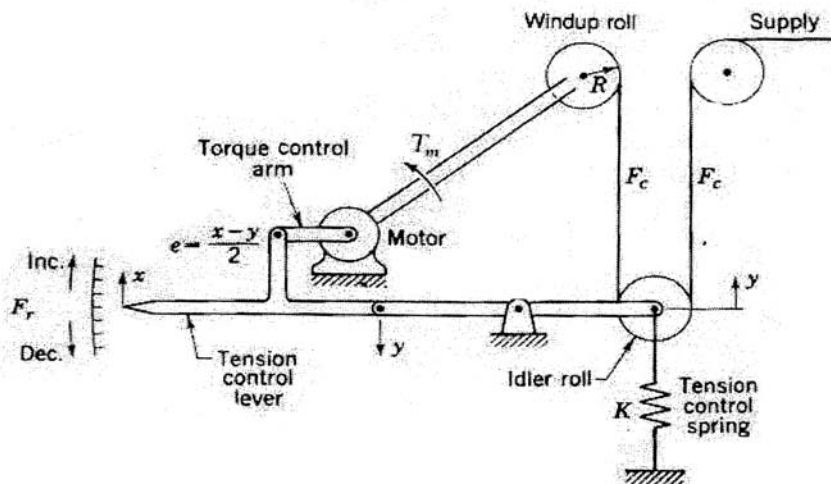
Fig. 1

2. a) With suitable example, describe proportional plus integral control action.   **6**

   b) Develop a mathematical model of a simple compressible fluid system.   **8**

3. a) Develop overall block diagram and transfer function for a hydraulic servomotor. **8**

   b) Discuss steady state errors, for ramp input, in a unity feedback control system. **6**

4. Write short notes on **(any three)** :   **14**
   a) Electropneumatic valves
   b) Adaptive control system
   c) Synchros
   d) PID controller.

5. a) Explain angle condition and magnitude condition of root locus.   **5**

   b) Sketch the root locus of a unity feedback control system with,

   $G(s) = \dfrac{k}{s(s+1)\,(s+3)}$ and determine the value of k for marginal stability.   **9**

6. a) Explain Bode plot for simple poles and zeros.   **5**

   b) A unity feedback control system has $G(s) = \dfrac{80}{s\,(s+2)\,(s+20)}$. Draw Bode

   plot. Determine GM, PM, w_{gc} and w_{pc}. Comment on stability.   **9**

7. a) Explain the concept of relative stability.   **5**

   b) Explain phase lag compensator and derive expression for the transfer function
   of a phase lag compensator.   **9**

8. a) For a system, $y(t) = \dfrac{1}{(D+2)\,(D+3)}\, f(t)$.

   Determine the computer diagram and state space representation by direct
   programming.   **9**

   b) Explain design of optimal control systems.   **5**

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SLR-BC – 113

M.E. (Mechanical Engg.) (Semester – I) Examination, 2014
Paper – I : COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. A) Obtain using Jacobi's method, all the eigen values and eigen vectors of the matrix. **7**

$$A = \begin{bmatrix} 1 & 1 & 0.5 \\ 1 & 1 & 0.25 \\ 0.5 & 0.25 & 2 \end{bmatrix}$$

B) A solid of revolution is formed by rotating about the x-axis, the area between the x-axis, the lines x = 0 and x = 1 and a curve through the points with the following co-ordinates : **10**

x :	0	0.25	0.50	0.75	1.0
y :	1	0.9896	0.9589	0.9089	0.8415

Estimate vol^m of solid formed using Simpson's $1/3^{rd}$ rule vol^m of solid generated is given as $\int \pi y^2 \, dx$.

2. A) A curve passes through the points (0, 18), (1, 10), (3, –18) and (6, 90). Find the slope of curve at x = 2. **8**

B) A slider in a machine moves along a fixed straight rod. Its distance is x cm along the rod is given below for various values of the time 't' seconds. Find the velocity of the slider and its account when t = 0.3 seconds. **10**

t :	0	0.1	0.2	0.3	0.4	0.5	0.6
x :	30.13	31.62	32.87	33.64	33.95	33.81	33.24

P.T.O.

3. A) Derive normal equations for evaluating the parameters 'a' and 'b' to fit the data to straight line $y = a + bx$ in curve fitting. **7**

   B) Obtain the cubic spline for the following data : **10**

x :	0	1	2	3
y :	2	−6	−8	2

SECTION – II

4. A) Using Runge Kutta method of order 4, find y for x = 0.1, 0.2, 0.3 given that

   $\dfrac{dy}{dx} = xy + y^2$, $y(0) = 1$. Continue the solution at x = 0.4 using Milne's method. **12**

   B) Explain importance of mathematical modeling of physical system in numerical computation. **5**

5. A) Consider the following boundary value problem : **10**

   $\dfrac{d^2u}{dx^2} + 4 = 1$ $0 \le x \le 1$ with $u(0) = 0$ and $\dfrac{du}{dx} = 0$ at x = 1. Solve this equation
   using Rayleigh-Ritz method.

   B) Determine values of y at pivotal points of the interval (0, 1) if y satisfies the boundary value problem $y^{iv} + 81y = 81x^2$, $y(0) = y(1) = y''(0) = y''(1) = 0$ (Take n = 3). Use finite difference method. **8**

6. A) Consider a boundary value problem described by following one-dimensional differential equation. **10**

   $\dfrac{d^2u}{dx^2} - u = 0$ $(0 \le x \le 1)$

   Boundary conditions : $u(0) = 0$, $u(1) = 1$. The trial f^n ϕ_i is chosen as weighting f^n w_i as $w_1(x) = \phi_1(x) = x\,(x - 1)$. Use Galerkin method.

   B) Solve $u_t = u_{xx}$ subject to $u(0, t) = 0$, $u(1, t) = 0$ and $u(x, 0) = \sin \pi x$, $0 < x < 1$. Take step size h = 0.2 and k = 0.02 and a = 1. **7**

Seat No.

M.E. (Mechanical Engineering) (Semester – I) Examination, 2014
INDUSTRIAL INSTRUMENTATION (Paper – II)

Day and Date : Wednesday, 31-12-2014　　　　　　　　　　Max. Marks : 70
Time :　10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt **any three** questions from Section – **I** and Section – **II**.
　　　　　　　　2) Figures to the **right** indicates **full** marks.
　　　　　　　　3) Draw **neat** sketches **wherever** necessary.

SECTION – I

1. Define the following :

   i) Accuracy

   ii) Precision

   iii) Hysteresis

   iv) Time lag

   v) Dead zone

   vi) Linearity.　　　　　　　　　　　　　　　　　　　　　　　**12**

2. a) Explain function of signal conditioning element.　　　　　　　**6**

   b) Explain with neat sketch Mechano-electronic transducer.　　　**6**

3. a) Explain with neat sketch Dual-slope integrating type A-D converter.　**6**

   b) Explain with neat sketch Elastic force measuring Devices.　　　**5**

4. a) Explain with neat sketch Prony-Brake dynamometer.　　　　　**5**

   b) Explain with neat sketch Electromagnetic Flow Meter.　　　　**6**

P.T.O.

SLR-BC – 114

SECTION – II

5. a) Explain Law of Intermediate temperature and Law of Intermediate metals. **6**

   b) Explain with neat sketch sound level meter. **6**

6. a) Explain Fourier Transform Analyser with neat sketch. **5**

   b) Explain selective radiation pyrometer with neat sketch. **6**

7. a) Explain with neat sketch Atomic absorption spectrometer. **5**

   b) Explain the terms sound pressure level, sound power level and sound intensity level. **6**

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

   a) Electret Microphone

   b) System analysis by Transient Testing.

   c) Vibration and Noise monitoring.

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Seat No.

M.E. (Mechanical) (Sem. – I) Examination, 2014
SOLID MECHANICS (Paper – III)

Day and Date : Friday, 2-1-2015

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

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

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

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

SECTION – I

1. a) Explain body forces and surface forces. **4**

   b) Derive the equation of compatibility in terms Cartesian coordinates for a plane stress problem. **8**

2. Investigate what problem of plane stress is solved by the stress function $\phi = \dfrac{a}{6} xy^3 + bxy$ applied to the region included by $y = \pm c$, and $0 \leq x \leq l$. where a and b are constants. **11**

3. Derive the stresses in rotating disc of uniform thickness having a hole at centre. **11**

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

   i) Stresses in rotating disc

   ii) Saint Venant's principle

   iii) Soap film analogy.

P.T.O.

SECTION – II

5. a) Explain in brief its importance of shear centre. **4**

   b) Determine the shear centre of the hat-type thin walled section shown in Fig. 1. The thickness t is constant throughout the section. **8**
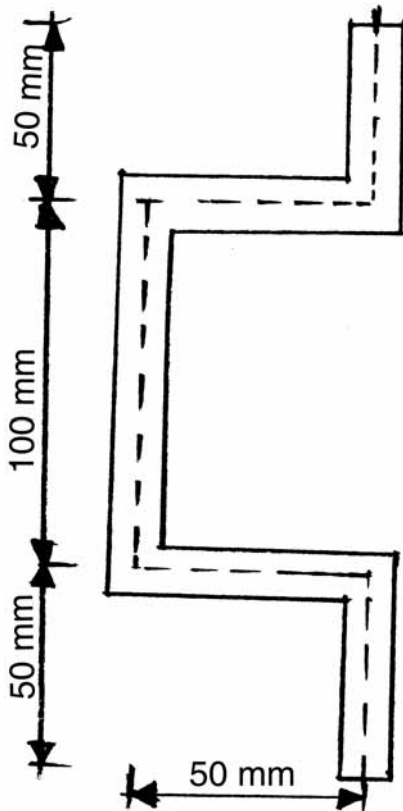

Fig. 1

6. a) Explain membrane stresses with suitable examples. **4**

   b) Derive equation of torsion and angle of twist for elliptical cross section. **7**

7. a) State and explain basic assumptions made in theory of contact stresses. **3**

   b) Derive expression for area of contact and pressure distribution over the contact surface of two spherical rollers subjected to compressive load. **8**

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

   i) Shell of uniform strength

   ii) Membrane analogy

   iii) Torsion of hollow shaft.

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Seat
No.

M.E. (Mechanical Engineering) (Semester – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH
METHODOLOGY (Paper – IV)

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 research problem formulation in detail.   **6**

   b) Differentiate between research methods and research methodology.   **5**

2. a) Discuss various problems encountered by researchers in India.   **6**

   b) Explain literature survey in detail.   **6**

3. a) Explain types of problem solving processes.   **5**

   b) What is a mathematical model ? How such models are classified ?   **6**

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

   a) Use of graphs in mathematical modeling

   b) Cause effect relations

   c) Research proposal

   d) Error in research

   e) Design of feedback form.

P.T.O.

SECTION – II

5. a) What are the various sources of data collection ? Explain any one in detail.   **6**

   b) What is the significance of design of experiments ?   **5**

6. a) Explain the concepts of synopsis of any research work.   **6**

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

7. a) Explain Taguchi approach to parameter design.   **6**

   b) Define report. Comment on various elements of report.   **5**

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

   a) Use of computational tools and softwares for research work

   b) Parametric and nonparametric data

   c) Readability of report

   d) Processing the results of experiments

   e) Testing a hypothesis.

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Seat
No.

M.E. (Mechanical Engineering) (Semester – I) Examination, 2014
Elective – I : FINITE ELEMENT METHOD (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. :   1) Solve **any three** questions from Section – **I** and Section – **II**.
            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 element shape and distortion.   **6**

   b) Explain size and number of elements.   **6**

2. a) Explain node and element numbering.   **6**

   b) Explain applications of FEM in detail.   **5**

3. a) Explain Isoparametric quadrilateral elements.   **6**

   b) Explain HRZ lumping scheme.   **5**

4. Consider a uniform cross-section bar as shown in Fig. – IV of length L made up
   of a material having Younge's modulus E and density ρ. Estimate the natural
   frequencies of axial vibration using both consistent and lumped mass matrices
   considering   **12**
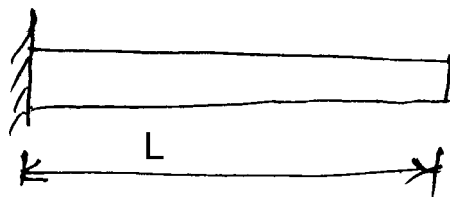
   i) one element for the entire rod.

   ii) two element model for the rod.

Fig. IV

SECTION – II

5. An axial load $p = 300 \times 10^3$ N is applied at 20°C to the rod as shown in Fig. V. The temperature is then raised to 60°C. Assemble the K and F matrices. Determine the nodal displacements and element stresses.
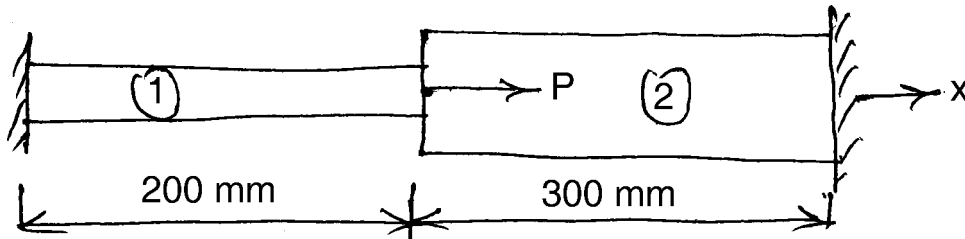

Fig. V

$E_1 = 70 \times 10^9$ N/m² $\quad E_2 = 200 \times 10^9$ N/m²

$A_1 = 900$ mm² $\qquad A_2 = 1200$ mm²

$\alpha_1 = 23 \times 10^{-6}$/°C $\quad \alpha_2 = 11.7 \times 10^{-6}$/°C $\hfill$ **12**

6. a) Explain plain stress, plain strain and axis-symmetric elements. **6**

   b) Explain iterative methods used in static and dynamic analysis. **6**

7. a) Explain shock-spectrum analysis. **6**

   b) Explain element distortion. **5**

8. a) Role of different softwares used in FEM. **6**

   b) Explain model validity and accuracy. **5**

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SLR-BC – 119

Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2014
DESIGN ENGINEERING (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) State the types of cam.   **4**

   b) Plot the SVAJ diagram for 3-4-5 polynomial cam.   **7**
   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.

2. a) What is thermal stress ? Derive the expression for thermal stress in flat plate.   **5**

   b) Explain in detail the contiguity constraint in case of rigid bolted joint subjected to thermal 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) Plastic bending.
   iv) Polydyne cam.

P.T.O.

SECTION – II

5. a) Derive the expressions for defection of beams on elastic foundation. **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 MTTF and MTBF used in reliability analysis. **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) $Z(t)$. **7**

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

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.

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Seat No.	

M.E. (Civil – Structures) (Sem. – II) Examination, 2014
Elective – II : DESIGN OF RCC BRIDGES (Paper – X)

Day and Date : Thursday, 8-1-2015 　　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Note :　1) **All** questions are **compulsory**.
　　　　　2) Figures to the **right** indicate **full** marks.
　　　　　3) Assume **suitable** data **if required** and mention **it clearly**.

1. Answer **any three** of the following : 　　　　　　　　　　　　　　**(3×3=9)**
   A) Explain IRC class A wheeled loading with neat sketch.
   B) Write a note on Courbon's theory discuss its limitations also.
   C) What is braking force ? How it is estimated ?
   D) Discuss the importance of bridges with case study.
   E) Write a note on Piegande's theory.

2. Design a slab panel having size of 3.5 m × 5 m. Consider IRC class AA tracked loading. Use Piegande's chart consider thickness of slab as 220 mm and wearing coat thickness as 100 mm. Use M-30 concrete and Fe-415 steel for

   $\dfrac{u}{b} = 1, \dfrac{v}{L} = 1 \; m_1 = 0.046, \; m_2 = 0.022.$
   For IRC class AA loading on slab panel take $m_1 = 0.0125, \; m_2 = 0.005.$ 　　**13**

3. Design central longitudinal girder of a 'T' beam bridge as shown in Fig. 3.1. 　**13**

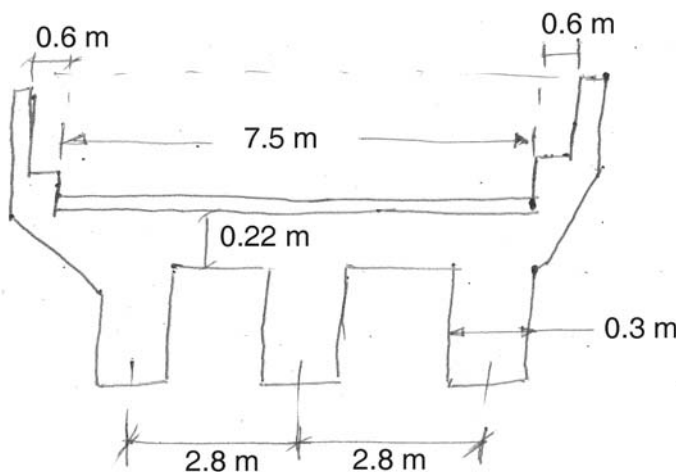Fig. 3.1

Consider following data :
1) Span of Bridge = 14 m
2) Live load = IRC class AA tracked
3) Material – M-25, Fe = 415.

4. Verify the stability of pier shown in fig. 4.1 for following data : **13**
   a) Span – 20 m
   b) DL from each span = 2250 kN
   c) Reaction due to L.L on one span = 900 kN
   d) Max. mean velocity of current = 3.6 m/sec.
   e) Use M-20 concrete
   f) IRC – class AA tracked load

Section   Plan at bottom

Fig. 4.1

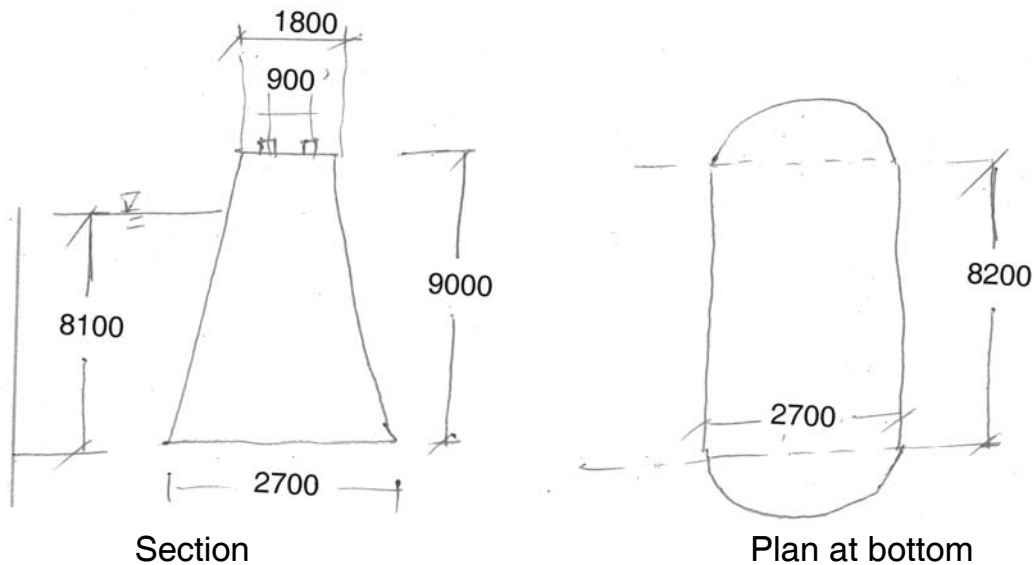5. A) Discuss the forces acting over the abutment of bridge. **4**

   B) Write in detail about construction of reinforced earth retaining wall. **5**

6. A) Design an elastomeric bearing to take vertical sustained load = 197 kN vertical dynamic load = 47 kN, Horizontal force = 57 kN. Modulus of rigidity of elastomer = 1N/mm² coeff. of friction = 0.3. **8**

   B) Write in detail about expansion joints. **5**

SLR-BC – 120

Seat No.	

M.E. (Mechanical Engineering) (Semester – II) Examination, 2014
THEORY AND ANALYSIS OF COMPOSITE MATERIALS (Paper – VII)

Day and Date : Thursday, 1-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) How the composite materials are classified ? Explain.   **7**

   b) What are the matrix and fiber factors that contribute to the mechanical performance of composites ?   **7**

2. a) Explain in detail the applications of composites.   **7**

   b) Write short notes as Metal Matrix composites and particulate conmposites.   **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 compliance and stiffness matrix for a graphite/epoxy lamina. The material properties are given as

   $E_1 = 181$ GPa, $E_2 = 10.3$ GPa, $E_3 = 10.3$ GPa

   $\nu_{12} = 0.28$, $\nu_{23} = 0.60$, $\nu_{13} = 0.27$

   $G_{12} = 7.17$ GPa, $G_{23} = 3.0$ GPa, $G_{31} = 7.00$ GPa.   **7**

P.T.O.

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 and 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**

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Seat No.

M.E. Mechanical Engg. (Semester – II) Examination, 2014
MECHATRONICS SYSTEM DESIGN (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

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

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

1. a) Describe two examples of mechatronic systems.   **7**

   b) Explain principle and working of tachogenerator used for measuring angular velocity.   **7**

2. a) Explain any one flow sensor used for measurement of liquid flow.   **7**

   b) Write a note on Instrumentation Amplifier.   **7**

3. a) Explain briefly electrical actuation systems.   **7**

   b) Draw ladder diagrams for logic functions AND, OR, NOR, XOR.   **7**

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

    i) Shift Registers in PLC

   ii) Force Sensors

   iii) Filtering.

5. a) Explain timers in PLC. **7**

   b) Draw a block diagram of a basic microcontroller and explain the function of each subsystem. **7**

6. Explain, in details, any one condition monitoring application of PLC. **14**

7. Explain, in details, how real time interfacing can be done for cantilever beam force measurement system. **14**

8. Write notes on the following : **14**

   i) Mechatronic control in automated manufacturing

   ii) Artificial Neutral Networks in Mechatronics

   iii) Micro-sensors.

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Seat No.

M.E. (Mechanical Engineering) (Semester – II) Examination, 2014
Paper – IX : INDUSTRIAL PRODUCT DESIGN

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 creativity in design and development of new products. **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 color with reference to ergonomics of consumer products. **7**

   b) Explain standard and legal requirements of a consumer product. **7**

4. a) Explain concept of purpose and style with reference to aesthetics of a product. **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 modeling technique in product design. **7**

   b) Discuss the organization structure of design organizations. **7**

7. a) Write a note on expressions of symmetry. **7**

   b) Write a note on quality considerations in product design. **7**

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Seat No.

M.E. (Mechanical Engg.) (Semester – II) Examination, 2014
MATERIAL HANDLING EQUIPMENT DESIGN (Paper – X) (Elective – II)

Day and Date :Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. : 1) Answer **any three** questions from Section – **I** and **three** questions from Section – **II.**

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

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

4) Draw neat sketches, flow charts, block diagrams etc. **wherever** necessary.

SECTION – I

1. a) Discuss scope and importance of material handling for mass production system.   **6**

   b) Discuss classification of material handling equipment.   **5**

2. Discuss types, design considerations for various types of cranes and hoists used in material handling.   **12**

3. a) Discuss design procedure of hook.   **5**

   b) Write a note on system design and economics.   **6**

4. Discuss construction, working and below mentioned parameters for :   **12**

   a) Pneumatic conveyor

   b) Screw conveyor.

   Parameters to be covered-sizes, speed, power requirement, capacity, advantages and limitations.

SECTION – II

5. Give detailed design step for belt conveyor. Assume suitable material properties, flow rate, horizontal distance and vertical height.   **12**

   i) Design of belt for strength

   ii) Design of drive rollers

   iii) Number of idler rollers.

6. a) Discuss stability and structural analysis of elevators.   **6**

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

7. a) Discuss relationship between material handling and plant layout.   **6**

   b) Discuss controls of travel mechanisms.   **5**

8. Write note on (**6** marks **each**) :   **12**

   a) Material handling and productivity.

   b) Systematic layout planning.

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SLR-BC – 126

Seat No.	

M.E. (Mechanical Manufacturing Process) (Semester – I) Examination, 2014
ADVANCED MANUFACTURING TECHNIQUES – I (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain with neat sketch AFM.   **5**
   b) Explain with neat sketch MAF.   **5**

2. a) Explain in detail friction welding.   **5**
   b) Explain any one NDT.   **5**

3. Write short note on :   **(5×3=15)**

   i) WJM

   ii) Atomic emission spectrometer

   iii) Chemical machining.

SECTION – II

4. a) Explain with neat sketch SLS.   **5**
   b) Explain precision fine blanking process.   **5**

5. a) Explain PVD.   **5**
   b) Explain prevention of corrosion and erosion wear.   **5**

6. Write short note on :   **(5×3=15)**

   i) LOM   ii) FDM   iii) CVD.

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Seat No.

M.E. (Mech. Manufacturing Process Engg.) (Sem. – I) Examination, 2014
Paper – II : ELECTRO PHYSICAL PROCESSES

Day and Date : Wednesday, 31-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 are the limitations in non-traditional machining processes ? Explain with appropriate examples.   **7**

   b) Classify modern machining processes and enlist the physical parameters for the same.   **7**

2. a) Describe the chemistry involved in the ECM process.   **5**

   b) Develop a theoretical MRR model in AJM as suggested by Sheldon and Finnie for ductile material.   **9**

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

4. a) Enlist various applications, advantages and limitations of AJM.   **7**

   b) What are the functions and characteristics of an electrolyte used in ECM process ?   **7**

5. Explain EDM process with neat sketch and discuss the effect of :
   i) Charging resistance
   ii) Gap setting
   iii) Capacitance on MRR
   Employing R-C realization circuit.   **14**

P.T.O.

6. a) Give applications, advantages and limitations of LBM processes. **7**

   b) Explain lasing process and photon cascade in LASER. **7**

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

   a) Microwelding by laser application

   b) Effect of voltage on the MRR in EDM process

   c) Sketch and explanation of EBM set-up

   d) ECDM.

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Seat
No.

M.E. Mechanical (Manufacturing Process) (Semester – I) Examination, 2014
Paper – III : COMPUTER AIDED MANUFACTURING

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

1. a) Differentiate the NC and CNC machines. **7**

   b) What is canned cycle ? Explain any two drilling canned cycles with their syntax. **7**

2. a) How GT cell is different from process layout ? Explain. **7**

   b) Explain AS/RS and AGV for a manufacturing system. **7**

3. a) Explain parts classification and coding system. **7**

   b) Explain FMS flexibilities. Explain FMS types. **7**

4. a) Explain briefly Concurrent Engineering Approach. **7**

   b) Discuss Process Capability Index. **7**

5. a) Discuss importance of GT in CAPP. **7**

   b) What is composite part concept ? Explain objectives of cellular manufacturing. **7**

6. a) Discuss the differences in MRP and ERP. **7**

   b) Describe Shop Floor Control. **7**

7. a) Discuss e-manufacturing. **7**

   b) Write a note on Production Flow Analysis. **7**

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Seat No.

M.E. (Mechanical) (Mfg. Process Engg.) (Semester – I) Examination, 2014
RELIABILITY AND TEROTECHNOLOGY (Paper – IV)

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

1. a) Explain the probability of multiple events.   **8**

   b) Explain the Risk Priority Number (RPN).   **6**

2. a) Discuss briefly breakdown and preventive maintenance.   **6**

   b) The following data refer to predicted reliability of six components in series. In case the desired reliability of the system is not fall below 85%, find the reliability goal for individual components.   **8**

Components	1	2	3	4	5	6
Predicted Reliability	0.994	0.998	0.990	0.996	0.990	0.980

3. a) What is difference between hazard rate and failure rate ? Draw hazard rate curve against life, showing various regions.   **6**

   b) A system consists of three sub-systems A, B and C having failure rates 0.005, 0.003 and 0.001 respectively per hour. If the mission time is 20 hours and the system reliability required is 0.95, find the failure rate as well as reliability of each sub-system for the entire mission period.   **8**

4. a) Explain different types of reliability configurations. **6**

   b) Find out the failure rates of the components so that the system reliability becomes 0.95 using AGREE method. The data being given below. **8**

Sr. No. Components (i)	No. of Component Modules (ni)	Operating Time (ti)	Prob. of system due to failure of subsystem (wi)
1	15	10	1.00
2	25	9	0.95
3	100	10	1.00
4	70	8	0.90

5. a) Discuss different types of Probability distribution curves. **6**

   b) The network shown in the fig. 1 indicates the reliabilities of the component. Find out the reliability of the system by using Star-delta method. **8**
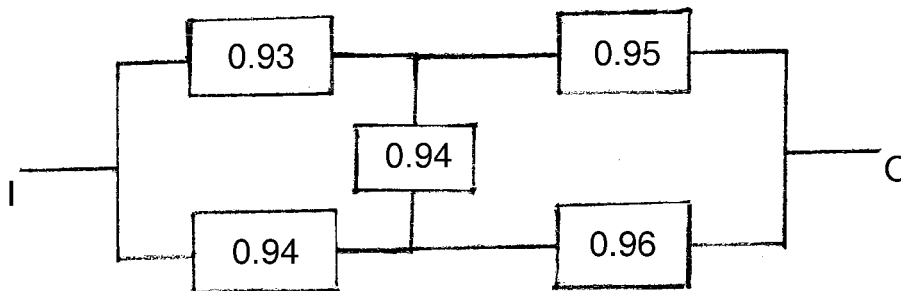

Fig. 1

6. Write short notes on the following (**any two**) : **(2×7=14)**

   a) Discuss in detail Overall Equipment Efficiency (OEE).

   b) Discuss condition based maintenance.

   c) What do you mean by Mean, Median, Mode deviation ?

Seat
No.

M.E. (Mechanical) (Manufacturing Process) (Semester – I) Examination, 2014
Elective – I : DESIGN FOR MANUFACTURING (Paper – V)

Day and Date : Wednesday, 7-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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, in details, typical steps involved in an engineering design process. **14**

2. With appropriate examples, distinguish between modular and integral product architecture. **14**

3. Explain material index and develop a suitable material index for the selection of material for a typical fly wheel used in automobile transmission. **14**

4. Give a broad classification of manufacturing processes and describe, in details, factors influencing manufacturing process selection. **14**

5. With suitable examples and appropriate sketches give at least ten design recommendations for metal casting. **14**

6. Enumerate design rules and guidelines applicable to dimensional tolerances of various machining processes. Explain design for machining. **14**

7. Explain the design guidelines for injection moulding. **14**

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Seat
No.

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2014
ADVANCED MANUFACTURING TECHNIQUES – II (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Answer **any five full** questions.
2) Assume suitable data **wherever** necessary and state it **clearly**.
3) Figures to the **right** indicate **full** marks.

1. A) Explain the steps to be followed in shell mould casting process. Also state some applications.   **7**

   B) In detail explain any four commonly observed defects in casting. Also suggest the remedies for the same.   **7**

2. A) Explain in detail the Sintering process related with powder metallurgy.   **7**

   B) Explain the finishing process "Lapping" in detail.   **7**

3. A) What do you mean by explosive forming process ? Explain.   **7**

   B) Explain in detail the Shell Mould casting process.   **7**

4. A) Explain the blow moulding technique of plastic manufacturing in detail.   **7**

   B) What are the different types of binders that are used in plastics ?   **7**

5. A) Explain in detail the method of isostatic moulding related with powder metallurgy.   **7**

   B) Describe the process of Expansion Moulding in detail.   **7**

6. Write short notes on (**any 4**) :   **14**
   1) Honning
   2) Hot pressing
   3) Blow Moulding
   4) HERF
   5) Burnishing processes

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Seat
No.

M.E. Mechanical (Manufacturing Process) (Sem. – II) Examination, 2014
Paper – VII : ROBOTICS AND ROBOT APPLICATIONS

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

Time : 10.00 a.m. to 1.00 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 various features of precision of movement.   **7**

   b) Discuss Spatial resolution.   **7**

2. a) Discuss the advantages and limitations of robot programming languages. **7**

   b) Explain the various degrees of freedom associated with the following robots :

      i) SCARA Robot

      ii) GANTRY Robot.   **7**

3. What do you mean by mechanical gripper ? Explain the two ways of constraining

   the part in gripper.   **14**

4. Explain various force control methods in robot manipulators.   **14**

5. a) Describe the important considerations in the design of Gripper.   **7**

   b) Sketch and explain the working of gear operated grippers used in industrial

      robots.   **7**

6. a) State characteristics of work which promote application of robots. Discuss robot application for assembly and inspection. **7**

   b) What is robot software and explain common software elements of a robot ? Discuss what is motion programming and how it is achieved. **7**

7. Write short notes on **any two** of the following : **14**

   a) Hydraulic drives

   b) Magnetic grippers

   c) Robot vision.

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SLR-BC – 136

Seat No.	

M.E. Mechanical (Mfg. Process Engg.) (Semester – II) Examination, 2014
Paper – VIII : MANUFACTURING PROCESS MODELLING

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) Explain the product cycle from the engineering perspective.   **10**

   b) Explain high volume production plant configuration.   **4**

2. a) Solve the Chinese problem for the graph shown below from the vertex V_1.   **7**
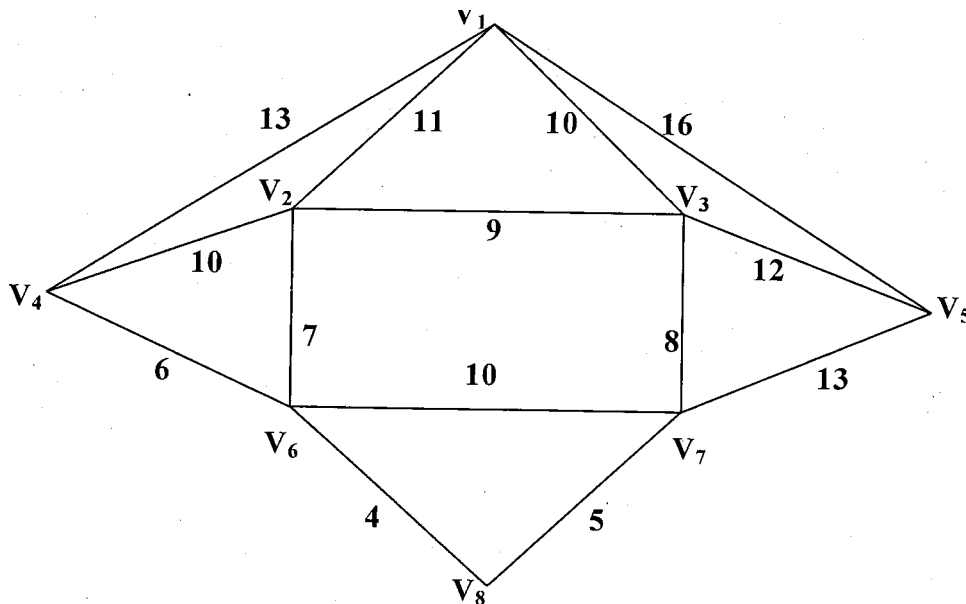
b) Use Dijkstra's algorithm on connected weighted graph shown below to find length of shortest paths from the vertex **"a"** to each of other vertices. **7**
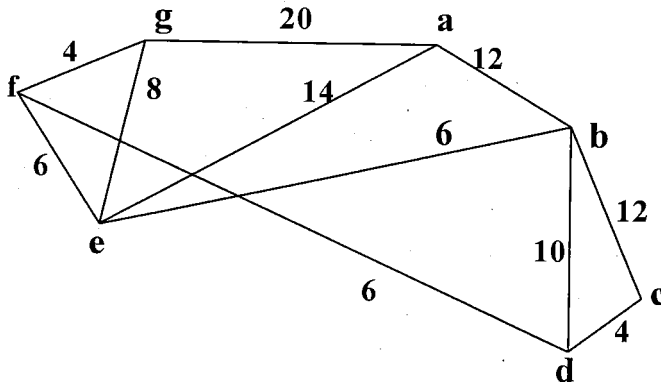
3. a) Difference between Deterministic Vs. Stochastic simulation model. **8**

   b) What are the advantages and disadvantages of simulation ? **6**

4. a) Discuss what is meant by correlation and their types. **6**

   b) From the following given data, find **8**
      i) the two regression equations and
      ii) estimate the value of X when Y = 75,
         if coefficient of correlation = 0.66

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

5. What is an artificial neural network ? Compare it with biological neural network. **14**

6. a) In the following table **S** is the weight of sodium chloride which will dissolve in 100 gm of water at **T°C**. Fit an equation of the form S = mT + b, by least square method. Use this relation to estimate S when T = 70°C. **8**

T =	0	20	40	60	80
S =	54	65	75	85	96

   b) Write a short notes on the following of **any two** : **(2×3=6)**
   i) Recurrent network
   ii) Boltzman learning
   iii) Multilayer network.

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Seat No.

M.E. (Mechanical) (Manufacturing Process Engineering) (Semester – II) Examination, 2014
MACHINE TOOL ENGINEERING (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

1. Discuss briefly the static dynamic acceptance test of machine tool and the stability charts of Tobias.   **14**

2. a) Explain the method of classifying a NC, CNC or DNC machine using kinematics of transmission system.   **7**

   b) With a neat circuit diagram show the functioning of :   **7**
      1) Electrical brake
      2) Thermal relay used in machine tool.

3. Show that maximum vertical load lifted by hydrostatic slideways of a table is given by   **14**

$$P = 3\mu Q(b^2 - a^2)/h_o^3$$

Where

Q = Consumption of oil

b = Breadth of guide

a = Size of rectangular pocket

μ = Viscosity of oil

h_o = Minimum oil film thickness.

P.T.O.

4. a) What are the specific advantages of working with hydrostatically lubricated guides in a machine tool ? **7**

   b) Explain in detail conical pressure variator. **7**

5. a) What is FMS ? Compare FMS with other manufacturing systems. **7**

   b) Find out an expression for dynamic rigidity of machine tool. State the factors affecting it. **7**

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

   1) Use of simplex search in metal cutting for optimization

   2) Tool oriented FMS

   3) Job oriented FMS.

7. a) Write a note on Punched tape of NC. **7**

   b) Discuss machine tool engineering principles. **7**

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Seat No.	

M.E. Mechanical (Manufacturing Process) (Semester – II) Examination, 2014
Paper – X : TOTAL QUALITY CONTROL (Elective – II)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) Write a note on Fishbone diagram by taking a suitable example.   **7**

   b) Define QFD and state its importance in product development process.   **7**

2. a) Write a note on Quality Spiral.   **7**

   b) Discuss in brief QS, ISO and QC.   **7**

3. a) Discuss Philosophy of TQM by Deming and Juran.   **7**

   b) Discuss Cost of Quality in detail.   **7**

4. a) Discuss in brief Seven New QC Tools.   **7**

   b) Discuss the procedure of ISO 9000 documentation in detail.   **7**

5. a) What are the types of Quality Audit ? Explain internal audit in detail.   **7**

   b) Differentiate Six-Sigma and Natural Tolerance.   **7**

6. a) Explain the formal and informal quality control loops. State how these can be
       implemented in an organization.   **7**

   b) Discuss the case study on IBM in quality control point of view.   **7**

7. a) What do you mean by customer satisfaction and dimensions of quality ?
       Explain.   **7**

   b) Discuss variability. Write a note on types of control charts.   **7**

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Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. – I) Examination, 2014
ADVANCED FLUID MECHANICS AND CFD (Paper – I)

Day and Date : Monday, 29-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What power is required per kilometer of a line to overcome the viscous resistance to the flow of glycerine through a horizontal pipe of diameter 100 mm at the rate of 10 liters/sec. ? Take μ = 8 poise and kinematic viscosity = 6 stokes. **8**

   b) Obtain Von Karman momentum integral equation for boundary layer flow. **9**

2. a) Explain the difference between wall turbulence and free turbulence shear flow. Give two examples of each. **8**

   b) For the velocity profile in laminar boundary layer as, $\dfrac{u}{U} = \dfrac{3}{2}\left(\dfrac{y}{\delta}\right) - \left(\dfrac{1}{2}\right)\left(\dfrac{y}{\delta}\right)^3$

   find the thickness of the boundary layer and the shear stress 1.5 m from the leading edge of a plate. The plate is 2 m long and 1.4 m wide and is placed in water which is moving with a velocity of 200 mm per second. Find the total drag force on the plate if μ for water = 0.01 poise. **9**

3. Write note on the following : **18**

   a) Prandtl's mixing length theory.

   b) Hydrodynamic theory of lubrication.

   c) Von Karman velocity distribution.

P.T.O.

SECTION – II

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

   b) What is Mach number ? What is the significance of Mach number in compressible fluid flow ? Based on Mach no categorise the types of fluid flow. **9**

5. a) State the physical principle of continuity equation and derive the continuity equation using model of the finite control volume fixed in space. **9**

   b) Explain the Lax-Wendroff techniques. **9**

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

   b) Explain divergence of the velocity. **6**

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

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Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. – I) Examination, 2014
Paper – II : MEASUREMENT IN THERMAL SYSTEMS

Day and Date : Wednesday, 31-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Attempt **any two** questions from **each** Section.
2) Figure 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 pressure gauge type of temperature measuring devices. **4**

   b) With neat sketch explain different laws of thermocouples. **4**

   c) Explain principles of working of radiation pyrometers. **9**

2. a) The mass flow rate is given in terms of $Ap/(T^{1/2})$. If A = 10, p = 20 and T = 484 in compatible units and the biases are respectively; 0.1%, 0.2% and 1%, find the absolute and relative biases in mass flow rate. **9**

   b) Define :
      a) Resolution
      b) Range
      c) Random error
      d) Systematic error
      e) Uncertainty
      f) Coefficient of correlation
      g) Sensitivity
      h) Accuracy. **8**

3. Write note on the following : **17**

   a) Different mounting methods of thermocouple. **5**

   b) Response of different temperature measuring devices to different types of inputs. **6**

   c) Describe optical pyrometer. **6**

SECTION – II

4. a) Draw neat sketch of Mcleodguage and explain how it is used to measure vaccum pressure in a tank. **8**

   b) A U-tube manometer uses mercury as the manometric fluid. What is the height to which mercury will rise in narrow limb if a differential pressure of 100 KN/m^2 is applied ? The wide and narrow limb diameters are 150 mm and 5 mm respectively. The density of mercury is 13.6×10^3 Kg/m^3. **9**

5. a) How dynamic pressure is measured ? Explain with neat sketch. **8**

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

6. a) Draw a neat sketch of measurement of air velocity with the help of pitot tube. **6**

   b) Explain Schlieren method of flow visualization. **5**

   c) Methods of thermal conductivity measurement. **7**

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Seat
No.

M.E. Mechanical (Thermal Engineering) (Semester – I) Examination, 2014
Paper – III : ADVANCED HEAT AND MASS TRANSFER

Day and Date : Friday, 2-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Determine the steady state temperature distribution along the length of a pin fin of constant cross sectional area A, perimeter P and length L, connected at its base to a wall at temperature T_0 and surrounded by a fluid at temperature T_∞. The surface heat transfer coefficient is h and the tip of the fin is insulated. Also obtain an expression for rate of heat flow from the surface of the fin and fin effectiveness. **9**

   b) A brick wall 60 cm thick is initially at a temperature of 20°C throughout. Suddenly the two sides are raised to 150°C and 300°C, respectively and maintained at these temperature levels. Determine the time elapsed before the centre of the wall attains a temperature of 150°C. Take $\alpha = 1.66 \times 10^{-3} \, m^2/h$. Use Schmidth plot. **8**

2. a) Compare thermal conductivity of solids, liquids and gases and its variation with temperature. **6**

   b) Explain the difference between fin effectiveness and fin efficiency. Hence discuss their usefulness in employing the fin in practice. **6**

   c) What is meant by thermal contact resistance ? Upon what parameter does this resistance depends. **6**

3. Write notes on :
   a) Write note on Schmidt's plot. **6**
   b) Reynolds analogy. **6**
   c) Colburn analogy. **5**

SECTION – II

4. a) Explain experimental method for shape factor. **6**
   b) Write note on radiation shield. **6**
   c) Explain the theory of thermal radiation by using electromagnetic spectrum. **6**

5. a) Derive an expression for overall heat transfer co-efficient for heat exchanger with fouling factor. **8**
   b) The tubes (k = 106 W/m°C) of single pass condenser are 30 mm outside diameter and 25 mm inner diameter. The condenser is required to handle 20000 kg/h of dry and saturated steam at 50°C. The inlet and outlet temperature of water are 15°C and 25°C respectively. If the average velocity of water in each tube is 2.5 m/s and steam side film heat transfer co-efficient is 5150 W/m^2°C, calculate the outside tube area. The properties of water at mean temperature are given as under :

   ρ =998.2 kg/m^3; c_p = 4.182 kJ/kg K; μ = 1004.5×10^{-6} Ns/m^2; υ = 1.006×10^{-6} m^2/s and k = 0.598 W/m^2°C.

   The latent heat (h_{fg}) at 50°C = 2374 kJ/kg.

   Nu = 0.023 Re$^{0.8}$ Pr$^{0.3}$. **9**

6. Write short note on :
   a) Drop wise condensation and promoters for the same. **4**
   b) Pool boiling and forced boiling. **4**
   c) Fick's law of diffusion. **5**
   d) Condensation number. **4**

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Seat
No.

M.E. (Mechanical) (Thermal Engineering) (Semester – I) Examination, 2014
Paper – IV : DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY

Day and Date : Monday, 5-1-2015 Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What are the objectives of research and what points are to be maintained for broad grouping ? **9**

   b) Draw research flow process chart and explain in detail. **9**

2. a) Explain broad classification of mathematical model. **8**

   b) Explain mathematics as a natural modelling language. **9**

3. a) Classify different types of models for experimental set up. **8**

   b) An automobile manufacturer has facilities for producing different types of trucks. He is considering for production of five different models during next month. Number of trucks of each type produced is restricted by capacity of various departments that is listed in table (III-b). Metal stamping department cannot handle more than equivalent of 20,000 trucks of type I. Engine assembly department cannot handle more than equivalent of 25,000 trucks of type I.

P.T.O.

Further every model has to be produced at least 10% of total production to have presence of product in the market formulate OR model for product mix.

Type	Final as assembly constraint	Stamping ratio to type I	Engine assembly ratio to type I	Profit expected in Rs. In 1000
I	7,500	1.0	1.0	35
II	10,000	1.4	1.6	45
III	5,000	2.0	3.0	50
IV	9,000	0.8	1.0	30
V	3,000	2.2	2.6	40

Table (III-b) **9**

SECTION – II

4. a) What is ANOVA and basic principles of ANOVA. **9**

   b) What do you mean by additive property of the technique of the analysis of variance ? Explain how this technique is superior in comparison to sampling. **9**

5. a) Describe techniques of interpretation. **8**

   b) How the survey based research report are prepared ? **9**

6. a) Explain steps to be considered in bibliography. **8**

   b) Explain oral presentation. **9**

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Seat No.

M.E. Mechanical (Thermal Engineering) (Semester – I) Examination, 2014
Paper – V : ADVANCED THERMODYNAMICS (Elective – I)

Day and Date : Wednesday, 7-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What is isothermal and adiabatic compressibility and prove that **9**

$$Cp - Cv = \frac{T.v.\beta^2}{k}$$

   b) Derive an equation $\left(\dfrac{\partial u}{\partial p}\right)_t = p_v.k - T.v.\beta$. **8**

2. a) What is reversible and irreversible thermodynamics process ? What condition must be satisfied for reversible process ? Give example of both type of process. **9**

   b) Explain limitations of second law of thermodynamics. **8**

3. Write notes on :

   a) Entropy and Disorder. **6**

   b) Difference between ideal gas and perfect gas. **6**

   c) P – V – T surfaces of real substances. **6**

P.T.O.

SECTION – II

4. a) Determine the increase in entropy when a number of ideal gasses are mixed which are at same temperature and pressure before mixing, the mixing process being adiabatic and constant volume. **9**

   b) Explain in detail volumetric analysis. Also explain energy changes and entropy changes of mixture. **8**

5. a) The percentage composition of certain fuel by mass is

   Carbon = 88%

   Hydrogen = 4%

   Oxygen = 2.5%

   Sulphur = 0.5%

   Remaining is incombustible,

   Find :

   i) Minimum air required for complete combustion.

   ii) Composition of product of combustion, if 15% excess air is supplied. **9**

   b) Discuss standard Gibb's function of formation and chemical equilibrium. **8**

6. Write short note on :

   a) Postulates of kinetic theory of gases. **6**

   b) Law of equilibrium of energy. **6**

   c) Transport phenomena. **6**

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Seat
No.

M.E. (Mechanical) Thermal Engineering (Semester – II) Examination, 2014
DESIGN OF THERMAL SYSTEMS (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

N.B. : 1) Question no. **1** is **compulsory** and solve **any two**

         questions from **each** Section.

     2) **Use** of nonprogrammable **calculator** is allowed.

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

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

SECTION – I

1. Crude oil is to be transported overland in Alaaska in such a way that the

    environment is not adversely affected.   **18**

    a) Describe two workable methods of transporting this oil.

    b) Of the workable methods, a pipeline is the method chosen for further

       examination. The inside diameter of the pipe is 600 mm and the pipe will carry

       a crude oil flow rate of 44kg/sec. The distance between pumping station is

       32km. To facilitate pumping a heater will be installed at each pumping station.

       The pipeline is to be buried into the permafrost whose temperature at design

       condition is -4°C. The permafrost is not to be melted. Insulation may be used

P.T.O.

on external surface whose temperature should not exceed 0°C. Use following data.

ho = 7.2 W/m2k

k for insulation = 0.036 W/mk

hi = 113 W/m2k

neglet thermal resistance of pipe wall.

The available thickness of insulation are 25, 50, 75, 100mm. (x)

$$\frac{1}{UiAi} = \frac{1}{113Ai} + \frac{x}{k\left[\dfrac{Ai + Ao}{2}\right]} + \frac{1}{7.2Ao}$$

mCp(–dt) = U π D[t – (– 4°C)]dL.

Cp = for oil = 1930J/kgK

D = 0.6

The pressure drop in the 32km section of pipe is a function of inlet and outlet temperature of the pipe. The maximum pressure of pipe that can withstand is 2350kpa. Assume pressure drop for 32km as 2200kpa. Specify the following.

Insulation =--------mm

Inlet oil temperature =

Outlet temperature =

Temperature of surface in contact with permafrost =

Review the design and list the decisions that preclude possible optimization later in the design.

2. a) Establish second degree polynomial for the thermal data shown in figure. **10**

T in°C	0	10	20	30	40	50	60	70	80	90	100
Hf in KJ/kg	-0.04	41.9	83.86	125.66	167.45	209.26	251.09	292.97	334.92	376.94	419.06

b) Discuss the method of curve fitting in establishing the correlation in experimental data. And enlist the commercial softwares available for curve fitting. **7**

3. a) The operating point of a fan duct system is to be determined. The equations for the two components are **10**

Ducts : $SP = 80 + 10.73Q^{1.8}$ Where SP = static pressuer, Pa

Fan : $Q = 15 - (73.5 \times 10^{-6}) SP^2$ Where Q = air flow rate, m^3/s

Use successive substitution to solve for operation point chosing as trial value $SP = 20$ and $Q = 10$

b) Explain different methods of simulation. **7**

SECTION – II

4. a) The dimension of rectangular duct are to be chosen so that the duct of maximum cross section area can be placed as shown in figure, in the opening in a bar joist. **10**

  i) Set up the objective function and constraint in terms of h and w

  ii) Using Lagrange's multiplier for constrained optimization determine the optimal value of h and w
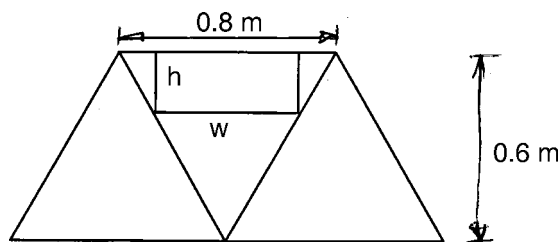
b) Explain different methods of optimization of thermal systems. **7**

5. a) Determine the minimum value of pressure drop Dp and the magnitude of mass flow rates m_x and m_y. **10**

   $Dp = 6m_x + 3m_y$

   Subject to constraints

   $5m_x + m_y \geq 10$

   $9mx + 13my \geq 14$

   $m_x + 3m_y \geq 9$

   b) Explain the method of dynamic programming. **7**

6. a) Derive the relation for the overall heat transfer coefficient of counterflow heat exchanger using NTU approach. **8**

   b) A counterflow heat exchanger a UA value of 2 kw/k receives stream one at a temperature of 60°C and stream two at a temperature of 20°C. The flow rates are 0.3 and 0.4kg/sec and Cp in KJ/kgK are 3.2 and 4.19 for stream one and two respectively. What is outlet temperature of stream two. **10**

7. a) Analyse dynamic behavior of mercury filled thermometer. **10**

   b) Explain significance of block diagram in dynamics of thermal systems. **7**

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Seat No.	

M.E. (Mechanical) (Thermal Engg.) (Semester – II) Examination, 2014
COMPUTATIONAL TECHNIQUES IN THERMAL ENGINEERING
(Paper – VII)

Day and Date : Thursday, 1-1-2015　　　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 matrix inversion method ? Explain, solve following set of equations by matrix inversion. **10**
   $X + Y + Z = 8$
   $X – Y + 2Z = 6$
   $3X + 5Y – 7Z = 14$

   b) Solve the equation $x \tan x = –1$ by Regula falsi method starting with $a = 2.5$ and $b = 3$ correct to three decimal places. **8**

2. a) Explain Iterative methods in solving linear algebraic equations. **9**

   b) Evaluate $\int_0^6 \frac{dx}{1 + x^2}$ by using trapezoidal rule. **8**

3. a) Using Runge-Kutta method to find approximate value of y for x = 0.2 in steps of 0.1, if $\frac{dy}{dx} = (x + y^2)$ given that y = 1 where x = 0. **10**

   b) Fit a parabola to the following data : **8**

x	1.0	1.5	2.0	2.5	3.0	3.5	4.0
y	1.1	1.3	1.6	2.0	2.7	3.4	4.1

P.T.O.

SECTION – II

4. a) Explain forward and central differences schemes along with tables. **9**

   b) Evaluate : **8**

   a) $\Delta \tan^{-1}(x)$

   b) $\Delta(e^x \log 2x)$

   c) $\Delta(x^2 / \cos 2x)$

   d) $\Delta^2 \cos 2x \cdot$

5. a) Explain application of finite difference techniques in 2D heat conduction problem. **9**

   b) Consider a conical fin having length 30 cm and diameter at the base 10 cm and the base is maintained at 200°C. Find by a finite difference method temperature distribution in a fin. Derive the relation used for finding the solution. **8**

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

   a) Rayleigh Ritz method

   b) Various elements defined in FEM

   c) Difference between FDM and FEM

   d) Shape function.

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Seat No.	

M.E. Mechanical (Thermal Engg.) (Semester – II) Examination, 2014
Paper – VIII : THEORY AND DESIGN OF I.C. ENGINES

Day and Date : Saturday, 3-1-2015   Total Marks : 70

Time : 10.00 a.m. to 1.00 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 Stirling engine with figure.   **9**

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

   Brake power = 3.75 KW.

   Speed = 1000 rpm.

   Indicated mean effective pressure = 0.35 Mpa

   Mechanical efficiency = 80%

   Determine the bore and length of the cylinder liner.   **9**

2. a) What are the stages of combustion of fuel in S.I. engine ? Explain them in detail by figure.   **8**

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

   Brake power = 7.5 KW

   Speed = 1400 rpm.

   Indicated mean effective pressure = 0.35 Mpa.

P.T.O.

Mechanical efficiency = 80%

Maximum gas pressure = 3.5 Mpa.

The cylinder linear and head are made of grey 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.

 ii) Thickness of the cylinder liner.

 iii) Thickness of cylinder head.

 iv) Size, number and pitch of studs. **9**

3. a) Compare knocking in SI engine and CI engine, in detail. **8**

 b) The bore of a cylinder of the four stroke diesel engine is 120 mm. The maximum gas pressure inside the cylinder is limited to 4 Mpa. The cylinder head is made of cast iron and allowable tensile stress is 40 N/mm^2. Determine thickness of cylinder. The studs which are made of steel, have allowable stress as 50 N/mm^2.

 Calculate :

 i) Number of studs

 ii) Nominal diameter of studs

 iii) Pitch of studs. **9**

SECTION – II

4. a) Explain cooling with thermostatic valve system. What are the advantage of using thermostatic valve. **9**

 b) The following data is given for the piston of four-stroke diesel engine :

 Cylinder bore = 250 mm.

 Material of rings = Gray cast iron

Allowable tensile stress = 100 N/mm^2

Allowable radial pressure on cylinder

Wall = 0.03 Mpa.

Thickness of piston head = 42 mm

Number of piston rings = 4

Calculate :

 i) Radial width of piston rings.

 ii) Axial thickness of piston rings.

 iii) Width of top land

 iv) Width of ring grooves

 v) Thickness of piston barrel

 vi) Thickness of the barrel at open end. **9**

5. a) Explain with figure "semi-pressure with splash lubrication system". **8**

   b) Determine dimensions of small and big end bearings of the connecting rod for a diesel engine with 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 any two recent advances in I.C. Engine. **8**

   b) Design an exhaust valve 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 μ /mm^2.

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

Data for solving problem

* 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 (Vp)

Type 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, 2014
Paper – IX : DESIGN OF REFRIGERATION AND AIR CONDITIONING SYSTEM

Day and Date :Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) An R-22 refrigeration system operates between –15° C and 40°C. Mass flow rate is 0.2 kg/sec. The condensate is subcooled by 5°C and vapour leaves the evaporator with degree of super heat as 10°C. Determine

   i) TOR
   ii) COP
   iii) Power required
   iv) Heat rejected in condenser

   Use following data :

T(°C)	P(bar)	h_f(KJ/Kg)	h_g(KJ/Kg)	S_f(KJ/Kg)	S_g(KJ/Kg)
-15	2.964	28.36	245.36	0.115	0.9555
40	15.267	95.40	261.38	0.3466	0.8767

   Cp(Condenser) = 0.82K/KgK, Cp(Evaporator) = 0.64 KJ/KgK.   **10**

   b) What is degree of saturation ? Derive the relationship between relative humidity (ϕ) and degree of saturation (μ) in the form.

   $$\phi = \frac{\mu}{1-(1-\mu)\dfrac{P_s}{P_b}}$$ **8**

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 various types of RAC controls. **8**

3. Write note on the following :

   a) Application of air conditioning. **6**

   b) Reciprocating compressor. **6**

   c) Evaporative condenser. **5**

SECTION – II

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

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

5. a) Give 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 temperature – Concentration diagram for binary mixture. **6**

6. a) Explain design of cooling tower. **9**

   b) Explain solar space heating and cooling system. **8**

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Seat No.	

M.E. (Mech./Thermal Engineering) (Sem. – II) Examination, 2014
Elective – II : POWER PLANT ENGINEERING (Paper – X)

Day and Date : Thursday, 8-1-2015   Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) The catchment area of hydroelectric power plant is 2260 sq.Km and the annual average rainfall is 154 cm. The head drop available at the power house site is 120 m. Assuming turbine efficiency as 85% and generator efficiency as 90%. Find the power that can be developed from the hydroelectric plant. Take percolation and evaporation losses as 20% and load factor as unity. If the speed of runner is to be maintained below 240 rpm, also suggest prime mover. **6**

b) Explain the working of underfeed and overfeed stocker with neat sketch showing different zones of combustion. **8**

c) List out and explain the function of any four boiler accessories. **4**

2. a) Explain Pressurized Water Reactor (PWR) and Simple Boiling Water Reactor (BWR) with neat sketch. Also discuss how the PWR is advantageous over BWR. **9**

b) Explain any two types of pulverizer mill with neat sketch. Also state the application of each pulverizer. **8**

3. a) Explain the different factors considered while selecting turbine for hydro-electric power plant. **6**

b) Consider a regenerative vapour power cycle with one open feed water heater. Steam enters the turbine at 8.0 MPa, 480°C and expands to 0.7 MPa, where some of the steam is extracted and diverted to the open feed water heater operating at 0.7 MPa. The remaining steam expands through the second stage turbine to the condenser pressure of 0.008 MPa. Saturated liquid exits

P.T.O.

the open feed water heater at 0.7 MPa. The isentropic efficiency of each turbine stage is 85% and each pump operates isentropically. If the net power output of the cycle is 100 MW. Determine :

  a) Thermal efficiency.

  b) Mass flow rate of steam entering the first turbine stage in Kg/hr.   **8**

 c) Explain the fast-breeder nuclear reactor concept.   **3**

SECTION – II

4. a) In a combined gas turbine-steam turbine plant the exhaust gas from open cycle gas turbine is the supply gas to the steam generator of the steam cycle at which additional fuel is burned in the gas. The pressure for the gas turbine 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 and 600°C and the condenser pressure is 0.1 bar. The total power output of the plant is 200 MW. The calorific value of fuel burnt is 43.3 MJ/Kg. Neglecting the effect of mass flow rate of fuel on the air flow, Determine –

  a) Flow rate of steam and air required.

  b) Power output of gas turbine and steam turbine.

  c) thermal efficiency of combined plant.

  d) Air-fuel 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.   **10**

 b) Write a short note on excitation system.   **4**

 c) Why it is necessary to operate hydro and steam plant in combination ? Explain in detail.   **4**

5. a) Explain how the air and water is polluted by thermal power plant and discuss how it can be controlled.   **9**

 b) Explain General Tariff form. Also explain block meter rate method.   **8**

6. a) Write short note on :

  i) Batteries

  ii) Sub-station and generating station earthing.   **6**

 b) Write short note on pollution due to Nuclear power station and its control.   **6**

 c) List out any five points where the pressures are required to be measured in power plants.   **5**

Seat No.	

M.E. (E&TC – Digital Electronics and Communication Systems) (Semester – I) Examination, 2014
COMMUNICATION NETWORKS (Paper – I)

Day and Date : Monday, 29-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What is IPV6 ? Explain it in brief.   **10**
   b) Draw and explain IGMP.   **10**
                                         OR
   b) Draw and explain domain names format.

2. Attempt **any two** :   **12**
   a) Explain ARP datagram format.
   b) Explain UDP in detail.
   c) Explain TCP state machine diagram.

3. Attempt **any one** :   **5**
   a) Explain Mobile IP.
   b) Explain primary and secondary servers defined by DNS.

SECTION – II

4. a) Explain Gigabit Ethernet architecture.   **10**
   b) Draw and explain ATM cell header format.   **10**
                                         OR
   b) Draw and explain B-ISDN structure.

5. Attempt **any two** :   **12**
   a) What are the different functions of ATM layers ?
   b) Explain RSVP message format.
   c) Explain PNNI routing in detail.

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Seat No.	

M.E. (E and TC) Digital Electronics and Communication System (Semester – I) Examination, 2014
CMOS VLSI DESIGN (Paper II)

Day and Date : Wednesday, 31-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain MOS Device Design Equations. **6**

   b) Show diagrammatically and explain the formation of Inversion layer and depletion layer in the channel with Vgs > Vtn and Vds < Vgs – Vtn. **5**

2. a) Explain Power and energy delay of CMOS Inverter. **6**

   b) Define noise margin and explain how it can be obtained from voltage transfer characteristics of CMOS Inverter. **5**

3. a) Explain Speed power dissipation of Dynamic logic Design. **6**

   b) Explain the Ratioed logic gate with neat diagram. **6**

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

   a) Design of half adder using CMOS logic

   b) Impact of Technology Scaling on Inverter

   c) Dynamic Logic : Basic Principle

   d) Static CMOS Design – Complementary CMOS.

P.T.O.

SECTION – II

5. a) Explain with neat Schematic True Single Phase Clocked Register (TSPCR) and write Transistor sizing issues in TSPCR. **6**

   b) Explain Master Slave positive edge triggered register using multiplexers. **5**

6. a) Explain various clock Distribution Techniques with examples. **6**

   b) Draw and explain synchronizers in detail. **5**

7. a) Explain arbiters with schematic symbol, Implementation and Timing Diagram. **6**

   b) Explain the Designing of DRAMS in detail. **6**

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

   a) Low voltage static latches

   b) Synchronous Timing Basics i.e. Clock skew and jitter

   c) Latch based clocking

   d) Designing Fast Multipliers.

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SLR-BC – 157

Seat
No.

M.E. (E and TC) (Digital Electronics and Communication System) (Semester – I) Examination, 2014
Paper – III : MODERN DIGITAL SIGNAL PROCESSING

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. 1) Design an FIR linear phase, digital filter approximating the ideal frequency response

$$H_d(\omega) = \begin{cases} 1 & \text{for } (\omega) \le \pi/6 \\ 0 & \text{for } \dfrac{\pi}{6} < |\omega| \le \pi \end{cases}$$

   Determine the coefficients of 25 tap filter based on window method with rectangular window. Determine and plot the magnitude and phase response of the filter. **6**

   2) Explain in detail design of linear phase FIR filters by frequency sampling method. **6**

2. 1) Draw the block diagram of forward linear prediction. Derive the equation for coefficient of linear predictor. **6**

   2) Consider the ARMA process generated by difference equation.
   x(n) = 1.6 x(n-1) – 0.63 x (n-2) + w(n) + 0.9 w(n-1). Determine the power density spectrum of {x(n)}. **6**

3. 1) For AR model parameter, explain in detail Burg method. **6**

   2) Determine the mean and auto correlation of the sequence x(n) which is the output of ARMA(1, 1) process described by the difference equation

$$x(n) = \frac{1}{2} x(n - 1) + w(n) - w(n - 1)$$

   where w(n) is white noise process with variance σ_w^2. **5**

SECTION – II

4. 1) Convert the analog filter with system function

   $$H_a(s) = \frac{s + 0.1}{(s + 0.1)^2 + 16}$$

   into digital filter by BLT. The digital filter is to have a resonant frequency

   of $w_r = \dfrac{\pi}{2}$. **6**

   2) Explain IIR filter design by using pade approximation method. **6**

5. 1) Explain in detail sampling rate conversion with timing diagram. **6**

   2) Explain the process of decimation by a factor 'D'. Draw the spectrum for each stage. **6**

6. 1) Define the wavelet transform. Give restrictions on wavelet transform. **6**

   2) Explain in detail wavelet expansion system. Give atleast one application example. **5**

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SLR-BC – 158

M.E. (E&TC) (Digital Electronics and Communication Systems) (Semester – I) Examination, 2014
PROBABILITY AND RANDOM PROCESS (Paper – IV)

Day and Date : Monday, 5-1-2015　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

SECTION – I

1. a) State the axioms that must be satisfied by the probability P(A) associated with event A defined on sample space S.　　　　　**5**

    Prove following using above axioms.

    $P(A \cup B) = P(A) + P(B) - P(A \cap B)$

   b) Two six sided (balanced) dice are thrown. Find the probability of the following events:　　　　　**5**

      i) 5 does not occur on either throw

      ii) A 5 and a 3 occur in any order

      iii) The sum is 7

      iv) Either throw is a 6

      v) The first throw is 5 and the second throw is a 5 or a 4.

2. a) Explain the concept of conditional expected value.　　　　　**4**

    Consider X as a Gaussian random variable with zero mean and unit variance. Obtain the conditional expected value of X given that X > 0.

P.T.O.

  b) Give PDF, CDF and application of following :   **4**
    i) Erlang random variable
    ii) Reyleigh random variable
    iii) Laplace random variable
    iv) Gamma random variable.

  c) Define CDF. State its properties and prove any one of these properties.   **5**

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

  c) A certain random variable has a probability density function of the form
    $f_x(x) = C \cdot e^{-2x} u(x)$. Find

    i) the constant C

    ii) $Pr(X > 2)$

    iii) $Pr(X < 3)$

    iv) $Pr(X < 3 \mid X > 2)$ **5**

3. a) Define n^{th} moment of a continuous and discrete random variable. Obtain the 1st and 2nd moment of a random variable that has a binomial distribution.   **6**

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

  a) Obtain the following for a Laplace random variable.   **6**

    i) The characteristic function

    ii) The Taylor series expansion of $\phi X(W)$

    iii) A general expression for the Kth moment of X.

  b) A random variable has a probability density function given by   **3**

$$f_x(x) = \begin{cases} 0.1 & -3 \le x \le 7 \\ 0 & \text{otherwise} \end{cases}$$

    i) Find the mean value

    ii) Find the mean square value

    iii) Find the variance.

  c) Explain in brief how to obtain expected value of function of a random variable. **3**

SECTION – II

4. a) Define Gaussian random process. Is W_{ss} Gaussian random process is also stationary in the strict sense ? Explain. **3**

   b) Consider the random process $X(t) = A \cos (w_o t) + B \sin (W_o t)$, where A and B are independent, zero mean Gaussian random variables with equal variances of 9. Obtain the mean and auto correlation functions of this process. **3**

   c) Define random process. **2**

   d) Let a discrete random process X[n] be generated by repeated tosses of a fair die. Let the values of the random process be equal to the results of each toss. **4**

      i) Find the mean $\mu x(n)$

      ii) Find the autocorrelation function $R_{xx}(K_1, K_2)$

      iii) Is the process Wss ? Is it stationary in strict sense ?

                  OR

   d) Let X(n) be a wide sense stationary, discrete random process with autocorrelation function $R_{xx}(n)$ and let C be a constant. **4**

      i) Find the autocorrelation function for discrete time process

         $Y(n) = X(n) + C.$

      ii) Are X(n) and Y(n) independent ? Uncorrelated ? Orthogonal ?

5. a) State and prove conditional PDF of random variable X given that Y = y. A certain pair of random variables has a joint PDF given by **6**

   $f_{x, y} (x, y) = \dfrac{2\,abc}{(ax + by + c)^3}$ u(x) u(y). Obtain conditional PDF's $f_{x|y} (x/y)$ and $f_{y|x} (y/x)$.

   b) Write note on Linear prediction. **5**

                  OR
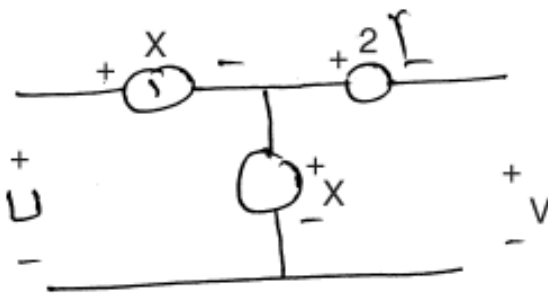
b) Two random variables X and Y have a joint probability density function given by   **5**

$$f_{xy}(x, y) = \begin{cases} A\, x^2(1-y) & 0 \le x \le 1,\ 0 \le y \le 1 \\ 0 & \text{elsewhere} \end{cases}$$

   i) Find A

   ii) Find $f_x(x)$ and $f_y(y)$

   iii) Find the correlation between two random variables

   iv) Are X and Y uncorrelated ? State with reason.

6. a) In the circuit below, X and Y may be considered to be statistically independent variables.   **5**

   Now X is a random variable with mean 1 and variance 9; Y is a random variable with mean 0 and variance 4. What is the correlation between U and V ?

b) Define joint PBF and state its properties.   **3**

c) Write note on complex random variable.   **4**

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Seat No.

M.E. (E and TC Digital Electronics and Communication System) (Semester – I) Examination, 2014
Elective – I : OPTICAL COMMUNICATION AND NETWORKS (Paper – V)

Day and Date : Wednesday, 7-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Attempt following :   **(7+6=13)**

    1) Explain different transmitters with their characteristics.

    2) If a light from monochromatic light source is allowed to fall on InP photo detector, calculate the velocity of electrons emitted because of light if work function of material is 1.2 eV.

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

    1) Explain basic optical communication system.

    2) Explain in detail the concepts of gain spectrum and bandwidth.

    3) Explain the characteristics of Raman amplifier with necessary equations.

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

    1) WDM

    2) Channel multiplexing

    3) Modulation methods in optical communication.

SECTION – II

4. Attempt following : **(7+6=13)**

   1) Prove that rise time T_r and 3-db bandwidth Δf of RC circuit are related by $T_r \cdot \Delta f = 0.35$.

   2) Explain the effect of noise on system performance.

5. Attempt **any two** : **(6×2=12)**

   1) Explain fiber dispersion measurement in detail.

   2) Explain FDDI reference model and its relation with OSI model.

   3) Explain in detail OTDR.

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

   1) SONET/SDH

   2) Broadcast network

   3) Link power budget.

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Seat No.	

M.E. (Mech. -Design Engg.) (Sem. – I) Examination, 2014
COMPUTATIONAL TECHNIQUES IN DESIGN ENGINEERING (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. A) Derive sterling formula for inter-polation. **10**

   B) The following values of x and y are given : **7**

   x : 1   2   3   4

   y : 1   2   5   11

   Find the cubic splines and evaluate y(1.5) and $y^1(3)$.

2. A) Using Doolittle method, solve the eqn. $3x + 2y + 7z = 4$, $2x + 3y + z = 5$, $3x + 4y + z = 7$. **10**

   B) Apply Bessel's formula to find the value of f(27.5) from table :

x :	25	26	27	28	29	30
f(x) :	4	3.846	3.704	3.571	3.448	3.33

   7

3. A) The pressure and volume of gas are related by the equation $PV^\gamma = K$, γ and K are constants. Fit this eqn. to the following set of observations. **10**

P :	0.5	1	1.5	2	2.5	3.0
V :	1.62	1	0.75	0.62	0.52	0.46

   B) Evaluate $\int_0^6 \dfrac{dx}{1+x^2}$ by using
      i) Trapezoidal rule
      ii) Simpson's $1/3^{rd}$ rule
      iii) Simpson's $3/8^{th}$ rule . **8**

4. A) Explain types of errors in numerical calculation along with suitable example. **6**

   B) Using Lagrange's formula, express the function $\dfrac{3x^2 + x + 1}{(x-1)(x-2)(x-3)}$ as a sum of partial fractions. **11**

SECTION – II

5. A) Given $\dfrac{\partial^2 f}{\partial x^2} = \dfrac{\partial f}{\partial t}$, f(0, t) = f(5,t) = 0, f(x, 0) = x^2(25 – x^2) kind f in the range taking h = 1 and upto 5 seconds. **10**

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

6. A) Given $y' = 1 - y$ and y(0) = 0 find

   i) y(0.1) by Euler's method

   ii) y(0.2) by modified Euler's method

   iii) y(0.3) by modified Euler's method and

   iv) y(0.4) by Milne's method. **12**

   B) Solve the equation , $y'' = x + y$ with the boundary conditions y(0) = y(1) = 0 using finite difference method. **6**

7. A) Using shooting method, solve the boundary value problem **12**

   $\dfrac{d^2 y}{dx^2} = 6y^2$, $y(0) = 1$, $y(0.5) = 0.44$

   Take $m_0 = -1.8$, $m_1 = -1.9$.

   B) Explain 5 point diagonal formula with suitable fig. **5**

8. A) Derive Adam's Bushforth predictor and corrector formula. **10**

   B) Explain Schmidt method to solve parabolic equation with suitable figure. **7**

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Seat No.

M.E. (Electronics and Telecommunication Engg. : Digital Electronics and Communication System) (Semester – II) Examination, 2014
RF AND MICROWAVE CIRCUIT DESIGN (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

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

   a) State and explain Maxwell's equation in point form and integral form.

   b) Define polarization of EM wave ? Briefly explain vertical and horizontal polarization.

   c) Define the following term and their physical significance with reference to a transmission line :
       i) Characteristic impedance
      ii) Phase velocity
     iii) Phase constant.

2. Solve **any one** question :   **(7×1=7)**

   a) A $600\,\Omega$ lossless transmission line is fed by a $50\,\Omega$ generator. If the line is 200 m long and of $500\,\Omega$, determine in dBs (i) Reflection loss (ii) Transmission loss and (iii) Return loss.

   b) Compute the ABCD matrix representation of following transmission line with characteristic impedance Zo, Propagation constant β and length 1.
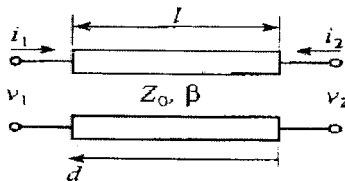
3. Attempt **any three** questions : **(6×3=18)**

    a) Define Scattering parameters and explain its meaning.

    b) Define standing wave ratio and derive the expression for SWR in terms of reflection coefficient.

    c) Explain the parameters which play a key role while analyzing filters.

    d) For a particular Si pn– junction the doping concentration are given to $N_A = 10^{18}$ cm^{-3} and $N_D = 5 \times 10^{15}$ cm^{-3} with an intrinsic concentration of $n_i = 1.5 \times 10^{10}$ cm^{-3}. Find the barrier voltages for T = 300°K.

SECTION – II

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

    a) Explain characteristics of Schottky diode with neat sketches.

    b) Explain the operation of BJT as active RF Element.

    c) Explain physical characteristic of HEMT.

5. Solve **any one** question : **(7×1=7)**

    a) Explain Analytical approach to the design of an L-Section matching network.

    b) Write and explain Amplifier power relations.

6. Attempt **any three** questions : **(6×3=18)**

    a) Write a note on frequency transformation.

    b) Explain about different topologies of single stub matching network.

    c) Explain design of high frequency microwave oscillator.

    d) Explain diffusion and ion implantation technique of MMIC fabrication.

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Seat No.

M.E. (E and TC) (Digital Electronics and Communication System (Semester – II) Examination, 2014
HIGH SPEED DIGITAL DESIGN (Paper – VII)

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

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain Geometry and electrical properties of wires.   **6**

   b) Explain signaling modes for transmission lines.   **5**

2. a) Explain the high speed properties of logic gates.   **6**

   b) Explain time frequency and distance related to high speed digital design.   **5**

3. a) Explain capacitance and inductance effect related to high speed digital design. **6**

   b) Explain the different noise sources in digital system.   **6**

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

   a) Modeling of wires

   b) Power supply network

   c) Lossless LC transmission lines in detail

   d) Inter symbol interference.

SECTION – II

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

    b) Explain base band antialiasing filters.   **5**

6. a) Explain Harmonic Sampling and band pass sampling.   **6**

    b) Explain grounding in high speed system.   **5**

7. a) Explain latency of ADC's.   **6**

    b) Explain distortion and noise in an ideal N bit ADC.   **6**

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

    a) Shielding concept related to power supply.

    b) EMI/RFI considerations related to power supply.

    c) High speed ADC AD 9066.

    d) Power supply conditioning related to power supply.

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Seat
No.

M.E. (Electronics and Telecom.) (Digital Electronics and Comm. system) (Sem. – II) Examination, 2014
ADVANCED EMBEDDED SYSTEMS (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. 1) Explain functionality of ASSP used in case as additional processing unit. For running embedded system application.   **6**

   2) Explain high speed input/output devices used for embedded systems.   **6**

2. 1) Explain interfacing of DRAM with microcontroller in detail.   **5**

   2) Explain how memory allocation can be done in case of embedded systems. **6**

3. 1) How effectively Thumb procedural call can be used in ARM ?   **6**

   2) Explain pre processing, compiling and cross compiling used in embedded system software.   **6**

SECTION – II

4. 1) Explain priority in heritance protocol used in case of scheduling.   **6**

   2) Explain the features of real time operating system.   **6**

5. 1) How does bottom-up approach of estimation differ from top down approach ? What are their strengths and weaknesses ?   **5**

   2) Explain the implementation of a state machine using function pointers. **6**

6. 1) With the help of functional block diagram explain ARM920T processor. **6**

   2) Explain serial transmission techniques and standards in ARM9 processor architecture.   **6**

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Seat No.	

M.E. (E&TC) (Semester – II) Examination, 2014
DIGITAL ELECTRONICS AND COMM. SYSTEM
Wireless and Mobile Networks (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Answer **any two :**   **14**

   a) What is diversity ? Explain different diversity techniques.

   b) Given the following geometry, determine :

     i) The loss due to knife-edge diffraction

     ii) The height of the obstacle required to induce 6 dB diffraction loss. Assume $f = 900$ MHz.
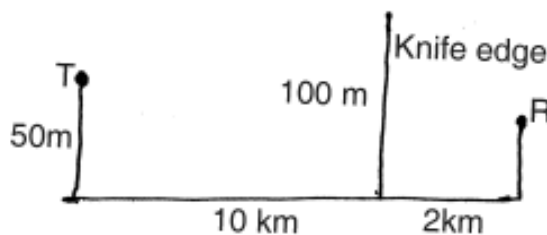
   c) What is the fundamental of channel coding ? What is the distance and weight of a code ? Explain properties of block code.

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

   a) Explain different parameters of mobile multipath channels.

   b) With block diagram explain RAKE receiver.

   c) Briefly explain different examples of block codes.

3. a) Compare parameters of base station of cordless and cellular phone.   **5**

   b) Write a note on 'Rayleigh fading' channel.   **4**

SECTION – II

4. Answer **any two** :   **14**

   a) Explain system and protocol architecture of 802.11.

   b) Describe mobile transport layer   protocol indirect TCP. What are its advantage and disadvantages ?

   c) Explain a WAP network configuration in detail.

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

   a) What are the advantages and disadvantages of wireless LAN ?

   b) Briefly write on Dynamic Host Configuration Protocol (DHCP).

   c) Explain physical layer of IEEE 802.11.

6. a) Briefly write on 'mobile Agents'.   **5**

   b) Compare intra red and radio transmission.   **4**

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Seat No.

M.E. (E and TC) Digital Electronics and Communication Systems (Semester – II) Examination, 2014
Paper – X : (Elective – II) : IMAGE AND VIDEO PROCESSING AND BROADCASTING

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Write a short note on **any two** :   **(6×2=12)**
   1) KL transform
   2) DCT
   3) Slant transform.

2. a) Explain MTF of visual system.   **4**
   b) Explain in detail 2D sampling theory.   **4**

                    OR

   b) Explain color vision model.
   c) For the 2 × 2 transform A and image U.   **5**

$$A = \frac{1}{\sqrt{2}} \begin{bmatrix} \sqrt{1} & 1 \\ 1 & -1 \end{bmatrix} \quad u = \begin{bmatrix} 1 & 2 \\ 3 & 4 \end{bmatrix}$$ calculate transformed image V and basis images.

3. a) Explain Levinson-Durbin algorithm.   **5**
   b) Explain AR model and its properties.   **5**

                    OR

   b) Explain SVD in detail.

SECTION – II

4. Answer **any two** :

   a) Explain spatial feature extraction. **5**

   b) Explain image analysis with reference to moment invariants. **5**

   c) What is random transform ? Explain its properties. **5**

5. a) Explain different statistical approaches for texture. **7**

   b) Explain Fourier reconstruction algorithm with its application to MRI. **6**

                    OR

   b) Explain 3D tomography.

6. a) Explain scalable video coding. **6**

                    OR

   a) Explain MPEG-4 in detail.

   b) Explain projection theorem in detail. **6**

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Seat No.

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
POWER ELECTRONICS (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Explain bakers clamp operation of BJT.

                              OR

1. Explain the reverse recovery phenomenon of power diode.   **10**

2. Explain the role of power electronics in different engineering applications.   **10**

3. Attempt **any two** :

    a) What are the benefits of regenerative braking and why it is applied in armature circuit ?

    b) Explain the effect of R, RL and RLE load on the inverting operation of AC to DC converter.

    c) Explain the behaviour of half controlled ac to dc converter if IL is continuous with R-L-E load.   **15**

SECTION – II

4. Explain the space vector modulation technique in detail with all circuit diagrams and waveforms.   **15**

                              OR

4. Explain the construction and working of single phase half wave bridge inverter for the following load conditions.

    I) R-load
    II) L-load
    III) R-L load
    IV) R-L-C load.

5. For the circuit as shown in fig. 1, $F_s = 1$ KHz, $D = 0.2$, $L = 20$ mH, $I_{avg} = 5A$. What is the peak to peak current ripple flowing through the load ?   **10**

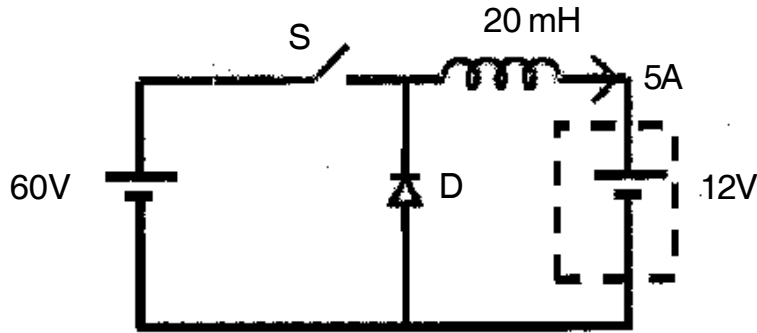Fig. 1

6. Explain single phase AC voltage controller and derive its output voltage.   **10**

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Seat No.

M.E. (Mechanical-Design) (Semester – I) Examination, 2014
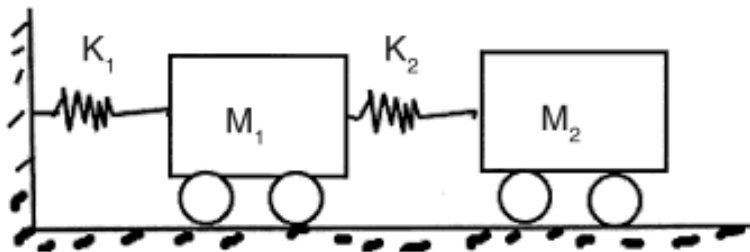## MACHINE DYNAMICS (Paper – II)

Day and Date : Wednesday, 31-12-2014　　　　　　　　　　Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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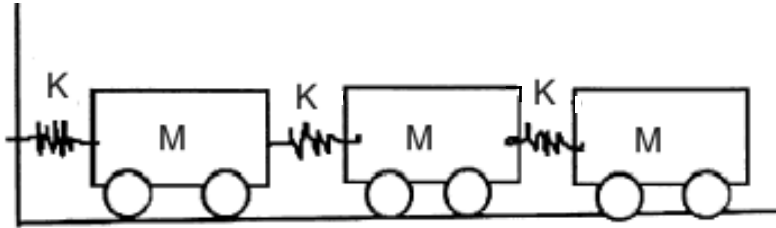
SECTION – I

1. Derive equation of motion and find natural frequencies of system given below : **12**

2. a) Explain principle of dynamic vibration absorber. **5**

　b) What is meant by coordinate coupling ? Explain types of coupling and their different combinations. **6**

3. Explain : **12**

　a) Lagrange's equation

　b) Rayleigh Damping and

　c) Modal Analysis

4. Find fundamental natural frequency using Rayleigh method of system shown below : **11**

SECTION – II

5. Derive expressions for vibrations of string and bars. **12**

6. Write note on Phase-Plane method and Duffing's equation. **11**

7. Write note on random vibrations and related terms. Also brief about process to obtain response of linear systems to stationary excitation. **11**

8. Explain in detail the terms "Machine Conditioning and Monitoring" and 'Fault Diagnosis'. Give detailed procedure of experimental Modal Analysis. **12**

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SLR-BC – 170

Seat No.	

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
POWER SYSTEM DYNAMICS AND CONTROL (Paper – II)

Day and Date : Wednesday, 31-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**. However some internal options are **provided**.

              2) **Assume** suitable data **wherever** necessary and mention the **same**.

SECTION – I

1. Draw the diagram of power system operating states and explain the same. **12**

2. Attempt **any two** : **12**
   a) Give the assumption for synchronous machine modelling and write the stator and rotor flux linkage equation.
   b) Derive Park's transformation.
   c) Explain the three phase short circuit transient analysis of a synchronous machine.

3. Applying Euler's method to the equation $\dfrac{dy}{dx} = \lambda x$, given $y(x_0) = y_0$, determine its stability zone. **11**

SECTION – II

4. Attempt **any two** : **12**
   a) Two alternators are connected in parallel if prime mover input of any one alternator is increased then what will be the effect on other alternator.
   b) Explain the static excitation system with necessary diagrams.
   c) State and explain the importance of power system modeling.

5. Draw the block diagram of excitation system and explain the same in detail. **12**

6. Explain D-Q transformation using $\alpha - \beta$ variables. **11**

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SLR-BC – 171

| Seat |
| No. |

M.E. (Electrical Engineering) (Sem. – I) Examination, 2014
DC DRIVES (Paper – III)

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : *Answer **all** the questions sequentially. Figure on **right** square bracket indicate **max.** marks. **Assume** suitable data **if required** giving reason.*

SECTION – I

1. With neat diagram give complete classification of semiconductor power modulator used for DC drive. Comment on importance of semiconductor based power modulator for DC drives. **[10]**

2. a) Discuss on stability behaviour of an electric of an electric drive. Derive necessary condition for stability of an electric drive. **[8]**

   OR

   a) Draw and explain family of torque-speed characteristics for combined armature voltage and field control. **[8]**

   b) A drive has $J = 15$ Kg-m^2, $T_m = 125\text{-}0.15N$, passive load torque is $0.0245\ N$ where N is the speed in rpm. Initially the drive is operating in steady state and now it is to be reversed by reversing T_m. Calculate time of reversal. **[4]**

3. a) With neat schematic diagram and operating equations explain process of dynamic braking in case of separately excited dc motor. **[8]**

   OR

   a) Enlist different methods of speed control of DC motor. With necessary diagrams explain speed control of DC motor by field weakening method. **[8]**

   b) 1.8 KW 1000 rpm, 10 amp separately excited dc motor is having armature resistance 0.2 ohm. Find the rated torque of the machine. Find the speed of the machine when the machine is developing half the rated torque. Neglect rotational losses. **[5]**

SECTION – II

4. a) Give the complete classification of phase controlled line commutated converters. With necessary diagrams explain the principle of construction and operation of two pulse bridge converter. **[9]**

OR

a) With neat circuit diagram and waveform explain various modes of operation of fully control converter fed dc motor. Explain process of starting fully converter fed dc motor. **[9]**

b) In a separately excited DC motor the speed is controlled by 1 φ full wave controlled rectifier. It is given that input AC supply voltage being 100 V (RMS), $\alpha = 30°$. The back emf developed is 90V. Assuming R_a to be 0.5 Ω, find the average current and torque for speed of 750 rpm. The motor circuit does not have inductance. **[4]**

5. a) Enlist different methods of electric braking used for DC drives. With neat circuit diagram and waveforms explain regenerative braking process for fully converter fed separately excited dc motor. **[8]**

OR

a) With neat schematic explain the principle of operation of type-A chopper and obtain expression for maximum and minimum current. **[8]**

b) A DC drive is supplied through type-A chopper having following specifications : Source voltage = 220 V, chopping frequency = 500 Hz, Ton = 800 μ sec, R = 1 Ω, L = 1 mH and back emf = 72V. Find whether load current is continuous or not, hence obtain average output current and maximum minimum values of steady state output current. **[5]**

6. Explain the need for closed loop speed control of DC drive in industry. With neat circuit schematic and relevant waveforms explain closed loop control of a dual converter fed drive. **[9]**

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M.E. (Electrical) (Semester – I) Examination, 2014
CONTROL ENGINEERING (Paper – IV)

Day and Date : Monday, 5-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Attempt **any four** :   **(4×6=24)**

   a) Write the differential equation governing the mechanical system shown in fig. 1. Also draw the F-V and F-I analogy.

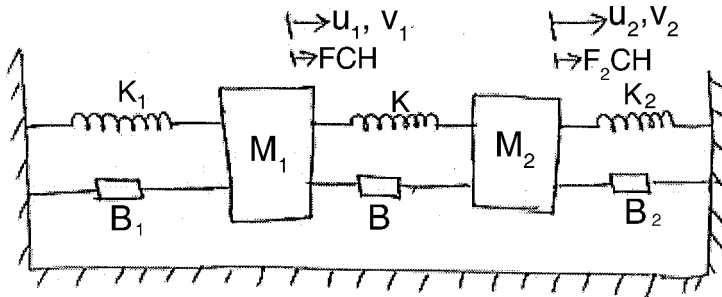Fig.1

   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.

SECTION – II

3. Attempt **any four** :   **(4×6=24)**

   a) State space representation of positional control system.

   b) Explain the performance specifications in time domain.

   c) Obtain the transfer function for the following system shown

     i) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -2 & -3 & -4 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U$

       $Y = [1 \ 0 \ 0] \ X$

     ii) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -4 & -6 & -8 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} U$

       $Y = [-2 \ 4 \ 0] \ X + 2U.$

   d) A feedback system has a transfer function $\dfrac{Y(s)}{R(s)} = M(s) = \dfrac{\omega_n^2}{s^2 + 2\zeta\omega_n s + \omega_n^2}, \ \zeta < 1.$

     Derive the expression for peak overshoot M_p and peak time t_p of the time response of the given system.

   e) Determine the breakaway points, angles of departure and centroid of the root locus for the system,

     $G(s) \ H(s) = \dfrac{k(s+3)}{2s(s+5) \ (s+6) \ (s+2s+2)}$

     Also sketch the root locus.

4. Attempt **any one** : (1×11=11)

a) Consider a type-1 unity-feedback system with an open loop transfer function,

$G(s) = \dfrac{k}{s(s+1)}$. It is desired to have the velocity error constant K_v = 10.

Furthermore, desire the P.M. of the system be at least 45°.

b) Explain the concept of controllability and observability.

Determine whether the following systems are completely state controllable and observable using

i) $\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} X + \begin{bmatrix} -1 \\ 1 \\ 1 \end{bmatrix} u$ $Y = [1\ 1\ 0]\ X$

ii) $\dot{X} = \begin{bmatrix} 2 & 0 & 0 \\ 0 & 2 & 0 \\ 0 & 3 & 1 \end{bmatrix} X + \begin{bmatrix} 0 & 1 \\ 1 & 0 \\ 0 & 1 \end{bmatrix} u$ $Y = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 1 & 0 \end{bmatrix} X$

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**Seat
No.**

M.E. (Electrical Engineering) (Semester – I) Examination, 2014
Paper – V : EXTRA HIGH VOLTAGE TRANSMISSION SYSTEMS
(Elective – I)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) *Necessary data* **wherever** *required is given. If such data is
not given it means that the knowledge of that data is a part
of examination.*

2) *If you have assumed any data then mentioned it* **clearly**
with reasons.

SECTION – I

1. Answer the **any one** question from the following :   **12**

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

   b) What are the various types of conductor vibrations in a transmission line ?
   Explain how they are measured and controlled.

2. Solve the **any one** question from the following :   **12**

   a) Discuss the effect of resistance, power loss and skin effect on EHVAC-lines
   in detail.

   b) Explain the inductance and capacitance calculations for single and
   multiconductor line for calculation of Maxwell's potential coefficients.

3. Attempt the **any one** question from the following :   **11**

   a) Explain the Charge-Voltage (q – V) diagram and corona loss.

   b) Explain the corona phenomena and the factors influencing the corona inception.

P.T.O.

SECTION – II

4. Answer the **any two** questions from the following :   **12**

   a) What is the purpose of reflection and refraction coefficients of traveling waves and its significance explain in detail ?

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

   c) Explain the clear difference between traveling and standing wave theory.

5. Solve the **any one** question from the following :   **12**

   a) Explain different type of lightning arresters and protective characteristics in detail along with the neat sketches.

   b) Discuss thoroughly with examples insulation coordination based on lightning.

6. Attempt the **any one** question from the following :   **11**

   a) 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.

   b) What is the purpose of synchronous condenser and how voltage profile increases using synchronous condenser also explain the selection of the rating of the synchronous phase modifier.

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Seat No.

M.E. (Electrical Engineering) (Semester – II) Examination, 2014
POWER ELECTRONICS APPLICATIONS TO POWER SYSTEM
(Paper – VI)

Day and Date : Tuesday, 30-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I   **(35 Marks)**

1. Attempt **all** :

   a) Explain various factors which limit the loading capability of transmission lines.   **8**

   b) Explain power flow and dynamic stability consideration of an interconnected transmission system ?   **9**

                        OR

   c) Why does utility need inter connected transmission system ?   **9**

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

   a) Explain thyristorised controlled reactor in detail.

   b) Explain thyristorised switched capacitor in detail.

   c) The particulars of a shunt compensator with TCR are V = 480 V, F = 60 HZ, X = 1.8 Ω and P_p = 96 kw. The maximum current of the TCR is $IL_{(max)}$ = 150 A. Find

      a) the phase angle δ,

      b) the line current I

      c) the reactive power Q_p

      d) the current through the TCR

      e) the inductance reactance x_L and

      f) the delay angle of the TCR if the I_L is 60% of the maximum current.

P.T.O.

SECTION – II   **(35 Marks)**

3. Attempt **all** :

   a) Explain the principle of series compensation in detail.   **9**

   b) The particular of the series compensated transmission line are V = 220 V,
      F = 60 HZ, X = 18 Ω and δ = 70°. The degree of compensation is r = 70%.
      Find

      a) the line current I_L

      b) the active power P_p

      c) the reactive power Q_p.   **8**

                          OR

   b) Explain thyristorized switch series capacitor (TSSC) in detail.   **8**

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

   a) Explain the principle of Phase Compensation in detail.

   b) Compare Shunt Compensation, Series Compensation and Phase Angle
      Compensation in detail.

   c) Explain Load Compensation in detail.

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Seat No.

M.E. (Electrical Engineering) (Sem. – II) Examination, 2014
POWER QUALITY (Paper – VII)

Day and Date : Thursday, 1-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. a) What are the major power quality issues ? Explain in detail. **6**

   b) Define power quality. Explain the reasons for increased concern in power quality. **6**

   c) Define total harmonic distortion, total demand distortion and write the formula. **6**

2. a) Explain the following terms related with PQ problem. **8**
   i) Sags
   ii) Swell
   iii) Waveform distortion
   iv) Voltage fluctuations.

   b) What is harmonics ? Explain harmonic distortion with relevant waveforms. **9**

SECTION – II

3. Explain in detail about general procedure for harmonic distortion evaluation at the point of coupling, utility systems, customer facility and industrial facility. **18**

OR

3. What are triplen harmonics ? Explain flow of triplen harmonics current in three phase transformers. **18**

4. a) Explain in brief about the following harmonic filters.
   i) Active filters
   ii) Passive filters. **9**

   b) Explain design philosophy of filters to reduce harmonic distortion. **9**

OR

   b) Explain schematic and working of unified power conditioner. **9**

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Seat
No.

M.E. (Electrical Engg.) (Semester – II) Examination, 2014
AC DRIVES (Paper – VIII)

Day and Date : Saturday, 3-1-2015

Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Answer the following :

   A) Derive torque expression for a three phase induction motor and draw its torque-slip characteristic. **8**

   B) Explain philosophy of speed control of a three phase induction motor using stator voltage control. Comment on T/I ratio under this control strategy. **9**

2. Attempt **any two** of the following : **(9×2=18)**

   A) Show that under variable frequency control (E/f control), torque produced by a three phase induction motor depends on "s. k" where s = slip and k = fraction of frequency.

   B) 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) Explain effect of voltage drop across stator impedance on E/f control strategy for speed control of a three phase induction motor.

SECTION – II

3. Answer the following :

   A) 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. **8**

P.T.O.

B) With neat circuit schematic explain static Scherbius drive. State basic philosophy used for operating induction motor in variable speed mode in this drive. **9**

4. Attempt **any two** of the following : **(9×2=18)**

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

B) Draw a neat equivalent circuit diagram for current fed induction motor drive. How do we decide the magnitude of current to be fed from source to such a drive ? Why starting torque is much lower in case of current fed drives than that for voltage fed drives ?

C) Explain V/f control strategy used for speed control of three phase synchronous motor. Draw family of torque-speed characteristics for a three phase synchronous motor drive.

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M.E. (Electrical Engg.) (Semester – II) Examination, 2014
Paper – IX : ADVANCED CONTROL ENGINEERING

Day and Date : Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

1. Attempt the following :   **(2×9=18)**

   a) Design a series-compensation scheme having the process model and controller

   transfer function as $G(s) = \dfrac{4}{s(2s+1)}$ and $G_c(s) = 2\left(1 + \dfrac{1}{2s}\right)$ for unit step input.

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

   PI-PD controllers $G_{c1}(s) = K_p\left(1 + \dfrac{1}{T_i s}\right)$ and $Gc2(s) = K_b + T_d s$ using model

   parameters : $k = 2$; $\alpha_1 = 0$ and $\alpha_0 = -4$ and optimised coefficients
   $c_1 = 0.5$ ------> $d_2 = 1.595$ and $d_1 = 2.12$. Estimate the PI-PD controller
   parameters for SISO process.

                    OR

   b) Explain relay control systems for off-line and on-line identification in detail.

2. Explain in detail the control structures for controlling various plants.   **(1×8=8)**

3. Design a feedback-compensation scheme having process model and the

   controller transfer function as $G(s) = \dfrac{4}{s(2s+1)}$ and $G_c(s) = 2s + 1$ for unit step

   input.   **(1×9=9)**

SECTION – II

1. Attempt the following :   **(2×9=18)**

   a) What are the conditions for sustained oscillatory output of FOPDT transfer function model ?

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

   OR

   b) How to measure the critical parameters of a limit cycle output signal by using wavelet transform ?

2. How to identify FOPDT model by using state-space analysis ?   **(1×8=8)**

3. Find the system model for given the output waveform :   **(1×9=9)**
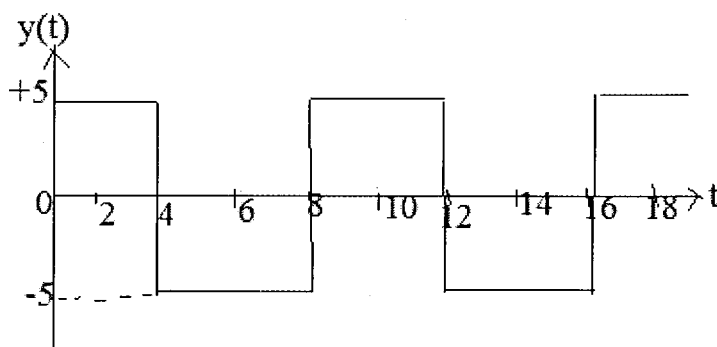
   OR

3. By using asymmetrical relay test, estimate the steady state gain for SOPDT transfer function model $G(s) = \dfrac{k(T_0s + 1)e^{-\theta s}}{(T_1s \pm 1)(T_2 s + 1)}$.

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SLR-BC – 18

Seat
No.

M.E. (Mechanical Design Engineering) (Semester – I) Examination, 2014
SOLID MECHANICS (Paper – III)

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain the plane stress and plane strain conditions with suitable examples.   **4**

   b) Derive the differential equation of equilibrium for plane stress problem in polar coordinates.   **7**

2. Prove that the following are the Airy stress functions and examine the stress distribution represented by them

   i) $\varnothing = Ax^2 + By^2$

   ii) $\varnothing = Ax^3$.   **12**

3. a) A hollow circular disc of uniform thickness has outer diameter of 400 mm and inner diameter of 100 mm. It is rotating at a speed of 1500 rpm. Determine the maximum and minimum circumferential and radial stresses. Assume poisons ratio as 0.3 and the density of material as 7800 Kg/m^3.   **8**

   b) What are the assumptions made in theory of elasticity ?   **3**

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

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

P.T.O.

SECTION – II

5. What are the membrane stresses ? Derive the equilibrium equation for membrane stresses for shells of revolution. **11**

6. a) Explain the importance of shear centre. **3**

   b) Locate the shear centre for the following cross section having uniform thickness of 2 mm. **9**
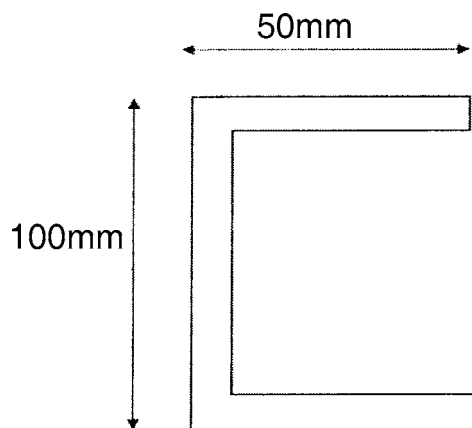
7. Derive the expression for pressure and area of contact between two cylindrical bodies subjected to compressive load. **11**

8. a) Explain the membrane analogy used in torsion problems. **8**

   b) What are the assumptions made in theory of contact stresses ? **4**

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Seat No.

M.E. (Electrical Engineering) (Semester – II) Examination, 2014
Paper – X : High Voltage DC TRANSMISSION SYSTEMS (Elective – II)

Day and Date : Thursday, 8-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I   **(35 Marks)**

1. Attempt **all** :

   a) Write differences between HVAC and HVDC and write applications of HVDC
      system.   **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

   Write down desired control features of HVDC system and explain system
   control hierarchy.

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

   a) With neat sketches explain the different kinds of D.C. links available.

   b) For a 3-φ, 6 pulse Graetz's circuit, draw the timing diagram considering
      overlap angle is less than 60° and without overlap for the following :

       i) Voltage across load.

      ii) Voltage across any two pair of conduction values.

   c) Explain firing angle control in detail.

SECTION – II   **(35 Marks)**

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) Give in detail the different sources of reactive power.   **9**

                    OR

   What are the types of MTDC systems and explain each in detail ?

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

   a) Explain the over current protection.

   b) Giver 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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Seat No.	

M.E. (Mech.) (Design Engineering) (Semester – I) Examination, 2014
DESIGN OF EXPERIMENTS AND RESEARCH METHODOLOGY
(Paper – IV)

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction : Attempt **any five** questions.

1. a) Define research. Explain types of research.   **7**

   b) Explain the issues in research design.   **7**

2. a) Explain literature review. What are the sources of literature ?   **7**

   b) What is analysis of data ? List the methods of data analysis.   **7**

3. a) Explain the logical approach of problem solving with suitable example.   **7**

   b) Explain principles of modelling.   **7**

4. a) Explain guidelines of design of experiment with suitable example.   **7**

   b) Explain principles of experimentation.   **7**

5. a) Explain any two optimization techniques in details.   **7**

   b) Explain the concept of robust design in details.   **7**

6. a) Describe briefly the technique of analysis of variance.   **7**

   b) Explain the format of research report.   **7**

7. Write short note on **any two** :   **14**

   a) Research process

   b) Brain storming

   c) Errors in experiment

   d) Hypothesis testing.

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Seat No.

M.E. (Civil Structures) (Semester – I) Examination, 2014
MECHANICS OF STRUCTURES (Paper – II)

Day and Date : Wednesday, 31-12-2014   Max. Marks : 70

Time : 10.00 a.m. to 2.00 p.m.

N.B. :   1) **All** questions are **compulsory**.

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

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

SECTION – I

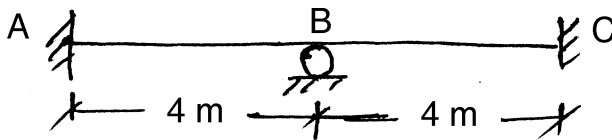1. Draw ILD for M_A, R_B and M_C of beam shown in Fig. 1. Show the ordinates at 1 m interval.   **12**

Fig. 1

OR

Draw ILD for B.M. at A and B of a frame shown in Fig. 2.   **12**

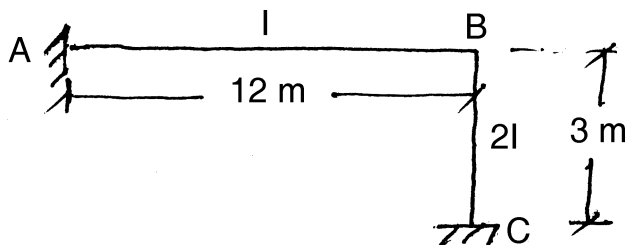
Fig. 2

2. A circular ring beam is supported on 6 columns symmetrically placed forming a square of side L. The ring beam is subjected to a UDL of 'w' throughout the length. Draw BMD and TMD. Refer Fig. 3. **12**

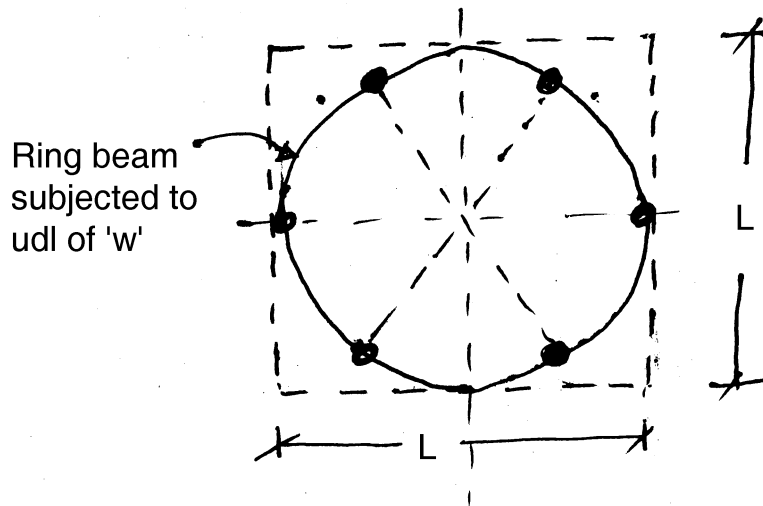
Ring beam subjected to udl of 'w'

Fig. 3

3. Derive equation for deflection, Bending moment, shear force and foundation pressure for a semi-infinite beam on elastic foundation subjected to a concentrated force 'P_0' acting at one end. **11**

SECTION – II

4. Derive the equation of BM and deflection of a beam column subjected to loading shown in Fig. 4. **11**
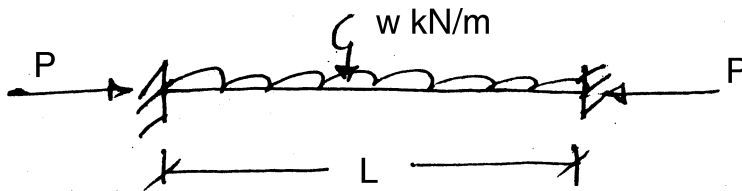

w kN/m

P ⟶ P

L

Fig. 4

5. Analyse the fixed beam shown in Fig. 5 by direct stiffness method. Draw BMD.   **12**
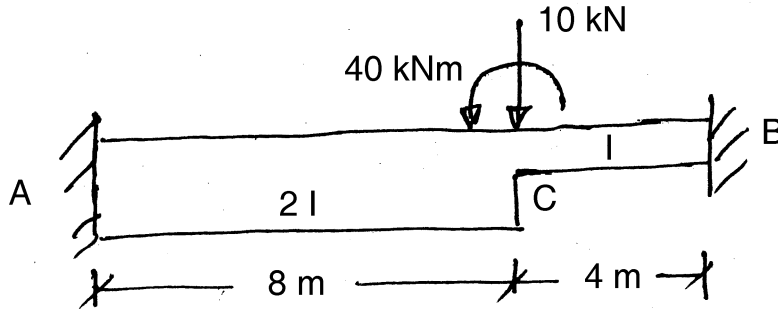

Fig. 5

6. Find forces in all members of pin jointed frame shown in Fig. 6 by member oriented stiffness method. Assume AE of all members same.   **12**
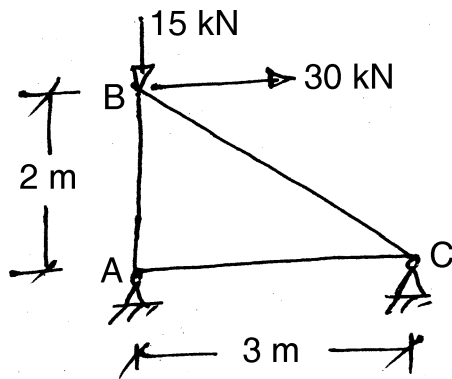

Fig. 6

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Seat No.	

M.E. (Mechanical-Design Engineering) (Semester – I) Examination, 2014
Paper – V : SYNTHESIS AND ANALYSIS OF MECHANISM AND
MACHINES (Elective – I)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Discuss Kinematic pairs with neat diagrams. **5**

   b) Determine the Chebyshev spacing for a function $y = 2x^2 + \sqrt{x}$, for a range $0 \le x \le 2$ with 4. accuracy points. Also obtain the correct values of y at accuracy points. **7**

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

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

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

3. a) Explain Crank follower synthesis of five accuracy point. **6**

   b) Explain in brief branch and order defects. **5**

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

   a) Cups and crunodes

   b) Relative poles of the four bar linkages.

P.T.O.

SECTION – II

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

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

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

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

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

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

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

   a) Eulerian angles

   b) Denavit-Harternberg Parameter.

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Seat No.	

M.E. Mechanical (Manufacturing Engg.) (Sem. – I) Examination, 2014
MATERIAL REMOVAL PROCESSES (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain the classification of material removal processes in detail. Also, explain types of cutting mechanism. **10**

   b) How chips formation takes place during cutting ? Explain types chip. **8**

2. a) Explain heat generation in metal cutting. **8**

   b) What is tool signature ? Explain with suitable example. **9**

3. a) Explain the Taylor Tool Life Equation and forms of tool wear in metal cutting. **9**

   b) Which types of cutting fluids are used during cutting ? Explain the properties of Ideal cutting fluid. **8**

SECTION – II

4. a) Explain variation of costs with cutting speed. **8**

   b) What is the classification of grinding machines ? And how are grinding wheels specified ? **9**

5. a) Explain grinding wheel wear in detail. **7**

   b) Explain the ultrasonic machining in detail. **10**

6. a) Compare the water-jet machining and abrasive-jet machining. **9**

   b) Explain various types of surface alternations. **8**

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Seat No.

M.E. Mechanical (Manufacturing) (Sem. – I) Examination, 2014
CNC AND ADAPTIVE CONTROL (Paper – II)

Day and Date : Wednesday, 31-12-2014　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What are the different drives for a CNC ? Explain in detail the drive systems with their features. Enumerate the benefits of each drive system.　**11**

   b) Discuss the design considerations for a CNC.　**6**

2. a) What do you mean by numerical control ? Explain the major components of a CNC machining centre and discuss their functions.　**12**

   b) What are the accessories of a CNC turning centre ?　**5**

3. Write short note on (**any three**) :　**(3×6=18)**

   1) Feedback system in CNC

   2) Interpolators in CNC

   3) ATC

   4) Linear Variable Differential Transformer (LVDT).

SECTION – II

4. a) What is the post processor ? Explain functions of a post processor.　**5**

   b) Discuss the significance of adaptive control with a suitable example.　**12**

P.T.O.

5. a) Explain the computer assisted part programming. Discuss the benefit of the same. **9**

   b) What is the part program format ? Explain the different types of formats. **8**

6. Write short note on (**any three**) : **(3×6=18)**

   1) Solids based part programming

   2) Cutter compensation

   3) Verification of CNC program

   4) Role of CNC machine in CIM.

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Seat No.

M.E. (Mechanical) (Manufacturing) (Semester – I) Examination, 2014
ADVANCED JOINING TECHNOLOGY (Paper – III)

Day and Date : Friday, 2-1-2015　　　　　　　　　　　　　　Total Marks : 70
Time : 10.00 a.m. to 1.00 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. Explain in brief classification of metal joining processes.　　　　**18**

2. Explain in brief various heat sources and equipments for joining of metals.　　**17**

3. Explain in brief related to LBW :　　　　　　　　　　　　　　　**17**

　　i) How is depth penetration accomplished with the laser ?

　　ii) How important is the reflective qualities of base metals when laser welding ?

SECTION – II

4. What is residual stresses ? Explain in brief various methods of stress relief.　　**18**

5. What do you know about NDT of welds explain in brief various methods of
　NDT of welds ?　　　　　　　　　　　　　　　　　　　　　　**17**

6. Write short notes on (**any two**) :　　　　　　　　　　　　　**17**

　　i) Adhesive bonding

　　ii) Soldering and brazing

　　iii) Failure of welds.

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SLR-BC – 207

M.E. Mechanical (Manufacturing) Semester – I Examination, 2014
Elective – I : Machine Tool Design (Paper – IV)

Day and Date : Monday, 5-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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. Explain in brief classification and choice of driving system and their basic design consideration. **18**

2. Explain in brief stepwise design procedure for design of power screw. **17**

3. Discuss briefly the silent features to be considered for selecting and designing a suitable drive system in a machine tool. **17**

SECTION – II

4. In designing the bed of machine tool make a comprehensive evaluation of the various types of cross sections commonly used in machine tool on the basis of stress and deflection in both bending and torsion. **18**

5. Classify the essential control systems with particular reference to shifting of gears in a gearbox. Explain the
   i) Centralized control
   ii) Selective control
   iii) Pre-selective control system. **17**

6. Write short notes on **(any two)** : **17**
   i) Latest trends in machine tool design
   ii) Concepts of aesthetic and ergonomics applied to machine tools
   iii) Design of precision machine tools.

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Seat
No.

M.E. (Mech.) (Design Engineering) (Semester – I) Examination, 2014
INDUSTRIAL INSTRUMENTATION (Elective – I) (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

3) Draw **neat** diagrams **wherever** necessary.

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

SECTION – I

1. a) Explain typical applications of instrument systems.   **6**

   b) Define Standard. Give classification of standards of measurement.   **6**

2. a) Distinguish between accuracy and precision. What are the important
      parameters for selection of instrument for static condition ?   **6**

   b) What do you mean by zero order and first order measuring system ?   **6**

3. a) Explain electrodynamic transducer for linear and rotary motion measurement. **5**

   b) Explain types of strain gauge transducers. What do you mean by strain gauge
      rosette ?   **6**

4. a) Describe mechanical and hydraulic amplifying elements.   **6**

   b) Explain LVDT type force transducer.   **5**

P.T.O.

SECTION – II

5. a) Write a note on magnetic tape recorders. **6**

   b) Explain absorption type dynamometer. **6**

6. a) Describe Mcleod gauge and Pirani gauge with neat sketch. **8**

   b) Explain particle counter. **3**

7. a) Explain working of thermistors. What are its advantages and disadvantages ? **6**

   b) Describe system analysis by transient testing. **5**

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

   a) Data acquisition system

   b) R.T.D.

   c) Permanent monitoring system

   d) Ferrographic analyser

   e) Sound level meter

   f) Pitot static tube.

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Seat No.	

M.E. (Mechanical) (Manufacturing Engineering) (Semester – I) Examination, 2014
Paper – V : MANUFACTURING PLANNING AND CONTROL (Elective – II)

Day and Date : Wednesday, 7-1-2015　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Solve **any five** questions.
　　　　　　　 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 project production system ? Discuss characteristics of project production. State the technique for scheduling and control in project.　**7**

　 b) State the comparison of various manufacturing systems by use of standard factors.　**7**

2. a) What is meant by flexibility in connection with FMS ? Explain at least three types of flexibility that can be considered while designing FMS.　**7**

　 b) Explain the factors influencing effective capacity.　**7**

3. a) Explain different methods of coding the parts in GT.　**7**

　 b) Discuss different techniques which guide the layout engineer in planning the best possible layout.　**7**

4. a) Discuss any two module related to engineering application for MRP-II.　**7**

　 b) Explain different input and output reports of MRP-I.　**7**

5. a) Explain the determination of batch size in batch production.　**7**

　 b) Discuss how material flow control is done in FMS.　**7**

6. a) Explain the concept of cost of quality.　**7**

　 b) Explain different phases and steps in the simulation process for manufacturing systems analysis.　**7**

7. Write short note on following :

　 a) Features of JIT.　**7**

　 b) Evolution of CIM.　**7**

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SLR-BC – 219

M.E. Mechanical (Manufacturing) (Sem. – II) Examination, 2014
METAL FORMING PROCESSES (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain the classification of metal forming processes in detail with neat sketches. **10**

   b) Explain the von mises criteria for isotropic material with assumptions. **8**

2. a) Explain the properties of hot forming with advantages and limitations. **9**

   b) What is cold forming ? Explain with suitable example. **8**

3. a) What are velocity relationship along slip lines ? Derive these relationship. **9**

   b) State upper bound theorem and explain its various terms. **8**

SECTION – II

4. a) Explain the hydrostatic extrusion process. **8**

   b) A rectangular disc is forged between two flat dies. Describe how the metal flow ? Sketch the resulting shapes of the disc after forging. How these shapes would change if height of specimen is increased from strip to rectangular block. **10**

5. a) Explain the rolling pass for billet rolling. **8**

   b) Explain the term barreling and bulging in connection with forging of non-circular shapes between two flat dies. **9**

6. a) What is isothermal forging ? Explain the significance of it. **9**

   b) Explain near-net-shape manufacturing. **8**

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Seat
No.

**M.E. (Mechanical) (Design Engineering) (Semester – I) Examination, 2014
RELIABILITY ENGINEERING (Paper – V) (Elective – I)**

Day and Date : Wednesday, 7-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. A) What are the three mathematical approaches for obtaining an item's mean
      time to failure ?   **5**

   B) A jet engine consists of five modules each of which was found to have a
      Weibull failure distribution with a shape parameter of 1.5. Their scale
      parameters (characteristics life) are (in operating cycles) 3600, 7200, 5850,
      4780 and 9300. Find the MTTF and median time to failure of the engine.   **6**

2. A) Using the existing design, the lives of three AA batteries are 20, 22 and 21 hr
      an experimental design produces batteries with values of 17, 21 and 25 hr.
      Which is the better design and how much ?   **6**

   B) In order to determine the tensile strength of the material of a supply of
      connecting rods, samples of tensile specimens were prepared and tests
      conducted. The results showed a normal distribution with a mean tensile
      strength of 310 Mpa and a standard deviation of 34.5 Mpa. If the consignment
      involved 300 connecting rods, estimate

      1) How many connecting rods can be expected to have a strength less than
         275 Mpa ? and

      2) How many connecting rods can be expected to have a strength between
         275 Mpa and 410 Mpa ? Use data if needed for $(z = -1.01) = 0.1562$ and
         $(z = +2.9) = 0.9981$.   **6**

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

   1) Bathtub Curve

   2) Lognormal distribution used in reliability

   3) Signal-to-Noise (S/N) ratio. (Give six basic S/N ratios)

   4) Boolean Algebra Laws and Probability Properties.

SECTION – II

4. A) Describe the steps associated with the RCM process. **5**

   B) Explain Fault Tree Analysis (FTA) with suitable example. **6**

5. A) Assume that a system is composed of five independent and identical subsystems in series. The constant failure rate of each subsystem is 0.0025 failures per hour. Calculate

   1) Reliability of the system for a 50-hour mission

   2) The system Mean Time to Failure (MTTF). **6**

   B) Discuss reliability allocation and its benefits. **6**

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

   1) Accessibility – as one maintainability design factor

   2) Assumptions associated with the Markov method

   3) Maintainability versus reliability

   4) Reliability life testing.

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Seat No.

M.E. (Mechanical – Manufacturing Engineering) (Semester – II) Examination, 2014
FINITE ELEMENT METHODS (Paper – VII)

Day and Date : Thursday, 1-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain advantages of Variational formulation. **6**

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

2. a) Explain principal of virtual work. **5**

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

3. Find axial deformation of uniform bar fixed at one end and subjected to an axial load at other end as shown in figure – 1 using the principal of minimum potential energy. **12**
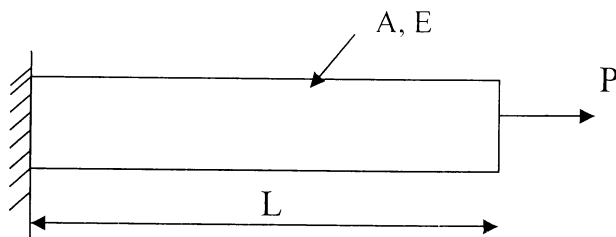
Figure 1

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

    a) Galerkin Approach

    b) Rayleigh Ritz Method

    c) Size and number of elements.

P.T.O.

SECTION – II

5. a) Derive linear interpolation polynomial in terms of natural coordinates for 2-D triangular elements. **6**

   b) Explain Galerkin approach for 1-D heat conduction problems. **6**

6. a) Using finite element method find temperature distribution and heat flow through composite wall as shown in figure (2).
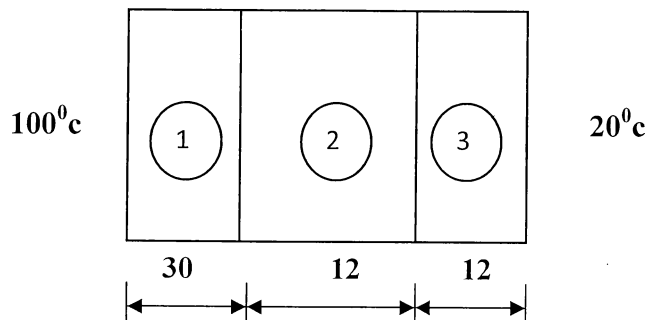
   Figure – 2

   $K_1 = K_3 = 80 * 10^{-3}$ W/mm°c; $K_2 = 0.8 * 10^{-3}$ W/mm°c; All dimensions are in mm. Assume Area of wall 1 mm^2. **6**

   b) Explain convergence requirement of Isoparametric elements. **5**

7. a) Explain modeling procedure of Turning operations in manufacturing using Finite Element Method along with its application. **6**

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

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

   a) Boundry conditions in Heat transfer problems

   b) Applications of FEM in field problems

   c) Shape Function.

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Seat
No.

M.E. Mechanical (Manufacturing) (Sem. – II) Examination, 2014
Paper – VIII : FLEXIBLE MANUFACTURING SYSTEM (Elective – III)

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 ? Discuss the benefits and limitations.   **9**

   b) Classify FMS and discuss the scope.   **8**

2. a) Explain different configuration of FMS layout and discuss their significance.   **9**

   b) Explain role of programmable controller in FMS.   **8**

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

   1) FMS Vc FMC

   2) FMS software

   3) Distributed numerical control

   4) Hardware configuration in FMS.

SECTION – II

4. a) Discuss scheduling and loading of FMS.   **9**

   b) Simulation and analysis plays a vital role in FMS design. Discuss.   **8**

P.T.O.

5. a) Explain the principles of material handling. **9**

   b) Explain the components of ASRS. **8**

6. Write short note on (**any three**) : **(3×6=18)**

   1) FMS fixtures

   2) Tool monitoring and fault detection

   3) Tool specification in FMS

   4) ATC.

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Seat No.

M.E. (Mech. Manufacturing Engg.) (Semester – II) Examination, 2014
Paper – IX : QUALITY CONTROL AND RELIABILITY (Elective – IV)

Day and Date :Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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) Define T.Q.M. State the chief requirements for the successful working (implementations) of T.Q.M. programme in a industrial organizations. **6**

   b) What do you know about cost of quality and value of quality ? How to balance them ? **6**

2. a) What is KAIZEN ? Explain the approach to implement KAIZEN. **6**

   b) Summerise the contributions of the following persons to quality management. **6**

   1) Deming

   2) Juran

   3) Crosby

3. a) What is Juran's Trilogy ? Explain its components in brief. **6**

   b) Describe the following in connections with S.Q.C. **6**

   1) Central tendency

   2) Dispersion

   3) Frequency distributions and histograms.

P.T.O.

4. Write a short note on **any 2** :   12

   a) KAIZEN and Innovations

   b) Valuable tools for quality controls

   c) Crosby's absolutes for quality management.

SECTION – II

5. a) What are the objectives and basis of statistical quality control in factories ?   **6**

   b) Explain the following in connections with reliability.   **4**

      1) Quality and reliability   2) Cost of reliability

6. a) Describe in briefly the variable charts and attributes chart with one example each.   **8**

   b) State and explain factors to be consider in designing for reliability.   **4**

7. a) Explain in briefly about Quality Functions Development (QFD).   **6**

   b) Describe the main characteristic of Weibull analysis or distribution.   **4**

8. Write short note on **any two** :   12

   a) Taguchi's approach to experimental design

   b) Operating characteristic curves

   c) Reliability and life testing plans.

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Seat
No.

M.E. (Electronics Engineering) (Semester – III) Examination, 2014
SELF LEARNING SUBJECT : NETWORK AND INTERNET SECURITY
Paper – I : Specialization – Telecommunication Engineering

Day and Date : Friday, 9-1-2015　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 Kerberos. **7**

　b) Explain federated identity management. **6**

2. Solve **any two** : **(2×6=12)**

　a) Explain mobile device security.

　b) Explain IEEE 802.11i security overview.

　c) Explain WAP security.

3. Solve **any two** : **(2×5=10)**

　a) Explain protected data transfer phase of IEEE 802.11i.

　b) Explain biometrics for security.

　c) What are wireless network threats ?

SECTION – II

4. a) Explain multipurpose internet mail extensions. **7**

   b) Explain S/MIME messages. **6**

5. Solve **any two** : **(2×6=12)**

   a) Explain DKIM functional flow.

   b) Explain packet filtering router.

   c) Explain trusted systems.

6. Solve **any two** : **(2×5=10)**

   a) Explain SA parameters in IPSec.

   b) Explain SSL record protocol.

   c) Explain secure electronic commerce.

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Seat No.

M.E. (Computer Sci. and Engg.) (Part – II) (Semester – III) Examination, 2014
SELF LEARNING
(Computer Network Administration) (Paper – I)

Day and Date : Friday, 9-1-2015　　　　　　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 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. Describe Data and Telecommunication Network with suitable diagram.　　**7**

2. A) Describe current status and Future of Network Management.　　**7**

 B) Draw diagram of OSI Communication Architecture and explain services provided by each layer.　　**7**

3. A) What is ASN.1 ? Explain ASN.1 macros.　　**7**

 B) Describe information model of OSI Network Management.　　**7**

4. A) Draw SNMP Network Management Architecture and explain SNMP manager and SNMP agent.　　**7**

 B) Describe structure of Managed Objects and Macros for Managed Objects.　　**7**

SECTION – II

5. Explain ATM Remote monitoring with help of ATM RMON MIB. **7**

6. A) Draw a diagram and explain SNMP Access Policy. **7**

    B) Describe functional model of SNMP v1 network management. **7**

7. A) Describe RMON 1 Groups and Functions. **7**

    B) Describe RMON 2 Conformance in details. **7**

8. A) Describe different Network Status-Monitoring Tools. **7**

    B) Describe system and Application Management. **7**

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Seat
No.

M.E. (Electronics and Telecommunication Engineering) (Semester – III) Examination, 2014
SELF LEARNING SUBJECT (Paper – I)
Modeling and Simulation of Communication System

Day and Date : Friday, 9-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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 stimulation of communication system.

   d) Write note on role of simulation in communication engineering system.

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** questions : **(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.

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Seat
No.

M.E. (Electronics and Telecommunication Engineering : Digital Electronics and Communication System) (Semester – III) Examination, 2014
MODELING AND SIMULATION OF COMMUNICATION SYSTEM
Paper – I : Self Learning

Day and Date : Friday, 9-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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 multi-disciplinary aspects of simulation.

   b) What is performance estimation ?

   c) Explain methodology problem 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.

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** questions. (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.

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Seat
No.

M.E. (Electrical Engineering) (Semester – III) Examination, 2014
SELF LEARNING SUBJECT : SMART GRID
(Paper – I)

Day and Date : Friday, 9-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Note : *Answer* ***all*** *questions.*

SECTION – I

1. Explain the concept of Smart Grid and its characteristics. Write down the technologies required for the Smart Grid.   **11**

2. Explain the concept Plug in Hybrid Electric Vehicles.   **8**

3. Write a note on, Intelligent Electronic Device (IED).   **8**

4. Explain how automatic meter reading can make the system smarter.   **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 the variable speed wind turbine system.   **8**

7. Explain the importance of Bluetooth in Smart Grid.   **8**

8. Explain in detail communication technologies for the Smart Grid.   **8**

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Seat
No.

M.E. (Mechanical Design Engineering) (Semester – II) Examination, 2014
Paper – VI : ADVANCED DESIGN ENGINEERING

Day and Date : Tuesday, 30-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) State and explain the laws of cam design.   **4**

   b) Plot SVAJ for 4-5-6-7 polynomial cam and find the peak values for data
      given below :
      Low dwell at zero displacement in 90°
      Rise of 30 mm for 90°
      High dwell of 30 mm for 90°
      Fall in 30 mm in 90°
      Cam velocity is 2Π.   **8**

2. a) Explain the nomenclature of hydrodynamic journal bearing with neat sketch.   **4**

   b) Derive Reynold's equation for hydrodynamic lubrication with assumption
      made in it.   **7**

3. a) Explain Hydrostatic lubrication system with neat sketch.   **5**

   b) The following data refer to a hydrodynamic full journal bearing.
      Journal diameter = 50 mm
      Bearing length = 25 mm
      Journal speed = 1500 r.p.m.
      Eccentricity = 30 microns
      Radial clearance = 40 microns
      Lubricant viscosity = 0.025 Pa-s
      Using narrow approximation, calculate :
       i) Load carrying capacity of bearing, and
      ii) Flow rate of lubricant in l/min.   **6**

P.T.O.

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

   a) Kinematics and dynamics of cam design.

   b) Archard's theory of adhesive wear

   c) Sommerfeld number and its significance.

SECTION – II

5. a) In Reliability analysis with usual notations prove that $z(t) = \dfrac{f(t)}{R(t)}$.   **6**

   b) The MTTF of a particular electronic component is 800 hours. What is the
      probability that the similar component fail in an operating time of   **6**

      i) 200 hours

      ii) 400 hours

      iii) 1000 hours.

6. a) Discuss the importance of thermal stresses in design with suitable example.   **4**

   b) Derive the expression for thermal stresses in flat plate.   **7**

7. a) Explain the system reliability with components in series configuration.
      A certain electric system is having 5 independent electric components arranged
      in series. The component failure probabilities are 0.05, 0.04. 0.03, 0.04 and
      0.02. Calculate the system reliability.   **5**

   b) Write a note on contiguity constraint and form constraint.   **6**

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

   a) Bath tub curve

   b) Design for manufacturing and assembly

   c) MTTF and MTBF.

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Seat No.	

M.E. (Mech. Design Engg.) (Semester – II) Examination, 2014
FINITE ELEMENT ANALYSIS (Paper – VII)

Day and Date : Thursday, 1-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain steps involved in finite element analysis. **4**

   b) Given differential equation $2\dfrac{d^2y}{dx^2} - \dfrac{dy}{dx} + 8 = 0$; $0 < x < 1$ $y(1) = 2$; $y(1.5) = 3$.
   Find y(0.1) and y(0.3) by using Galerkin method and tabulate the results. **8**

2. a) Derive general equation for determining stiffness of an element with usual notations in the form of $[K]e = \int_v [B]^T [D][B] dv$. **12**

3. a) Find the approximate solution of differential equation of cantilever beam subjected to uniform axial load using weighted residual method. **6**

   b) Use finite element method calculate the displacement and stresses of the bar as shown in figure. **6**
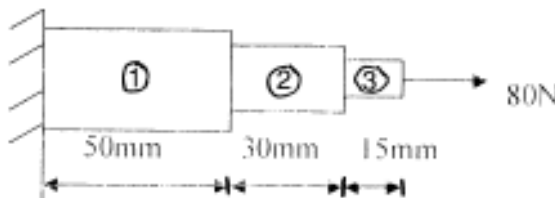
A1 = 60 mm^2, A2 = 30 mm^2, A3 = 15 mm^2, E1 = E2 = 180x10^3 N/mm^2,
E3 = 200x10^3 N/mm^2.

P.T.O.

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

   a) CAE and major CAE software

   b) Rayleigh Ritz Method

   c) Finite Element Formulation.

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) Write a short note on Hermite Polynomials. **4**

6. a) Explain in brief Isoparametric, Subparametric and Superparametric elements. **6**

   b) Derive shape function for a four noded rectangle element with nodes 1(–a, –b), 2(0, –b), 3(0, 0), 4(–a, 0). **6**

7. a) Explain modeling procedure of modal analysis using software based FEM along with its application. **10**

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

   a) Mesh Design and Refinement.

   b) Transient analysis.

   c) Geometric nonlinearity.

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Seat
No.

M.E. (Mechanical-Design Engineering) (Semester – II) Examination, 2014
EXPERIMENTAL STRESS ANALYSIS (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain effect of stressed model in circular polariscope.   **8**

   b) Differentiate between natural and artificial doubly refraction.   **4**

2. a) A photo elastic model in the shape of a beam 1.5 cm deep and 3 mm thick is stressed in pure bending. When a force of 200 N is applied at distance of 30 mm from each end of beam, the 9th fringe just appears at the outer edge. Calculate the material fringe value of the photo elastic model.   **5**

   b) Discuss fringe sharpening.   **6**

3. a) Explain shear difference method.   **6**

   b) Derive stress optics law for 2D photo elasticity.   **5**

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

   a) Stress – freezing technique in 3D photo elasticity.

   b) Brittle coating method.

SECTION – II

5. a) The strain readings as measured by a three element rectangular rosette at a point in the stressed body are as follows :
$\epsilon_a = -400$ micro-Strain, $\epsilon_b = 550$ micro-strain, and $\epsilon_c = 150$ micro-strain, Determine the maximum principal strain direction, principal stresses and the maximum shear stress. Take E = 210 GPa and $\mu = 0.3$. **8**

   b) Explain bonding of strain gauges and moisture proofing. **4**

6. a) Define transverse sensitivity of a strain gauge. Derive the expression for transverse sensitivity of a strain gauge. **6**

   b) Explain various ways of initial balance of Whetstone's bridge. **5**

7. a) Explain Moiré fringe method. What are the merit and demerit ? **6**

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

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

   a) Material used for photo elastic coating.

   b) Temperature compensation of strain gauges.

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Seat No.	

M.E. (Mechanical Design Engineering) (Semester – II) Examination, 2014
Paper – IX : INDUSTRIAL PRODUCT DESIGN

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 role of creativity in new product development. **7**

   b) Explain the design and development process of industrial products. **7**

2. a) Discuss the ergonomic aspect of design of automobiles. **7**

   b) Explain the process of setting specifications of a product. **7**

3. a) Discuss effect of color with reference to ergonomics of consumer products. **7**

   b) Explain interpretation of information in product design. **7**

4. a) Explain the aesthetic expressions of symmetry and balance. **7**

   b) Explain the psychology of seeing. **7**

5. a) Explain the concept of design for production. **7**

   b) Write a note on 'Standardization'. **7**

6. a) Explain value analysis and cost reduction. **7**

   b) Discuss conceptual (conceptional) design. **7**

7. a) Write a note on influence of line and form. **7**

   b) Write a note on rhythm and radiance with reference to aesthetics of a product. **7**

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Seat No.

M.E. Mechanical (Design Engineering)
(Semester – II) Examination, 2014
INDUSTRIAL TRIBOLOGY (Paper – X) (Elective – II)

Day and Date : Thursday, 8-1-2015　　　　　　　　　　　Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Write a note on lubrication and its types. **5**

   b) Using narrow bearing approximation of the bearing, find load carrying capacity and attitude angle for a full journal bearing with 100 mm journal diameter and L/D ratio equal to unity. The radial clearance is 0.0025mm and the journal is rotating with 3000 rpm. Take operating eccentricity ratio (Epsilon) equal to 0.6 and average viscosity of lubricant 0.02 N–S/m^2. **8**

2. a) Discuss the solution of Petroff's equation and its limitations. **6**

   b) Explain the factors affecting wear. **5**

3. a) Derive an equation for load carrying capacity of infinitely long journal bearing. **6**

   b) Explain the concept of Sommerfield number. **5**

4. Write a short note on :
   a) Lightly loaded bearings and heavily loaded bearings. **4**
   b) Stick-slip phenomenon in friction. **4**
   c) Friction control. **3**

P.T.O.

SECTION – II

5. a) Derive Reynolds equation in Elasto-hydrodynamic bearings in terms of
   pressure viscosity.   **8**

   b) Explain Piston pin lubrication.   **5**

6. a) Write a note on theory of hydrodynamic lubrication.   **6**

   b) Explain the tribological aspects of metal rolling.   **5**

7. a) Explain Ertel-Grubin equation.   **5**

   b) Explain the rectangular and circular flat plate hydrostatic squeeze film
   bearings.   **6**

8. Write short notes on **any three** :

   a) Lubrication of spheres.   **3**

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

   c) Hertz theory.   **4**

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Seat
No.

M.E. (Civil-Structures) (Sem. – I) Examination, 2014
ADVANCED DESIGN OF CONCRETE STRUCTURES (Paper – III)

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

Instructions : 1) Question **2** and **5** is **compulsory** from Section **I** and
Section **II** respectively.
2) Solve **any one** from the **remaining two** questions in
Section **I** and Section **II**.
3) **Assume** suitable data **if necessary**.
4) **Use** of calculator and IS 456, IS 3370 Part **IV** are **allowed**.

SECTION – I

1. Design a typical interior panel of a flat slab of 5.5 m × 5.5 m without providing a
drop and column head. Size of column is 450 × 450 mm and live load on the
panel is 4 kN/m^2. Take floor finishing of 1kN/m^2. Use M$_{25}$ concrete and Fe$_{500}$
steel. Sketch the reinforcement details by showing cross sections of column and
middle strip.   **17**

2. Design a combined rectangular footing for two columns A and B, carrying loads
of 500 kN and 700 kN respectively. Column A is 300 mm × 300 mm in size and
column B is 400 mm × 400 mm in size. The centre to centre spacing of the
columns is 3.4 m. The safe bearing capacity of soil may be taken as 150 kN/m^2.
Use M$_{20}$ concrete and Fe$_{415}$ steel.   **18**

OR

Design a combined trapezoidal footing for two columns A and B spaced 5 m c/c.
Column A is 300 mm × 300 mm in size and transmits a load of 600 kN. Column B
is 400 mm × 400 mm in size and carries a load of 900 kN. The maximum length
of footing is restricted to 7 m only. The SBC of soil may be taken as 120 kN/m^2.
Use M$_{20}$ concrete and Fe$_{415}$ steel. Design by providing a longitudinal beam
connecting the two columns.   **18**

3. a) Design a square tank of capacity 1 lakh litre placed on ground with open top. Use M_{20} concrete. $\sigma_{st} = 115$ N/mm^2 on water face and 125 N/mm^2 on face away from liquid for thickness of concrete layer larger than 225 mm. SBC of soil may be taken as 200 kN/m^2. **14**

   b) Write on staging analysis of water tank. **3**

SECTION – II

4. a) A beam of symmetrical I section spanning 8m has flanges width of 200 mm and a flange thickness of 60 mm. The overall depth of beam is 400 mm. Thickness of web is 80 mm. The beam is prestressed by a parabolic cable with an eccentricity of 150 mm at the centre and zero at the supports with an effective force of 100 kN. The live load on the beam is 2000 N/m. Draw the stress distribution diagram at the mid-span section for the following condition.
   i) Prestress + self weight
   ii) Prestress + self weight + live load
   Take weight of concrete = 25000 N/m^2. **9**

   b) Explain with neat sketches the stress concept, strength concept and load balancing concept used in prestressed concrete. **8**

5. a) Design a simply supported prestressed concrete beam having a span of 20 m subjected to a live load of 22 kN/m. Assume M_{40} grade concrete and Fe_{1600} steel. **9**

   b) A prestressed concrete beam 250 mm wide and 600 mm deep is subjected to an axial prestressing force of 1500 kN. Design the end block. **9**

                    OR

   a) Explain Magnel's method and Guyon's method of analysing end block. **7**

   b) A prestressed concrete beam is 230 mm × 350 mm. The initial prestressing force is 500 kN at an eccentricity of 70 mm. The beam has a span of 6 m and has to carry a superimposed load of 8 kN/m. Analyse the beam section for the stresses produced at mid span before and after the application of the live load. Allow a loss of prestress of 20%. Take weight of concrete equal to 25 kN/m^3. **11**

6. a) A post tensioned continuous beam consists of two spans each 18 m. The external loading other than the dead load of the beam is 20 kN/m. Design the beam. **12**

   b) What are the different steps involved in analysis of prestressed concrete continuous beam ? **5**

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Seat
No.

M.E. (Mech. – Design Engineering) (Semester – II) Examination, 2014
THEORY AND ANALYSIS OF COMPOSITE MATERIALS
(Elective – II) (Paper – X)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 in detail the applications of composites.   **7**

   b) Write short notes on Metal Martix composites and particulate composites.   **7**

2. a) With the help of neat sketch describe the Vacuum bag autoclave process for producing carbon fiber reinforced epoxy part for an aircraft.   **7**

   b) With the help of neat sketch explain the hand lay-up process for Manufacturing Composite.   **7**

3. a) Reduce the monoclinic stress-strain relationships to those of an orthotropic material.   **7**

   b) Find the compliance and stiffness matrix for a graphite/epoxy lamina. The material properties are given as   **7**

$E_1 = 181 \text{GPa}, E_2 = 10.3 \text{GPa}, E_3 = 10.3 \text{GPa}$

$v_{12} = 0.28, v_{23} = 0.60, v_{13} = 0.27$

$G_{12} = 7.17 \text{GPa}, G_{23} = 3.0 \text{GPa}, G_{31} = 7.00 \text{GPa}$

P.T.O.

4. a) Evaluate the Four Elastic Moduli of a unidirectional lamina by strength of Materials Approach

   • Longitudinal Young's modulus, E1

   • Transverse Young's modulus, E2

   • Major Poisson's ratio, v12

   • In-plane shear modulus, G12 **7**

   b) Find the maximum value of S > 0 if a stress of $\sigma_x = 2S$, $\sigma_y = -3S$ and $\tau_{xy} = 4S$ is applied to the 60° lamina of graphite/epoxy. Use maximum stress failure theory and the properties of a unidirectional graphite/epoxy lamina are

   $E_1 = 181GPa$, $E_2 = 10.3GPa$, $v_{12} = 0.28$, $G_{12} = 7.17GPa$.

   $\left(\sigma_1^T\right)_{ult} = 1500MPa$, $\left(\sigma_1^C\right)_{ult} = 1500MPa$, $\left(\sigma_2^T\right)_{ult} = 40MPa$,

   $\left(\sigma_2^C\right)_{ult} = 246MPa$, $\left(\tau_{12}\right)_{ult}$ 68MPa **7**

5. Derive the extensional, coupling and bending stiffness matrices for a laminate. **14**

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

   b) Explain the restriction assumptions and consequences in deriving the governing equations for bending of laminated plates. **7**

7. a) Explain the effect of material properties on stresses at the edge of a circular hole in a orthotropic plate under principal stress applied : **7**

   • Along the fiber orientation

   • At an angle to the fiber orientation

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

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

   b) Explain in detail the stiffeners design parameters. **7**

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SLR-BC – 31

Seat No.	

M.E. (Mech.) (Design Engg.) (Semester – II) Examination, 2014
Paper – X : Engineering Design Optimization (Elective II)

Day and Date : Thursday, 8-1-2015 — Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain historical development of optimization. **6**

   b) Find out the critical points in the function $f(x) = x^4$ and describe nature of the critical points. **6**

2. a) Find the maximum value of function $f(x) = x(1.5 - x)$ in the interval (0, 1) with step length 0.1, using accelerated unrestricted search method. **6**

   b) Write a note on Fibonacci series method. **6**

3. a) Maximize $F = 19x + 7y$

   Subjected to

   $$7x + 6y \leq 42$$
   $$5x + 9y \leq 45$$
   $$x - y \leq 4$$
   $$x \geq 0, y \geq 0$$

   Using simplex method. **6**

   b) Express the following LPP in standard form **5**

   Min $Z = x_1 - 2x_2 + x_3$

   Subjected to

   $$2x_1 + 3x_2 + 4x_3 \geq -4$$
   $$3x_1 + 5x_2 + 2x_3 \geq 7$$

   $x_1 \geq 0, x_2 \geq 0$ and x_3 is unrestricted in sign.

4. a) Write a note on engineering applications of optimization. **5**

   b) Explain the following : **6**

   i) Objective function

   ii) Variable

   iii) Constraints.

SECTION – II

5. a) Explain grid search method. **6**

   b) Explain sequential linear program. **6**

6. Minimize $f(X_1, X_2) = \left(X_1^2 + X_2 - 11\right)^2 + \left(X_1 + X_2^2 - 7\right)^2$ using initial simplex

   $x_1 = (0, 0)$; $x_2 = (2, 0)$, $x_3 = (1, 1)$ and $\gamma = 1.5$, $\beta = 0.5$, $\in = 10^{-3}$. **12**

7. a) Write a note on simulated annealing. **6**

   b) Explain the procedure of optimal problem formulation. **5**

8. a) Write a note on genetic algorithm. **6**

   b) Explain direct search method. **5**

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SLR-BC – 32

M.E. (Electronics Engg.) (Semester – I) Examination, 2014
CMOS VLSI DESIGN (Paper – I)

Day and Date : Monday, 29-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain cut off region, nonsaturation region and saturation region of NMOS transistor. **6**

   b) Explain second order effects for MOS transistor. **5**

2. a) What is VTC of CMOS inverter ? What is noise margin and how it can be obtained from VTC of CMOS inverter ? **6**

   b) Explain static power dissipation of CMOS inverter. **5**

3. a) Design full adder using CMOS logic. **6**

   b) Explain signal integrity issues in dynamic design. **6**

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

   a) Technology scaling

   b) Power and Energy delay

   c) Pass transistor logic

   d) Ratioed CMOS logic.

P.T.O.

SECTION – II

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

   b) Explain C^2MOS master-slave positive edge triggered register. **5**

6. a) Explain clock skew in detail. **6**

   b) Explain latch based clocking. **5**

7. a) Explain any one method of designing fast adders. **6**

   b) Explain designing of $DRAM_s$. **6**

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

   a) Bistability principle

   b) Arbiters

   c) PLL for clock synchronization

   d) Designing fast multipliers.

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SLR-BC – 33

M.E. (Electronics Engg.) (Sem. – I) Examination, 2014
ADVANCED DIGITAL SIGNAL PROCESSING (Paper – II)

Day and Date : Wednesday, 31-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. 1) Explain Levinson-Durbin algorithm for efficient solution of normal equation. **6**

   2) Discuss a pipelined architecture for implementing the schur algorithm. **6**

2. 1) Explain relationship between the auto correlation and the model parameter. **6**

   2) Discuss parametric methods for power spectrum estimation. **5**

3. 1) Explain the design of Hilbert transformer. **6**

   2) Explain the design of optimum equiripple Linear phase FIR filter. **6**

SECTION – II

4. 1) Design a digital Butter worth low pass filter whose transfer function is given by

$$0.7 \le \left| H\left(e^{j\omega}\right) \right| \le 1 \quad 0 \le \omega \le 0.2\,\pi$$

$$\left| H\left(e^{j\omega}\right) \right| \le 0.3 \qquad 0.6\pi \le \omega \le 0.2\pi$$

   using bilinear transformation. **6**

   2) Explain digital IIR filter design in time domain using pade approximation method. Illustrate with example. **6**

5. 1) Explain the method of sampling rate conversion by factor I/D. Explain the design of inter polater and decimater filter. **6**

   2) Explain poly phase structure in detail. **6**

6. 1) Discuss in detail concept of Haar Wavelet transform. **6**

   2) Explain the properties of wavelet transform. **5**

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Seat No.

M.E. (Electronics Engineering) (Semester – I) Examination, 2014
ADVANCED NETWORK ENGINEERING (Paper – III)

Day and Date : Friday, 2-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

SECTION – I

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

   1) What is silly window syndrome related to TCP ? How silly syndrome may be avoided ?

   2) Draw and explain the IPv6 datagram format.

   3) Discuss concept of digital signature in detail.

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

   1) Why ICMP is required ? Draw and explain message formats of destination unreachable and ICMP source quench in ICMP.

   2) How internet management is different than network management ? Draw and explain architecture model of network management.

   3) Discuss TCP congestion control algorithm in detail.

3. Answer following questions :

   1) Compare the performance of public and private key systems. For N = 119, public key = 5 and private key = 13, find cipher text generated by a transmitter t uses that RSA algorithm to transmit character 'F'. Also demonstrate the operation of receiver to recover plain text from cipher text.   **5**

   2) Draw and explain IPsec authentication header. What is security association with IP ?   **6**

   OR

   2) What is proxy access through a firewall ? Draw and explain firewall architecture.   **6**

SECTION – II

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

   1) Discuss various multimedia applications.

   2) What is JPEG standard ? Explain image compression using JPEG.

   3) Draw and explain end to end architecture for transportation for MPEG-4 over internet.

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

   1) Explain layered media streaming in detail.

   2) Explain in detail framework of MPEG – 21.

   3) What are the objectives of application layer QoS control ? Discuss techniques employed for QoS control.

6. Answer following questions :

   1) Why TCP is unreliable for real time applications ? Discuss RTP in detail. **5**

   2) Draw the home reference model for DVB. Discuss multimedia home platform (MHP) application. **6**

                    OR

   2) What is digitization of video ? Explain video compression in internet. **6**

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Seat
No.

M.E. (Electronics) (Semester – I) Examination, 2014
**Paper – IV : RANDOM SIGNALS AND PROCESSES**

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) The probability of the closing of each relay of the circuit shown below is given
      by p. If all the relays function independently, show that the probability that a
      circuit exists between terminals A and B is $p^2(2 - p^2)$.   **4**
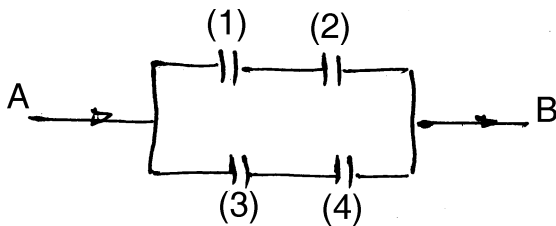
   b) A coin with p{h} = p = 1 – q is tossed n times. Show that the probability that
      the number of heads is even equals $0.5 [1 + (q - p)^n]$.   **4**

   c) A coin is tossed five times. Find the probability of getting at least one tail.   **4**

2. a) Consider the random variable X undergoes a linear transformation as below

      X ——————| Linear transformation |—————— Y

      $f_X(x)$ $f_Y(y)$
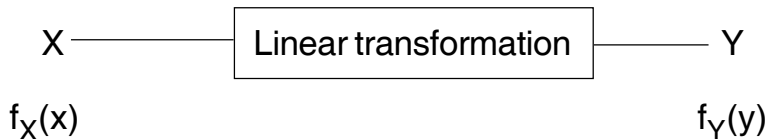
      Let Y = g(x) = aX + b a ≠ 0 obtain $f_Y(y)$.   **5**

   b) A fair coin is tossed three times and the random variable X equals the total
      number of heads. Find and sketch $F_X(x)$ and $f_X(x)$.   **6**

                        OR

b) On a given limited access highway, the minimum speed limit is 35 km/hr and maximum speed limit is 60 km/hr. After extensive observation it is determined that the pdf of actual speed s is
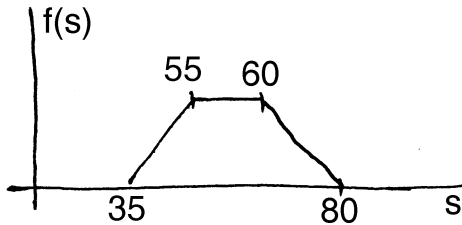

i) What is the mean speed ?

ii) What fraction of vehicles are speeding ?

iii) What is the conditional mean speed, given that a car is exceeding the speed limit ?

iv) If the threshold of a police speed radar is set at 65 km/hr, what fraction of the speeders will be caught ? **6**

3. a) State and explain the statistical properties of jointly distributed random variables. **4**

b) Consider two random variable X and Y with mean and variance as μ_x, μ_y and σ_x, σ_y respectively. Obtain the relation for variance of Z = X + Y. **3**

c) Two random variables X and Y have a joint PDF of

$$f_{XY}(x, y) = \begin{cases} 2e^{-(x+3y)} & x \geq 0, \quad y \geq 0 \\ 0 & \text{elsewhere} \end{cases}$$

Let Z = X + Y

i) Determine the probability density function $f_Z(z)$

ii) Determine the probability distribution function $f_Z(z)$. **5**

OR

c) Two random variables X and Y have a joint PDF of the form **5**

$$f_{XY}(x, y) = \begin{cases} A(x + y) & 0 \leq x \leq 1, \ 0 \leq y \leq 1 \\ 0 & \text{elsewhere} \end{cases}$$

i) Find A

ii) Find $f_X(x)$, $f_Y(y)$

iii) Find f(x/y), f(y/x)

iv) Are X and Y statistically independent ?

SECTION – II

4. a) What is cross correlation function ? Explain along with its properties.

   Prove the relation $\left|R_{XY}(\tau)\right| \le \sqrt{R_X(0)R_Y(0)}$. **4**

   b) A noise voltage V(t) has an autocorrelation function given by

   $$R_v(\tau) = 4\delta(\tau) + 2e^{\left|-b\tau\right|}$$

   The signal travels to a receiver by two different paths, as below
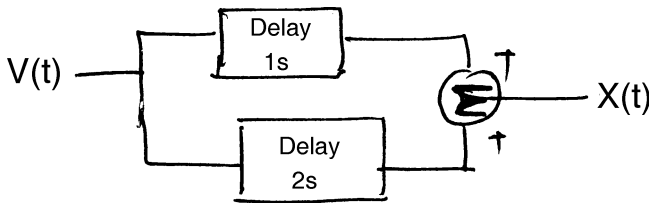
   Find the autocorrelation function of X(t), denoted by $R_X(\tau)$. **4**

   c) Two jointly wide sense stationary random process have sample functions of the form

   X(t) = A cos ($\omega_o t + \theta$) and

   Y(t) = B cos ($\omega_o t + \phi + \theta$)

   Where θ is a random variable uniformly distributed between 0 and 2π and A, B and ϕ are constants.

   i) Find the cross correlation function $R_{XY}(\tau)$

   ii) For what values of ϕ are X(t) and Y(t) are orthogonal. **4**

5. a) Define cross spectral density between two random processes. State its properties. How to estimate cross spectral density of records of limited duration ? **5**

   b) Find the power spectral density of a stationary random process for which

   $$R_{XX}(\tau) = \sigma^2 e^{-\alpha\left|\tau\right|}.$$ **4**

   OR

b) Find the mean, variance and root mean square value of the process with autocorrelation function **4**

$$R_{XX}(\tau) = \frac{25\tau^2 + 36}{6.25\tau^2 + 4}$$

c) Define coherence function. Explain its significance. **2**

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

a) Define :

 i) Markov process

 ii) Poisson process. Is Poisson process is a Markov process ? Explain.

b) An ergodic random process has a spectral density of the form

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

It is applied to a system whose transfer function is

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

Find the magnitude of mean value of the system output.

c) Derive the expression for autocorrelation function of output of linear system. Also obtain expression for its power spectral density.

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Seat No.

M.E. (Electronics Engineering) (Semester – I) Examination, 2014
(Elective – I) DESIGN OF WIRELESS SYSTEM (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Design a passive loop PLL synthesizer with frequency range 2.4 – 2.5 GHz (Center frequency 2.45 GHz), V_{cc} = 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 = 45%, PLL IC of National LMX2326, VCO of RFMD VCO790 – 2300T. **7**

   b) Design a Pierce Crystal oscillator for 600 KHz to 30 MHz. How to tune it to a particular frequency. What are issues associated with it ? **6**

2. a) Discuss any two lumped filter circuit types in details. **6**

   b) What are digital modulation issues ? **6**

                OR

   c) With suitable diagram explain experimental set up for measurement of reverse S parameter measurement. **6**

3. a) Design a wideband feedback RF amplifier with bandwidth of 430 to 930 MHz. **5**

   b) What are passive mixer distortions ? **5**

                OR

   c) What are SAW filters ? What are issues associated with it ? **5**

SECTION – II

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

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

5. a) Give a brief overview of methodology used for communication system simulation. **6**

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

   OR

   c) Discuss AGC and issues associated with it. **6**

6. a) Draw and explain in brief a long amplifier, with integrator and buffer amplifier, used in a receiver's AGC circuit. **5**

   b) Draw and explain a full duplex FDD radio. **5**

   OR

   c) Explain splitters used in communication systems. **5**

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Seat No.

M.E. (Electronics Engg.) (Semester – I) Examination, 2014
IMAGE AND VIDEO PROCESSING (Paper – V) (Elective – I)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Solve **any two** :   **(2×6=12)**

    i) What is sampling in image processing ? Explain limitation of sampling.

    ii) Define DCT and explain its properties.

    iii) Define Quantization. Explain Uniform Optimum Quantizer.

2. Solve **any two** :   **(2×6=12)**

    i) What is K-L transform ? Write down drawbacks and application of K-L transform.

    ii) Derive 4×4 Haar matrix.

    iii) Explain details in point operation.

3. Solve **any two** :   **(2×6=12)**

    i) Differentiate between false color and pseudo color.

    ii) Explain wiener filter. What is the advantage of a wiener filter over an inverse filter ?

    iii) What is blind de-convolution ? Explain details of blind de-convolution.

SECTION – II

4. Solve **any two** :   **(2×6=12)**

    i) A person wishes to apply the Laplacian – of-Gaussian edge operator to an image $f(m, n)$ of size 256×256. The size of edge operator is 32×32, and the origin is at its center. Describe in words how to perform the operation in frequency domain.

P.T.O.

ii) What is Edge detection ? Explain its details.

iii) Consider the image segment,

128	128	128	64	64	32	32	8
64	64	128	128	128	8	32	32
32	8	64	128	128	64	64	64
8	128	128	64	64	8	64	64
128	64	64	64	128	128	8	8
64	64	64	128	128	128	32	32
8	128	32	64	64	128	128	128
8	8	64	64	128	128	64	64

Based on the histogram, find out segment the image into two regions.

5. Solve **any two** :   **(2×5=10)**

   i) Explain lossless DPCM.

   ii) Explain Huffman coding for given below example and find out efficiency of Huffman coding.

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

   iii) What is coding redundancy ? Explain brief details.

6. Solve **any two** :   **(2×6=12)**

   i) Explain fundamental concept of video processing.

   ii) Explain details MPEG 4, MPEG 7.

   iii) Explain color model in video processing.

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Seat
No.

M.E. (Civil-Structure) (Semester – I) Examination, 2014
Paper – IV : DYNAMICS OF STRUCTURES

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 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. From the first principle derive the governing differential equation for damped free vibrations. Obtain the complete solution of differential equation if the system is under critically damped. **18**

2. A sensitive instrument of weight 444.8 N is to be installed at a location where the vertical acceleration of the ground is 0.1 g at a frequency of 10 Hz. The instrument is mounted on a rubber pad of stiffness 14.016 N/mm and damping such that the damping ratio of the system is 10%. Determine
   a) What acceleration is transmitted to the instrument ?
   b) If the instrument can tolerate only an acceleration of 0.005g. Suggest a solution assuming that same rubber pad is to be used. Provide numerical results. **17**

3. A SDOF system is subjected to a transient force as shown in the following figure 1. Derive the expression for magnification factor for the forced as well as free vibration phases. **17**
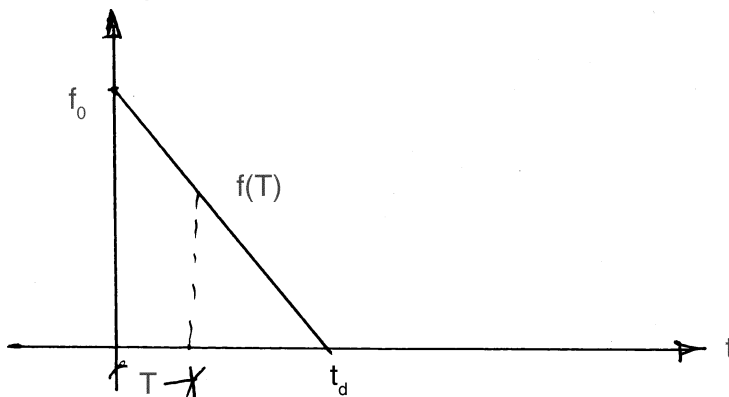
Figure 1. Q. 3)

SECTION – II

4. A two storey frame subjected to forces as shown in figure 2. Determine the maximum floor displacement. Assume damping c = 2%. **18**
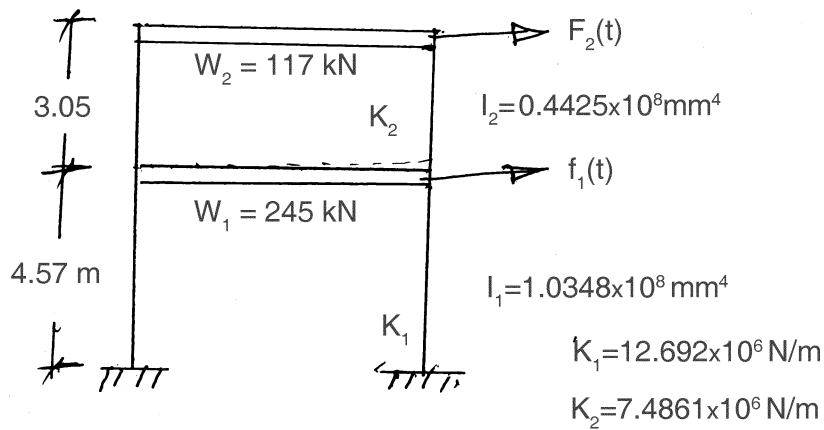
Figure 2. Q. 4)

5. From the first principle derive the governing differential equation of damped forced vibration of a two storey building. **17**

6. Explain the procedure of determining response of a distributed parameter system by mode superposition. Compare it with that of discrete parameter system. **17**

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Seat
No.

M.E. (Electronics Engineering) (Semester – II) (Old) Examination, 2014
ADVANCED COMPUTER ARCHITECTURE (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Max. Marks : 100
Time : 10.00 a.m. to 1.00 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 data dependences.   **8**
   b) Explain different addressing modes with examples.   **10**
                         OR
   c) Explain basic pipeline for DLX.   **10**

2. a) Explain data hazard classification.   **8**
   b) Explain control hazards.   **8**

3. a) Discuss classification of instruction set.   **10**
   b) Discuss first three cycles of DLX instructions.   **6**
                         OR
   c) Explain encoding of an instruction set.   **6**

SECTION – II

4. a) Explain directory protocol.   **10**
   b) Explain implementation of locks using coherence.   **8**
                         OR
   c) Explain FFT Kernel and LU Kernal parallel applications.   **8**

5. a) Explain alternate protocol for enforcing coherence.   **8**
   b) Explain Barrier synchronization.   **8**

6. a) Explain basic vector architecture.   **8**
   b) Explain vector execution time.   **8**
                         OR
   c) Discuss issue of vector length control.   **8**

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Seat No.

M.E. (Electronics) (Sem. – II) Examination, 2014
EMBEDDED SYSTEM DESIGN (Paper – VII) (Old)

Day and Date : Thursday, 1-1-2015   Max. Marks : 100
Time : 10.00 a.m. to 1.00 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. Answer **any two** :   (8×2=16)

   a) What are the various function blocks in PIC 16F877 ? Discuss the architectural feature of PIC 16F877.

   b) Explain brown out reset feature in PIC microcontroller. Explain the meaning of orthogonal instruction set. Is PIC instruction set orthogonal.

   c) Write a PIC programme to initialize I/O ports. Set PORT B as an output port and PORT A as an input port with AIN3 as an analog input and other input lines of PORT A as simple digital inputs.

2. Answer **any two** :   (8×2=16)

   a) Explain, Compare and Capture mode in brief.

   b) What is the function of the STATUS register bit IRP in PIC 16F877 ?

   c) Explain in detail I^2C Bus.

3. Answer **any two** :   (9×2=18)

   a) Discuss the timer 0, 1 and 2 operations and write the various steps to initialize them stating the appropriate control words in the associated SFRs. What is meant by prescaling and postscaling.

   b) What are the registers associated with the operation of the AD module ? What is the function of ADON bit ? What is the right and left justification ?

   c) Draw and explain the interrupt structure for PIC 16F877. How to set the interrupt priority in assembly program ? Explain with suitable example.

SECTION – II

4. Answer **any two** :   **(8×2=16)**

   a) Explain considerations for designing using RTOS.

   b) What are the ways of saving memory space ?

   c) What are problems with semaphore ?

5. Answer **any two** :   **(8×2=16)**

   a) Compare function queue scheduling with Round Robin with interrupt.

   b) Software consideration for saving power in an Embedded System.

   c) Compare various embedded system software architectures.

6. Answer **any three** :   **(6×3=18)**

   a) Memory management RTOS

   b) Role of timer function in RTOS

   c) Use of semaphores for intertask signaling

   d) Message queue and mailboxes.

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Seat No.

M.E. (Electronics) (Semester – II) (Old) Examination, 2014
ADVANCED PROCESS CONTROL (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Attempt **any two** :   **(8×2=16)**

    a) Draw flow chart showing procedure for the empirical model building and explain experimental design step in detail.

    b) Develop feed forward control design for any process control system. Draw neat diagram. What is feed forward control decision criteria explain ?

    c) What is controller tuning ? Why it is necessary ?

2. Attempt **any two** :   **(8×2=16)**

    a) Explain statistical model identification methods and its merits.

    b) Explain the importance of step 'validate model' in mathematical modeling of any process/system.

    c) Explain with appropriate examples, what happens to system if degree of freedom (D-O-F)=0, (D-O-F)<0 and (D-O-F)>0.

3. Attempt **any three** :   **(6×3=18)**

    a) Explain conventional feedback control system.

    b) Write short note on feature of PID controller.

    c) Necessity of processes control.

    d) Define goal-in modeling procedure.

SECTION – II

4. Attempt **any two** :   **(8×2=16)**

   a) Write in detail implementation guidelines for predictive controller.

   b) Discuss on problem solving techniques associated with statistical process control. Explain Shewhart chart.

   c) Explain in detail different types of PLC.

5. Attempt **any two** :   **(8×2=16)**

   a) Explain advantage of PLC in control system.

   b) What are the guidelines in implementation of Processes Model Based Control (PMBC) ? Explain.

   c) Explain effect of process interaction on multi variable system behavior.

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

   a) PLC Software.

   b) Effect of feedback on Dynamic Metrics Controller.

   c) Internal Mode Control (IMC).

   d) Pattern Recognition Control.

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Seat No.

M.E. (Electronics) (Semester – II) (Old) Examination, 2014
MOBILE COMMUNICATION ENGINEERING (Elective – II) (Paper – IX)

Day and Date : Tuesday, 6-1-2015
Time : 10.00 a.m. to 1.00 p.m.

Max. Marks : 100

N.B. : 1) **All** questions are **compulsory.**

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

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

SECTION – I

1. A) Explain basic propagation mechanisms which impact propagation in a mobile communication system. **9**

   B) Briefly explain time dispersion parameters. Compute the rms delay spread for the following power delay profile. **9**
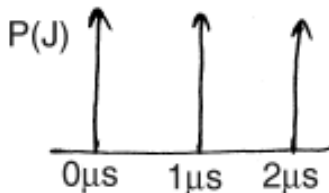
   a) Calculate the rms delay spread for the given figure.

   b) If BPSK modulation is used, what is the maximum bit rate that can be sent through the channel without needing an equalizer.

2. A) With block diagram explain any two small scale multipath measurement techniques. **8**

   B) Given the following geometry, determine : **8**

   a) The loss due to . knife edge diffraction

P.T.O.

b) The height of the obstacle required to induce 6 dB diffraction loss. Assume f = 900 MHz.
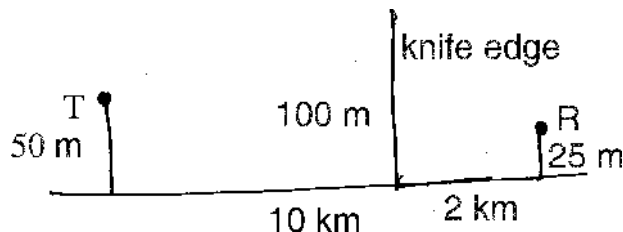
3. Answer **any two** : (2×8=16)

A) Explain π/4 QPSK transmission techniques.

B) Briefly describe standard radio modems for wireless network.

C) Explain fading effects due to Doppler spread.

SECTION – II

4. A) Why diversity techniques are used in cellular systems ? Explain different methods of space diversity reception. **9**

B) List the features of CDMA.
A normal GSM has 3 start bits, 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 : **9**
a) number of overhead bits per frame
b) total number of bits / frame
c) frame rate
d) frame efficiency

5. A) Briefly write about North American TDMA. **8**

B) With block diagram explain PACS system architecture. **8**

6. Answer **any two** : (2×8=16)

A) Explain feature and characteristics of DECT.

B) Briefly write a note on GSM architecture and its features.

C) With diagram explain a simplified communication system using an adaptive equalizer at the receiver.

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Seat No.

M.E. (Electronics) (Semester – II) (Old) Examination, 2014
DISTRIBUTED DATABASE SYSTEM (Paper – IX) (Elective – II)

Day and Date : Tuesday, 6-1-2015   Max. Marks : 100
Time : 10.00 a.m. to 1.00 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 different levels of distribution transparency for read only application. **10**

   B) Explain Top-down and Bottom-up approaches to design of data distribution. **8**

   　　　　　　OR

   B) Explain equivalence transformation of queries. **8**

2. Solve following :

   A) What is the basic purpose of fragmentation design also explain design of horizontal fragmentation ? **10**

   B) Explain 2 phase commitment protocol. **6**

3. Solve following :

   A) Explain reference architecture for distributed databases. **10**

   B) Explain optimization of join queries. **6**

   　　　　　　OR

   Explain vertical fragmentation with example. **6**

SECTION – II

4. Solve following :

   A) Explain in serializability in a distributed database system.   **10**

   B) Explain quorum based approach for locking in concurrency control.   **8**

                   OR

   Explain architecture of MULTIBASE.   **8**

5. Solve following :

   A) Explain commitment protocols and network partitions.   **10**

   B) Explain optimistic methods for distributed concurrency control.   **6**

6. Solve following :

   A) Explain how to allocate authorization rules which are part of catalog.   **10**

   B) Explain in detail fundamental object concept.   **6**

                   OR

   Explain about catalog management.   **6**

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Seat
No.

M.E. (Electronics Engineering) (Sem. – II) (Old) Examination, 2014
BROADBAND COMMUNICATION (Elective – III) (Paper – X)

Day and Date : Thursday, 8-1-2015 Max. Marks : 100
Time : 10.00 a.m. to 1.00 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 are the advantages of digital communication over analog communication ? List various switching techniques and explain each in detail.

   2) Which services are supported by ISDN ? Draw and explain physical layer format of ISDN.

   3) What are ISDN principles ? Explain ISDN architecture in detail.

2. Solve **any two** : **(2×8=16)**

   1) Explain fluid source model for packet voice in detail.

   2) What are Markov processes ? Explain it in detail.

   3) What is the need of interworking in ISDN ? Discuss ISDN-ISDN interworking in detail.

3. Solve **any two** : **(2×9=18)**

   1) What is X.25 packet level protocol ? Draw various packet formats of X.25 and describe them in detail.

   2) What is contention in ISDN ? Discuss contention resolution mechanism in case of ISDN.

   3) What is rate adoption and multiplexing in case of ISDN ? Explain them in detail.

P.T.O.

SECTION – II

4. Solve **any two** :   (2×8=16)

   1) Explain interactive and distributive services in B-ISDN.

   2) Draw and explain logical and physical hierarchy of SONET.

   3) Draw UNI and NNI ATM cell format and describe each field in detail.

5. Solve **any two** :   (2×8=16)

   1) What are different AAL services ? Draw format of AAL-1 protocol and explain.

   2) What is cell based physical layer and SDH based cell transfer ? Explain each in detail.

   3) How ATM cell is processed in ATM switches ? Explain effect of buffer on the performance of ATM switches.

6. Solve **any two** :   (2×9=18)

   1) What is feedback congestion control in broadband network ? Explain rate based traffic control.

   2) Draw and explain B-ISDN architecture and user interface.

   3) What are the ATM switching requirements ? Explain matrix type ATM switches.

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Seat
No.

M.E. (Electronics Engineering) (Semester – II) (New) Examination, 2014
Paper – VI : RESEARCH METHODOLOGY

Day and Date : Tuesday, 30-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What is a research design ? What is its significance ? What is its need ? **6**

    b) With suitable example explain different ways to classify research. **6**

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

OR

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

    c) What are motivational factors for carrying research ? **5**

3. a) With suitable example explain objective, sub objective and scope in a typical
research synopsis. **7**

    b) Explain continuous modeling. **6**

OR

    c) Explain discrete modeling. **6**

SECTION – II

4. a) Explain any three statistical distributions with applications. **6**

    b) Explain significance of E books and E journals in modern research. **6**

5. a) Explain confidence interval in statistical output analysis. **5**

   OR

   b) Explain hypothesis testing in statistical output analysis. **5**

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

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

   b) Discuss a structure of a typical project report with suitable example. **6**

   OR

   c) Discuss a structure of a typical research paper with suitable example. **6**

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Seat No.

M.E. (Electronics Engg.) (Semester – II) (New) Examination, 2014
EMBEDDED SYSTEM DESIGN (Paper – VII)

Day and Date : Thursday, 1-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction : All questions are compulsory.

SECTION – I

1. Explain the following instruction (**any five**) :   (5×3=15)
    1) ADC
    2) AND
    3) BL
    4) CMP
    5) LDC
    6) MLA.

2. Interface a relay with on time 30 seconds and off time 10 seconds also give the buzzer indication for timer O using **ARM 9** and write the programme in C.   **10**

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

                          OR

3. Explain the characteristics of embedded computing applications.

SECTION – II

4. Explain queues and stacks used in C/C++.   **10**

5. Explain in detail semaphore management in linux.   **10**

6. Explain system design example of data base application in CCD camera.   **15**

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Seat No.

M.E. (Civil) (Structures) (Semester – I) Examination, 2014
Elective – I : DESIGN OF FOUNDATIONS (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 2.00 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) State assumptions and limitations in Terzaghi's analysis for bearing capacity. Also write on effect of water table on bearing capacity. **4**

   B) A square footing has to carry load of 1000 kN. Find size of footing for FOS of 2.5. The depth of foundation is 1.5 m. Soil has following properties

   $G = 2.6$, $e = 0.53$, $Sr = 0.5$, $\varnothing = 30°$ and $C = 10$ kN/m^2. What will be the size of footing if footing has to carry the load of 2000 kN. Take $N_c = 37.5$, $N_q = 22.5$ and $N_\gamma = 19.7$. **8**

2. A) Describe different types of combined footing with neat sketch. **4**

   B) Design a strap footing to carry two column loads of 1200 kN and 1800 kN. The centre to centre distance between the columns are 5 m. Size of column are 450×450 mm (1200 kN) and 500×500 mm (1800 kN). Footing area under the columns are respectively 1.2 m $\times$ 2.5 m and 2.5 m $\times$ 2.5 m connected by strap. Take SBC = 250 kN/m^2. Use M-20 concrete and Fe-415 steel. **8**

3. A) Describe various types of raft foundation. **5**

   B) Describe conventional method of design of raft foundation. **6**

SECTION – II

4. A) What is pile group efficiency ? How it is determined ?   **4**

   B) A pile 300 mm dia and 8 m length is cast in situ. Pile is constructed through soil consisting of two layers mentioned below,

      I) 3 m thick top layer (from ground level)

         $\gamma_b = 14$ kN/m^3, $\emptyset = 28°$, C = 10 kN/m^2

      II) 5 m thick layer (below top layer)

         $\gamma_b = 17$ kN/m^3, $\emptyset = 0°$, C = 60 kN/m^2

      Determine its static capacity if FOS = 2.   **8**

5. A) Describe various types of drilled pier.   **4**

   B) Describe various components of well foundation by typical sketch. Write about the design guidelines for these components.   **7**

6. A) Draw the sketch of block foundation with all 6 degrees of freedom (3 translation and 3 rotation).   **4**

   B) What do you understand by vibrator isolators ? Describe them.   **4**

   C) Write short note on permissible amplitude of vibration for machine.   **4**

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Seat
No.

**M.E. (Electronics Engineering) (Semester – II) (New)
Examination, 2014
PERIPHERAL SYSTEM DESIGN AND INTERFACING (Paper – VIII)**

Day and Date : Saturday, 3-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) What is balanced data transmission ? Specify characteristics of RS 232.

   2) Draw and explain I/O write cycle in ISA bus system. Discuss limitations of ISA bus.

   3) Explain features of PCI bus.

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

   1) Draw structure of EISA bus and explain in detail.

   2) Draw and explain memory read and memory write in case of ST-100.

   3) Mention different pins and signals associated with GPIB. Explain asynchronous handshake protocol used in GPIB.

3. Answer following questions :

   1) Draw diagram showing multi-drop connection in RS 485 standard and explain it in detail.   **6**

   2) Specify various features of USB. Explain USB system and signaling in detail. **5**

                OR

   2) Discuss MODBUS message structure and message format for data transmission over RS-485.   **5**

SECTION – II

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

   1) What are the different sampling methods in multiplexed DAQ system ?

   2) Explain application based classification and objectives of control system.

   3) Describe basic DMA operation in P.C.

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

   1) Draw and explain functional block diagram of PC based DAQ system.

   2) What are the different registers involved in universal transmitter / receiver controller ?

   3) With neat sketch explain construction and working of PLC. How PLC is selected for certain application ?

6. Answer following questions :

   1) List carious field bus systems. Explain DeviceNet bus system and message frame format in detail.   **6**

   2) Which layers are involved in ControlNet protocol ? Explain briefly ControlNet message frame.   **5**

              OR

   2) Draw block diagram showing system configuration in field bus system. What is difference between field bus and industrial ethernet ?   **5**

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SLR-BC – 51

M.E. (Electronics) (Semester – II) (New) Examination, 2014
Paper – IX : ADVANCED CONTROL SYSTEMS

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

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

   a) Explain digital control system in detail.

   b) Derive the state variable representation of the system with following transfer function.

   $$\frac{Y(s)}{U(s)} = \frac{8}{(s + 1)(s + 2)(s + 4)}$$

   c) Explain procedure for deriving transfer function from the given state space model.

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

   a) Determine the contalability and observability properties for following system

   $$A = \begin{bmatrix} 0 & 0 & 0 \\ 1 & 0 & -3 \\ 0 & 1 & -4 \end{bmatrix} B = \begin{bmatrix} 40 \\ 10 \\ 0 \end{bmatrix} C = \begin{bmatrix} 0 & 0 & 1 \end{bmatrix}.$$

   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.

   c) Explain steps to draw root locus and explain each role in detail.

3. a) Obtain Eigen values for following matrix

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

5

   b) Explain sampling, quantization effect in detail.

6

SECTION – II

4. Attempt **any two** :

(6×2=12)

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

as $\dfrac{Y(s)}{U(s)} = \dfrac{10}{s(s+1)}$. While the feedback path transfers function H(s) is 5.

Determine the sensitivity of the closed loop transfer function with respect to G and H at $\omega = 1$ rad/sec.

   b) Explain robust internal model control system.

   c) Write a note on basic MIMO control loop.

5. Attempt **any two** :

(6×2=12)

   a) Consider the system with transfer function $\dfrac{Y(s)}{U(s)} = \dfrac{9}{s^2 - 9}$. Find matrices

A, B, C in observable canonical form.

   b) Explain conversion of MIMO problem to SISO problem.

   c) Explain different parameters considered in design of robust control system.

6. a) Write short notes on design vai pole placement.

6

   b) Explain sensitivity of the control system.

5

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Seat No.

M.E. (Electronics Engineering) (Sem. – II) (New) Examination, 2014
MOBILE TECHNOLOGY (Elective – II) (Paper – X)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 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 functions of functional groups of GPRS in detail. **7**

   b) With message flow diagram explain inter MSC registration and inter VLR registration. **7**

2. Answer **any two** : **12**
   a) Explain any two GPRS interfaces in detail.
   b) Describe WAP mechanism tailored for wireless communication.
   c) Explain failure restoration procedure for VLR and HLR.

3. a) Explain a WAP network configuration. **5**
   b) Briefly explain about GPRS billing procedure. **4**
                   OR
   b) With diagram explain international call setup procedure. **4**

SECTION – II

4. a) Explain in detail the phases of evolution of CDMA 2000. **7**
   b) Describe Iu-PS and Iu-CS interface protocol architecture. **7**

5. Answer **any two** : **12**
   a) Explain any two packet session available for use within a CDMA 2000 network.
   b) Describe different components of information security.
   c) Explain downlink, scrambling and modulation process for air interface.

6. a) With suitable sketch explain types of attacks observed in mobile computing. **5**

   b) Briefly write about EVDO revision A. **4**
                   OR
   b) What different types of handover, UMTs supports ? **4**

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Seat
No.

M.E. (Electronics Engg.) (Sem. – II) (New) Examination, 2014
(Elective – II) VLSI IN SIGNAL PROCESSING (Paper – X)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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.
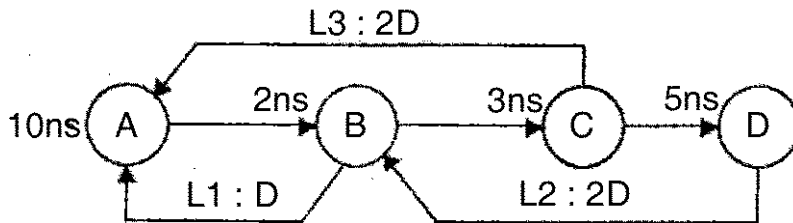
   d) Perform the retiming for the following DFG shown in fig.
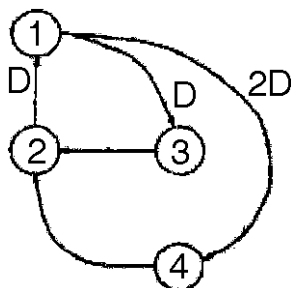
   e) What is retiming of DFG ? Explain properties of retiming.

2. Solve the following :

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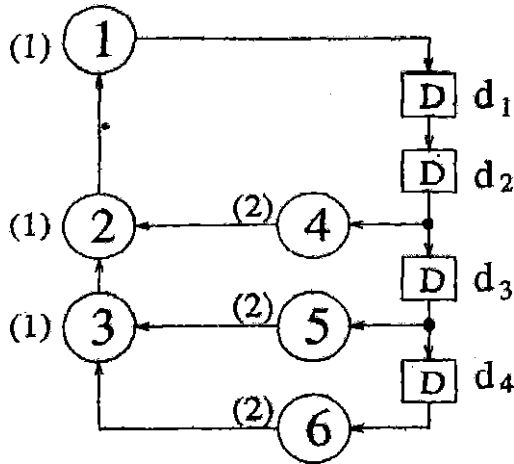
   b) In the SFG shown in fig (a) the computation time for each node is assumed to be 1 u.t.

   i) Calculate critical path computation time.

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

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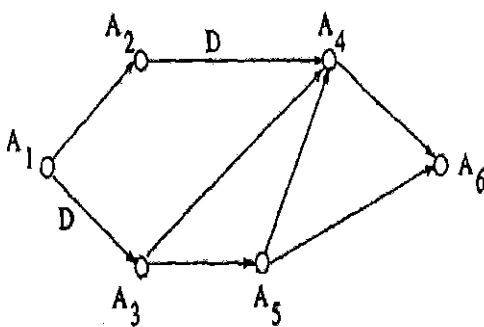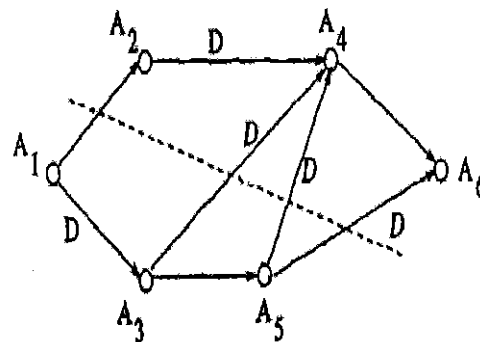
Fig. a   Fig. b

OR

b) Find the loop bound and iteration bound for the DFG shown below. Also examine the precedence constraints and justify the loop bound calculated above.
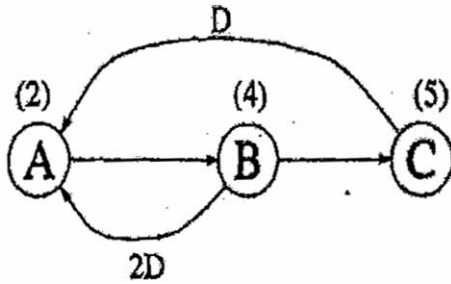
7

SECTION – II

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

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

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

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

d) Explain applications of unfolding.

e) Explain parallel carry save array multipliers.

4. Solve the following :

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

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

$r_1 - r_2 \leq 0$

$r_3 - r_1 \leq 5$

$r_4 - r_1 \leq 4$

$r_4 - r_3 \leq -1$

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

OR

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

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

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SLR-BC – 56

M.E. (CSE) (Semester – I) Examination, 2015
THEORY OF COMPUTATION (Paper – I)

Day and Date : Monday, 29-12-2014
Time : 10.00 a.m. to 1.00 p.m.

Total Marks : 70

SECTION – I

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

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

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

   c) Show that in a graph G, the sum of degree of the nodes of G is an even number.

   d) What is multitape TM ? Prove that every multitape TM has an equivalent single tape TM.

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

2. Answer the following : **6**

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

3. Answer the following : **5**

   What is diagonalization method ? Prove the corollary " some languages are not turing recognizable.

SECTION – II

4. Answer **any four** :   24

   a) If $R_{TM} = \{ < M > \mid M$ is a TM & L (M) is a regular language} then prove that R_{TM} is undecidable.

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

   c) Explain recursion theorem with self reference example.

   d) Elaborate NP completeness with example.

   e) Elaborate growth rate of functions.

5. Answer the following :   6

   Illustrate PCP problem and prove that PCP is undecidable.

6. Answer the following :   5

   What are tractable and intractable problems ? Explain in detail.

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Seat
No.

M.E. (Computer Science and Engg.) (New) (Semester – I) Examination, 2014
Paper – II : ADVANCED OPERATING SYSTEMS

Day and Date : Wednesday, 31-12-2014　　　　　　　　　　　　Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

I. Answer **any two** of the following :　　　　　　　　　　　　　　　　**10**

　1) Discuss some of the important concepts that a distributed operating system designer must use to improve the reliability of the system.

　2) Explain some of the guiding principles for designing the scalable operating system.

　3) In distributed operating system, state the advantages and disadvantages of using a single server and multiple servers for implementing a service.

II. Answer **any two** of the following :　　　　　　　　　　　　　　　　**10**

　1) How to keep track of lost and out-of-sequence messages using bit vector and selective repeat technique. Explain with example.

　2) The operations performed by the server are nonidempotent. Describe a mechanism for implementing exactly once IPC semantics in this case.

III. Answer the following :

　1) What is an orphan call ? How are orphan calls handled in the implementation of the following types of call semantics ?

　　i) Last-one call semantics

　　ii) Last-of-many semantics

　　iii) At least-once call semantics.　　　　　　　　　　　　　　　　**7**

　2) What are the several criteria's used for choosing granularity in DSM ?　　**8**

SECTION – II

IV. Answer **any two** of the following : **10**

1) Explain state information exchange policies in load-balancing algorithms.

2) Suppose you have to design a load-sharing algorithm for a distributed system, will you prefer to use a sender-initiated or a receiver-initiated location policy in your algorithm ? Give reasons for your answer.

3) A system consists of three processors P1, P2, P3 and a process having four tasks t1, t2, t3 and t4 to be executed on this system. Suppose E_{ij} is the cost of executing task ti on processor Pj and C_{IJ} is the cost of communication between tasks ti and tj when the two tasks are assigned to different processors. Let $E_{11} = 31$, $E_{12} = 4$, $E_{13} = 14$, $E_{21} = 1$, $E_{22} = 5$, $E_{23} = 6$, $C_{12} = 35$, $C_{13} = 3$, $C_{14} = 8$, $C_{23} = 6$, $C_{24} = 4$ and $C_{34} = 23$. Find an optimal assignment of the tasks to the processors and calculate the cost of optimal assignment.

V. Answer **any two** of the following : **10**

1) List five important features of a good process migration mechanism.

2) Explain different models for organizing threads.

3) Explain address space transfer mechanism in process migration.

VI. Answer the following :

1) Explain the following consistency models : **8**

i) Sequential consistency model

ii) Causal consistency model.

2) What are different server creation semantics ? Explain each in detail. **7**

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SLR-BC – 58

Seat No.	

M.E. (CSE) (Semester – I) Examination, 2014
ANALYSIS OF ALGORITHM (Paper – III)

Day and Date : Friday, 2-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instruction : *Solve **any three** questions from **each** Section.*

SECTION – I

1. Solve the following recurrence : **12**

   A) $T(n) = 2T\left(\dfrac{n}{2}\right) + n$

   B) $T(n) = \begin{cases} 1 & n \le 4 \\ T(\sqrt{n}) + c & n > 4 \end{cases}$.

2. A) What is the solution generated by job sequencing algorithm when $n = 7$ **6**

   $(p_1, p_2, \ldots , p_7) = (3, 5, 20, 18, 1, 6, 30)$

   $(d_1, d_2, \ldots , d_7) = (1, 3, 4, 3, 2, 1, 2)$.

   B) Two jobs have to be scheduled on three processors. The task time are given by the matrix J. **6**

   $$J = \begin{bmatrix} 2 & 0 \\ 3 & 3 \\ 5 & 2 \end{bmatrix}$$

   Find finish time and mean flow time for both type of scheduling.

3. A) Explain how backtracking is appropriate than Boute force approach with example. **6**

   B) Draw the portion of the state space tree generated by LCBB for the following Knapsack instances :
   $n = 5$, $m = 12$
   $(p_1, p_2, \ldots , p_5) = (10, 15, 6, 8, 4)$
   $(w_1, w_2, \ldots , w_5) = (4, 6, 3, 4, 2)$. **6**

P.T.O.

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

   A) Asymptotic notation

   B) Hamilton cycle.

SECTION – II

5. A) What is Clique Decision Problem (CDP) and show that CNF-satisfiability α CDP ? **6**

   B) What is Node Cover Decision Problem ? **6**

6. A) Explain odd-even merge algorithm with example for PRAM. **6**

   B) Solve the Boolean OR and AND problem on the CREW and EREW PRAM. **6**

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

   B) Explain Voronoi diagrams. **6**

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

   A) Shared Memory Machines

   B) Directed Hamilton Cycle.

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SLR- BC – 59

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) Explain in short the significance of research. What are the points that need
   to be remembered for understanding the significance of research ?   **6**

   b) Explain the difference between research methods and research methodology.   **6**

2. a) What are the different research designs ? Explain any one of them.   **6**

   b) List the three principles of experimental design and explain them in short.   **6**

3. a) Explain the telephone interviews with merits and demerits.   **6**

   b) Write a short note on collecting data through schedules.   **6**

4. a) Describe the process of collection of secondary data. What are the desirable
   characteristics of secondary data ?   **6**

   b) What are the points that need to be remembered for selecting a research
   problem ?   **5**

SECTION – II

5. a) Explain the basic concepts concerning hypothesis testing. **6**

   b) What are the important statistical measures used to summarize the survey or research data ? **6**

6. a) Write a short note on Plagiarism. **6**

   b) Write short note on Intellectual property rights. **6**

7. a) Explain the technical report in detail. **6**

   b) What are the different types of reports ? Explain popular report in detail. **6**

8. a) What things are to be considered while reading a scientific paper ? **6**

   b) What are the precautions that need to be taken while writing a research report ? **5**

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Seat No.

M.E. (Civil Structures) (Semester – I) Examination, 2014
Elective – I : ADVANCES IN CONCRETE COMPOSITES (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Enumerate different types of fibres used and explain properties of steel fibre used for Fibre Reinforced Concrete. **9**

   b) Explain mix proportion, mixing and casting methods of Fibre Reinforced Concrete. **9**

2. a) Explain material used for Ferro cement and their mechanical properties. **9**

   b) Explain Ferro cement design for Direct tension. **9**

3. a) Write on properties of freshly mixed fibre reinforced concrete. **9**

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

SECTION – II

4. a) Explain reaction mechanism of Silica Fumes in case of Silica Fume Concrete. **9**

   b) Explain the role of Polymer Concrete. **8**

5. a) Explain properties of Silica fume concrete in fresh state. **9**

   b) What are the advantages of Silica Fume Concrete ? **8**

6. a) Explain different chemical properties of Silica Fumes. **6**

   b) Classification of Polymer Concrete. **5**

   c) Factors influenced by Silica fume on hardened concrete. **6**

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SLR-BC – 60

SECTION – I

1. With a neat diagram, explain the architecture of typical data mining systems. **7**

2. With a suitable example, explain the characterization based on data generalization and summarization. **7**

3. Explain various components involved in datawarehouse architecture. **7**

4. List out the categories of OLAP tools and explain them. **7**

5. Explain KDD. **7**

6. Explain in detail the mining of single-dimensional association rules in large databases. **7**

SECTION – II

7. Write short notes on Data Mining Query Language. **7**

8. Write note on spatial data mining. **7**

9. Explain SD (CLARANS) algorithm. **7**

10. What do you mean by SPADE ? **7**

11. Explain trend dependencies. **7**

12. Explain Attribute Relevance Analysis. **7**

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Seat No.

M.E. (Computer Science and Engg.) (Semester – I) Examination, 2014
Elective – I MOBILE COMPUTING (Paper – V)

Day and Date : Wednesday, 7-1-2015　　　　　　　　　　　　　Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Solve **any two** : **12**

    a) MSK system is used for signal transmission. Explain and draw waveforms to show that following data does not produce any phase shift.

    Data : 1　1　0　1　0　0　1　0

    b) Explain basic spread spectrum technique.

    c) Draw and explain FHSS transmitter and receiver.

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

    a) Explain GSM system architecture.

    b) Explain GSM handover in detail.

    c) Explain PRMA implicit reservation scheme.

3. How MACA can avoid hidden terminals problem ? Explain with diagram. **6**

    OR

    Explain ISMA scheme for packet data transmission service.

4. Write a note on Mobile terminated call in GSM. **5**

SECTION – II

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

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

   b) Draw and explain Symbian OS architecture.

   c) Explain snooping TCP in detail.

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

   a) Explain agent solicitation and agent advertisement in agent discovery phase.

   b) Write a note on Plam OS.

   c) Explain DFWMAC-PCF with polling.

7. Draw and explain wireless datagram protocol of WAP.   **6**

                              OR

   Write a note on WML script.

8. Write a note on transport layer security in WAP.   **5**

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Seat No.	

M.E. (Computer Sci. and Engineering) (Semester – II) (Old) Examination, 2014
COMPUTER NETWORK ADMINISTRATION (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What do you mean by Distributed Computing Environment (DCE) ? Explain model of client – server network in DCE.   **8**

   b) What are network management standards ? List the salient points of each standard.   **8**

2. What is network management ? Draw and explain Dumbbell Architecture and interoperablity in network management.   **16**

3. a) Explain two – tier and three – tier network management organization model.   **8**

   b) With neat diagram explain SNMP network management architecture.   **8**

4. Write a short note on **any three** :   **18**

   a) Comparison between MIB and MDB

   b) Information model

   c) Internet fabric model

   d) Elements of system group in MIB – II.

SECTION – II

5. a) What is remote probing ? Explain RMON1 textual conventions. **8**

   b) What are the common RMON 1 and Ethernet groups ? Explain the functions of each group. **8**

6. List Management Information Base (MIB) groups and tables and conformance specifications with respect to RMON2. **16**

7. a) What are different network management tools ? Explain protocol analyzer with neat diagram. **8**

   b) Describe and explain network statistics measurement system in detail. **8**

8. Write a short note on **any two** : **18**

   a) Major changes in SNMP v2 and v3

   b) ATM remote monitoring

   c) Case study of internet traffic using RMON.

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Seat No.	

M.E. (Computer Science and Engg.) (Semester – II) (Old) Examination, 2014
ADVANCED DATABASE DESIGN (Paper – VII)

Day and Date : Thursday, 1-1-2015   Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) *Question No.* **4** *and* **8** *are* **compulsory.**

               2) *Attempt* **any two** *from remaining questions of* **each** *Section.*

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

               4) **Assume** *suitable data* **wherever** *necessary.*

SECTION – I

1. a) Discuss following motivations for distributed databases :   **8**

     i) Incremental growth

     ii) Reduced communication overhead

   b) Discuss importance of following objectives in the design of data distribution : **8**

     i) Availability and reliability of distributed data

     ii) Workload distribution

2. a) With the help of an architectural diagram, discuss 'Types of accesses to a distributed database'.   **6**

   b) Consider the following global, fragmentation and allocation schemata :   **10**

     Global Schema : STUDENT (NUMBER, NAME, DEPT)

     Fragmentation Schema : $STUDENT_1 = SL_{DEPT = \text{"EE"}}$ STUDENT

                               $STUDENT_2 = SL_{DEPT = \text{"CSE"}}$ STUDENT

     Allocation Schema : $STUDENT_1$ at sites 1,2

                               $STUDENT_2$ at sites 3,4

P.T.O.

(Assume that "EE" and "CSE" are only possible values for DEPT)

Write an application that moves the student having number 123 from department "EE" to department "CSE", at level 1,2, and 3 of transparency.

3. a) Discuss in detail 'Weighted Majority Locking'. **6**

   b) Consider two transactions T1 and T2 which both transfer funds from an account 'A' located at site 1 to an account 'B' located at site 2. The two transactions are described as follows :

   $T_1 : R_1 (A), W_1 (A), R_1 (B), W_1 (B)$

   $T_2 : R_2 (A), W_2 (A), R_2 (B), W_2 (B)$

   Show all possible executions of the two transactions if 2-phase locking is mused for concurrency control. **10**

4. a) Consider a data item x. Let RTM (x) = 21 and WTM (x) = 20. Let the pair $(P_i(x), TS)$ denote a pre-write request of transaction T_i on the data item x with timestamp TS. Indicate the behaviour of the timestamp method with 2-phase commitment if the following sequence of requests is received. **9**

   $<P_1 (x), 22)>, <P_2 (x), 26>, <R_3 (x), 19>, <R_4 (x), 23>, <W_1 (x), 30>, <R_5 (x), 24>, <P_6 (x), 18>, <R_7 (x), 27>, <W_2(x), 31>$

   b) Consider a data item x. Let RTM (x) = 25 and WTM (x) = 20. Let the pair $<R_i (x), TS> <W_i (x), TS>$ denote a read (write) request of transaction T_i on the item x with timestamp TS. Indicate the behaviour of the basic timestamp method with the following sequence requests : **9**

   $<R_1 (x), 19>, <R_2 (x), 22>, <W_3 (x), 21>, <W_4 (x), 23>, (R_5 (x), 28>, <W_6 (x), 27 > (9).$

SECTION – II

5. a) List and explain at least 5 mobile database system applications. **6**

   b) With the help of diagram, discuss in detail page server architecture. **9**

6. a) Discuss nested transactions in OODBMS. Cite appropriate examples. **6**

   b) With the help of an architectural diagram, discuss Video Database System. **9**

7. a) What is object serialization ? How is the concept linked to object persistence ? How does a persistent programming language help in object oriented databases ? **6**

   b) What do you understand by LOID ? How are they generated ? Discuss their mapping. **9**

8. a) Describe the role that XSL can play when dynamically generating HTML pages from a relational database. **5**

   b) A vehicle Rental company maintains a vehicle database for all vehicles in its current fleet. For all vehicles, it includes the vehicles identification number, registration number. Engine number, manufacturer model, colour of vehicle, date of purchase and the drivers of vehicles. Special data are included for certain types of vehicles. **15**

      i) Trucks : Cargo capacity

      ii) Sports Cars : Horsepower, renter age requirement

      iii) Vans : Number of passengers

      iv) Off road vehicles : ground clearance, drive train (four or two wheel drive).

   Similarly, the details of drivers include such items as driver's name, date of birth, license number, permanent account number and the type of vehicles he is allowed to drive.

   Construct an object oriented database schemes for this example. Use inheritance where appropriate.

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SLR-BC – 66

Seat No.	

M.E. Computer Science and Engineering (Semester – II) (Old) Examination, 2014
ADVANCED COMPUTER ARCHITECTURE (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Max. Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Q. **4** and Q. **8** are **compulsory**. Answer **any 2** questions
from Q. **1** to Q. **3** and **any 2** questions from Q. **5** to Q. **7**.

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

SECTION – I

1. a) Explain types and levels of parallelism.   **8**

   b) State basic computational models. Explain Von Neumann model in detail.   **8**

2. a) Compare between RISC and CISC architectures.   **8**

   b) State and explain different performance measures used to measure
   performance of a pipeline.   **8**

3. a) How load use delay is handled in case of pipeline ?   **8**

   b) Draw a 4 stage logical layout of pipeline for RISC pipelined architecture.
   How is it used to implement different instruction classes ?   **8**

4. Write notes on **any two** :   **18**

   a) Instruction processing in pipelines

   b) Preserving sequential consistency

   c) Dependencies in pipeline.

SECTION – II

5. a) Explain VLIW architecture. **8**

   b) Draw the layout of dispatch policy in shelving of superscalar architecture. **8**

6. a) Draw design space of issue policy in case of superscalar architecture. Explain. **8**

   b) How issue blockages are handled in case of superscalar architecture ? **8**

7. a) Draw design space of type of rename buffers used in superscalar architecture. Explain. **8**

   b) Explain the basic concept of shelving. **8**

8. Write notes on **any two** : **18**

   a) DRIS

   b) Superscalar CISC processor using a superscalar RISC core

   c) R10000.

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SLR- BC – 67

M.E. (Computer Science and Engineering) (Semester – II) (Old) Examination, 2014
Elective – III : WEB TECHNOLOGY (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Total Marks : 100
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Question **1** and **8** are **compulsory**.
　　　　　　　 2) Solve **any five** questions from **each** Section. **Each** question carries **eight** marks.
　　　　　　　 3) Figures to the **right** indicate **full** marks.

SECTION – I

1. Create HTML page for following features :

   Create an unordered list

   Create an ordered list

   Use various bullet styles created nested lists

   Use the font tag in conjunction with lists

   Create definition lists use graphics as bullets.   **10**

2. What is a markup language and what is the relationship between XML, HTML and SGML ?   **8**

3. Discuss the working of ASP with proper diagram; also briefly discuss all its seven objects.   **8**

4. Discuss HTTP request and response messages.   **8**

5. Explain Dom event handling in detail.   **8**

6. Explain client side scripting versus server side scripting and accessing web servers.   **8**

7. Explain the use of relative URL's with example.   **8**

P.T.O.

SECTION – II

8. Write a program for Inter servlet communication (servlet-servlet communication). **10**

9. Explain JSP Architecture with suitable diagram. **8**

10. Differentiate between web 2.0 and web 3.0. **8**

11. Describe servlet architecture and the various interfaces invoked by the servlet container. **8**

12. Describe a servlet program, that handles HTTP get request containing data that is supplied by the user as part of request. **8**

13. Write short note on Podcasting and Widgets. **8**

14. Explain listing of server side risks. **8**

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Seat No.

M.E. (Computer Science and Engineering) (Semester – II) (Old) Examination, 2014
Elective – IV : NATURAL LANGUAGE PROCESSING (Paper – X)

Day and Date : Thursday, 8-1-2015   Total Marks : 100
Time : 10.00 a.m. to 1.00 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) Illustrate different Karaka structures.

   b) Illustrate Kriya Rupa Chart.

   c) Mention the types of Karakas.

   d) How do we establish Morphological analysis ?

   e) Give the steps in creating a Paradigm table.

   f) What are the goals of Natural Language Processing ?

2. Attempt **any two** :   **16**

   a) What is Utsarga-apvaada ? Illustrate its use.

   b) Explain the semantic model of Panninian framework.

   c) What are the rules involved in the analysis of sentences following Panninian approach ? Give illustrations of each.

3. Attempt **any two** :   **16**

   a) With an illustration explain the use of Panninian grammars.

   b) Compare Noun groups with Verb groups.

   c) Demonstrate constraint parser working with an illustration.

P.T.O.

SECTION – II

4. Answer briefly : **18**

   a) What is the problems w.r.t. machine translation ?

   b) Compare TAG with TSG.

   c) Illustrate the use of TAM labels.

   d) Give the language bridges in Hindi.

   e) Why does PG perform better than TAG ?

   f) What are the features of Dakshin Hindi ?

5. Attempt **any two**: **16**

   a) State and illustrate the levels of GB.

   b) How does LFG deal with Wh movements ?

   c) What are the basic goals of GB and PG ?

6. Attempt **any two** : **16**

   a) Illustrate the adjoining operation of LFG.

   b) Compare the Theta Theory with Case Theory.

   c) State the basic levels of GB. How do they Co-relate with each other ?

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Seat No.

M.E. (CSE) (New) (Semester – II) Examination, 2014
Paper – VI : INTERNET ROUTING ALGORITHM

Day and Date : Tuesday, 30-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Assume data **if required**.
                2) Diagrams should be drawn **wherever** required.

SECTION – I

I. Solve **any two** :   **(2×5=10)**

    a) Write a short note on MAC.

    b) Explain network management architecture with diagram.

    c) What is CIDR ? Consider IP Address 10.21.5.90 that is given to be part of a /17 address block. Determine IP prefix it belongs to in the CIDR notation.

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

    a) What are the main differences between shortest path routing and Widest path routing ?

    b)
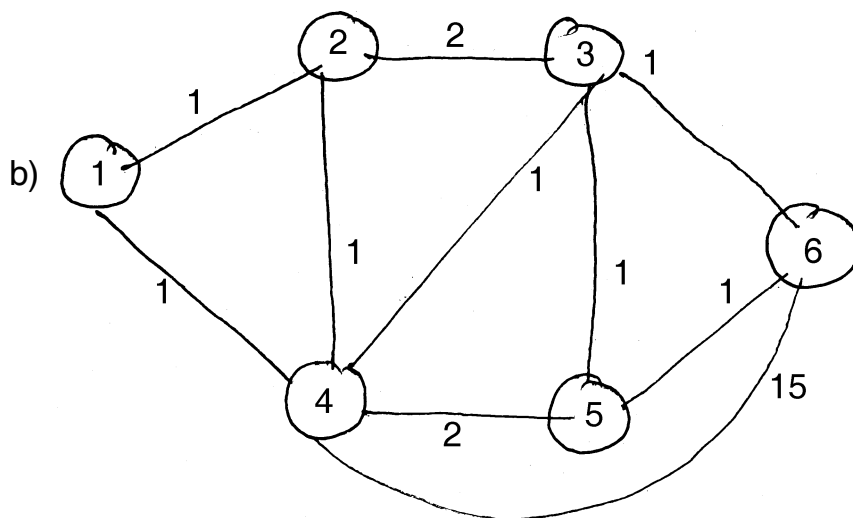
       For the above figure, compute the shortest path from node 6 to the other nodes. If link 3-6 fails, recompute the shortest paths from node 6 to other nodes, using Dijkstra's algorithm.

    c) Explain K-shortest path algorithm with example.

III. a) Give a brief overview of BGP. Also explain BGP timers. **10**

b) State differences between OSPF and integrated IS-IS. **5**

SECTION – II

IV. Solve **any two** : **(2×5=10)**

a) Explain path vector routing with example.

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

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

V. Solve **any two** : **(2×5=10)**

a) Explain hierarchical tries solution for packet classification.

b) List and explain basic forwarding functions of an IP packet.

c) Explain types of routers.

VI. a) Draw the diagram of packet flow in router. Also explain ingress and engress packet processing. **10**

b) Explain in brief shared CPU architecture of routers. **5**

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Seat No.

M.E. (Computer Science and Engg.) (Semester – II) (New) Examination, 2014
ADVANCED DATABASE CONCEPTS (Paper – VII)

Day and Date : Thursday, 1-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Q. **4** from Section – **I** and Q. **8** from Section – **II** are **compulsory**.

2) Attempt **any two** from remaining questions from **each** Section.

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

SECTION – I

1. a) Explain in detail, with the help of operator tree diagrams, equivalence transformation for relational algebra. **6**

   b) With the help of hypothetical queries prove importance of query optimization. **6**

2. a) Discuss in detail how deadlocks are detected and recovered in a DDB. **6**

   b) Discuss in detail non-blocking commitment protocol with the help of state diagrams. **6**

3. a) Discuss in detail Intraquery parallelism. **6**

   b) Discuss in detail Interoperation parallelism. **6**

4. a) With the help of reference architecture for DDB, discuss distribution transparency. **6**

   b) How reliability is achieved in DDB with 3-phase commitment protocol ? Use transition diagrams. **5**

P.T.O.

SECTION – II

5. a) Define and explain with examples following structured data types : **6**
   1) Arrays
   2) Multiset
   3) Nest, unnest
   4) Ref is, ref from, deref.

   b) Discuss in detail the Persistent Java Systems. **6**

6. a) How data is stored in Multimedia DBMS ? List and discuss the 3 parts used to store it. **6**

   b) Discuss following image retrieval approaches : **6**
   1) Text-based
   2) Content-based
   3) Composite.

7. a) Explain with examples how following types of queries are handled : **6**
   1) Nearness queries
   2) Region queries
   3) Intersection and union of regions.

   b) What are grid files ? Discuss with examples challenges faced for grid files. **6**

8. a) What is table inheritance ? Discuss in detail with examples of defining and querying. **6**

   b) Define and discuss followings for time in databases : **5**
   1) Valid time
   2) Transaction time
   3) Temporal relation
   4) Bitemporal relation.

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Seat
No.

M.E. (Computer Sci. and Engg.) (Semester – II) (New) Examination, 2014
PARALLEL COMPUTER ARCHITECTURE (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All** questions from Section – **I** and **II** are **compulsory**.
2) **Figures** to the right indicate **full** marks.
3) **Assume** data **if necessary**.

SECTION – I

1. A) Discuss the principle of the operation of ILP-Processors.   **5**

   B) What are the main aspects of Data Dependencies ?   **5**

   C) Draw the simplified structure of a straightforward pipeline. Explain each stage. **5**

2. Describe in detail two different kinds of RAW dependency and two
   corresponding kinds of latencies.   **10**

3. Describe the following with respect to Operand fetch Policies.   **10**

   1) Operand fetch during instruction issue, assuming a single register file for
      both FX and FP data.

   2) Operand fetch during instruction dispatch, assuming a single register file for
      both FX and FP data.

SECTION – II

4. Attempt **any three** of the following :   **(5×3=15)**
   a) What are the types of branches ? Explain it in short.
   b) Write a note on branch statistics.
   c) What are the basic approaches to branch handling ?
   d) What is snoopy coherence ? Explain how it occurs.

5. Discuss two architectural concepts which can be used for checking the
   results of Operations.   **10**

6. Draw and explain a block diagram of IBM Power 4. Draw a pipeline layout of
   IBM Power 4. Explain stages of the pipeline.   **10**

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Seat
No.

M.E. (Computer Science and Engineering) (Sem. – II) (New) Examination, 2014
GRID COMPUTING (Elective – II) (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Explain the difference between Grid computing and Cloud computing.   **7**

2. Explain emergence of virtual organization.   **7**

3. Explain grid architecture in practice.   **7**

4. Give description of GRID architecture.   **7**

5. Explain knowledge layers.   **7**

6. Explain OGSA service model.   **7**

SECTION – II

7. What is Strasbourg Ontology ?   **7**

8. Explain Ontology mapping.   **7**

9. What is combinatorial chemistry ? Explain SPLIT and MIX approach.   **7**

10. Explain chemical markup language.   **7**

11. What is MONTAGE architecture ?   **7**

12. Explain encyclopedia of life project.   **7**

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SLR-BC – 79

Seat No.	

M.E. (Comptuer Science and Engineering) (Semester – II) (New) Examination, 2014
REAL TIME OPERATING SYSTEM (Elective – II) (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Explain full featured real time operating system.   **7**

2. Explain round robin and Preemptive priority systems.   **7**

3. Explain broadcast communication.   **7**

4. Write a pseudocode algorithm computing 64 megabytes of memory that is divided into 1 megabyte pages. Use a pointer scheme.   **7**

5. Discuss counting Semaphores and problems with Semaphores.   **7**

6. Explain event flags and signals.   **7**

SECTION – II

7. Explain real time image processing and virtual reality.   **7**

8. Explain real time application with real time programming languages.   **7**

9. Explain Backoff method and patching.   **7**

10 Explain data flow architecture.   **7**

11. How is reliability in distributed system calculated ?   **7**

12. What are Halsteads Metrics ?   **7**

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SLR- BC – 8

Seat No.	

M.E. (Civil) Structures (Semester – II) Examination, 2014
THEORY OF PLATES AND SHELLS (Paper – VI)

Day and Date : Tuesday, 30-12-2014   Max. Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) A rectangular plate is loaded laterally. Derive Governing Differential Equation
       for its deflection surface.   **12**

   b) Write assumption made in thin plate theory.   **5**

2. a) Write a note on Levy's method as applied to solution of rectangular plate
       problems.   **5**

   b) Evaluate maximum deflection of a simply supported square plates subjected to
       uniformly distributed load using Levy's solution.   **13**

3. a) Obtain governing differential equation for deflection of circular plates. **12**

   b) Write a note on Energy method for solution of plate problems.   **5**

SECTION – II

4. a) Distinguish between plate and shell behaviour.   **6**

   b) Derive the expression for stress resultants per unit length of middle surface
       of shell.   **12**

5. a) Write a note on : i) Finsterwalder's theory ii) D. K. J. theory.   **12**

   b) Describe membrane theory.   **5**

6. a) Enlist types of shells based on their geometry and other parameters.
       Draw neat sketches.   **7**

   b) Describe bending theory as applicable to shells.   **10**

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Seat No.

M.E. (Computer Science and Engineering) (Semester – II) (New) Examination, 2014
Elective – II : NATURAL LANGUAGE PROCESSING (Paper – IX)

Day and Date : Tuesday, 6-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) Question **1** and **5** are **compulsory**.
2) Answer **any three** questions in **each** Section.
3) **Use** suitable data **wherever** necessary.

SECTION – I

1. Answer briefly : **15**

   a) Illustrate DCG formalism.

   b) Compare between Chart parser and link parser.

   c) Give example of verbal structure with noun-verb modification.

   d) Define the term 'Locative' w.r.t. case grammar.

   e) Comment on Free Word Order and Vibhakti.

2. a) What are the phases involved in the analysis of sentences ? Give illustrations of each.

   b) Illustrate the formation of Kriya-Rupa Chart. **10**

3. a) Translate the sentence in an Indian language and perform morphological analysis – 'I need a strong comb to comb my hair.'

   b) Compare noun groups and verb groups. **10**

4. a) With an illustration explain the use of case grammars.

   b) Explain the semantic model of Panninian framework. **10**

P.T.O.

SECTION – II

5. Answer briefly : **15**

   a) What does GB form exhibit ?

   b) Give the language barriers in Hindi.

   c) What is machine translation ? State the problems involved.

   d) PG performs better than TAG for Indian languages, Justify.

   e) Compare GB and PG.

6. a) Define locality and illustrate.

   b) How is Wh-movement handled in questions using LFG ? **10**

7. a) State and illustrate the levels in GB.

   b) State the basic theories on which GB is built. **10**

8. a) What are the basic goals of GB and PG ?

   b) Illustrate the adjoining operation of LFG. **10**

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Seat
No.

M.E. (Computer Science and Engineering) (Semester – II) (New) Examination, 2014
WEB TECHNOLOGY (Elective – III) (Paper – X)

Day and Date : Thursday, 8-1-2015
Total Marks : 70
Time : 10.00 a.m. to 1.00 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. Discuss HTTP request and response messages. **7**

2. List any two differences between HTML respect to elements and XHTML with also explain about the XHTML DTD. **7**

3. Write ASP code to display different each time a user visit a page. **7**

4. Explain in detail DOM event handling. Also explain with an example of creating a context menu. **7**

5. Explain XPATH nodes in detail and state the rules of XML parser. **7**

6. Explain how does parameters passing work in Javascript. **7**

SECTION – II

7. Write a JSP program to demonstrate usage of page and include directives. **7**

8. What are different stages of servlets ? **7**

9. Write a servlet program to Blogging application. One servlet for login, second one for previewing/adding entry to the blog, third one for viewing the blog that generates HTML documents. **7**

10. Write components of JSP. **7**

11. Write short notes on : **7**

   a) Mashups and   b) RSS.

12. Explain service providers security issues. **7**

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Seat
No.

M.E. (Semester – II) (Computer Science and Engineering) (New) Examination, 2014
Elective – III : WIRELESS AD-HOC NETWORK (Paper – X)

Day and Date : Thursday, 8-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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** necessary.
4) Figures to the **right** indicate **full** marks.

SECTION – I

1. A) What is the IEEE standard for LAN ? Explain physical layer and data link layer for wireless LAN (802.11).   **6**

   B) Explain in details the difference between Cellular and Ad-hoc wireless network.   **6**

2. A) What is packet radio network ? List and explain components of packet radio networks.   **6**

   B) Draw schematic diagram of Ad-hoc wireless internet and discuss its major issues.   **6**

3. A) Explain in details IEEE 802.11 DCF and RTS-CTS (medium access) mechanism.   **6**

   B) What are the features of Ad-hoc network because of which it has become popular ? List and explain in details the application of Ad-hoc wireless network. **6**

4. A) List the criteria for classification of Routing Protocols in Ad-hoc WANs. Explain with diagram the DSDV protocol.   **6**

   B) Explain with proper example and diagram the AODV protocol. List its advantages and disadvantages.   **5**

P.T.O.

SECTION – II

5. A) What are the issues in designing a multicast routing protocol ? Explain with diagram source-initiated multicast protocols. **6**

   B) Explain with neat diagram the architectural framework of an Ad-hoc multicast protocol. **6**

6. A) Why dose TCP dose not perform well in Ad-hoc WANs. **6**

   B) Discuss the design issues in TCP for Ad-hoc wireless networks. **6**

7. A) Explain in details security requirements and challenges in Ad-hoc wireless network protocols. **6**

   B) Explain key management for Cryptography algorithms in Ad-hoc wireless networks. **6**

8. A) Give the comparison of various TCP solutions for Ad-hoc wireless networks. **6**

   B) Explain with diagram tree initialization, maintenance and route optimization phases in BEMRP. **5**

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<table>
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M.E. (Electronics and Telecommunication Engg.) (Semester – I) Examination, 2014
Paper – I : ADVANCED LIGHT WAVE COMMUNICATION

Day and Date : Monday, 29-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Attempt **any one** of the following questions.   **(7×1=7)**

   a) What is numerical aperture ? Derive an expression for numerical aperture and maximum acceptance angle in case of step index optical fiber in terms of refractive index of core and cladding material.

   b) A multimode step index fiber with a core diameter of 80 μm and a relative index difference of 1.5% is operating at a wavelength of 0.85 μm. If the core refractive index is 1.48, estimate :

     i) the normalized frequency for the fiber

     ii) the number of guided modes.

2. Attempt **any two** of the following questions :   **(5×2=10)**

   a) Differentiate between intrinsic and extrinsic absorption.

   b) Explain the working of semiconductor injection laser. What are its advantages and disadvantages ?

   c) A step index multimode fiber with a numerical aperture of a 0.20 supports approximately 1000 modes at an 850 nm wavelength.

     i) What is the diameter of its core ?

     ii) How many modes does the fiber support at 1320 nm ?

3. Write a short note on (**any three**) :   **(6×3=18)**

   a) Intramodal and intermodal dispersion

   b) Power budgeting

   c) Spontaneous emission and stimulated emission

   d) Surface emitter LEDs.

SECTION – II

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

   a) Explain with suitable diagram a WDM system with facility for add as well as drop wavelengths.

   b) Explain the working of silicon avalanche photo diode. Why guard rings are added to it ?

   c) Discuss rise time budget of point to point optical link.

5. Attempt the following (**Any two**) :   **(7×2=14)**

   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**) :   **(3×3=9)**

   a) Avalanche multiplication noise

   b) Soliton system

   c) Hybrid and planar waveguide devices

   d) Design consideration of optical multiplex/demultiplex.

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SLR-BC – 87

Seat No.

M.E. (E and TC) (Semester – I) Examination, 2014
LINEAR ALGEBRA AND ERROR CONTROL TECHNIQUES (Paper – II)

Day and Date : Wednesday, 31-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions :   i) **All** questions are **compulsory**.
               ii) **Assume** suitable data, if **necessary**.
               iii) Use **separate** answer book for **each** Section.

SECTION – I

1. Solve **any two** :   **15**

   a) Find whether the vectors $2x^3 + x^2 + x + 1$, $x^3 + 3x^2 + x - 2$ and $x^3 + 2x^2 - x + 3$ of R(x), the vector space of all polynomials over the real number field are linearly independent or not.

   b) Define vector space. Explain general properties of vector space.

   c) Show that the set W of the elements of the vector space $V_3(R)$ of the form $(x+2y, y, -x+3y)$. Where $x, y \in R$ is a subspace of $V_3(R)$.

2. Solve **any two** :   **10**

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

   b) Let F be field of complex numbers and let T be the function from F^3 into F^3 defined by

   $T(x_1, x_2, x_3) = (x_1 - x_2 + 2x_3, 2x_1 + x_2 - x_3 - x_1 - 2x_2)$. Verify that T is linear transformation. Describe the null space of T.

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

                                                       P.T.O.

3. Solve **any two** :   **10**

   a) In an inner product space V(F), prove that

      i) $\|\alpha\| \geq 0$ and $\|\alpha\| = 0$ iFF $\alpha = 0$.

      ii) $\|a\alpha\| = |a| . \|\alpha\|$

   b) In Schwarz's inequality of an inner product space V(F), prove that

$$\left|(\alpha, \beta)\right| \leq \|\alpha\| . \|\beta\|$$

   c) IF α and β are vectors in an inner product space then show that

$$\|\alpha + \beta\|^2 + \|\alpha - \beta\|^2 = 2\|\alpha\|^2 + 2\|\beta\|^2.$$

SECTION – II

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

   a) Explain Viterbi algorithm for decoding convolutional codes.

   b) Define primitive polynomials. Draw addition table and multiplication table for GF (2^3) with $f(x) = 1 + x + x^3$.

   c) Design (5, 2) linear block code.

      i) Choose the code words to be in systematic form, choose them with the goal of maximizing d_{min}.

      ii) Find the generator matrix for the code word set.

      iii) Calculate parity check matrix.

      iv) Enter all n-tuples into standard array.

5. Attempt **any two** : **10**

a) Determine which of following polynomial can generate a cyclic code with codeword length $n \leq 7$. Find (n, k) values that can generate such code

   i) $g(X) = 1 + X^3 + X^5$

   ii) $g(X) = 1 + X + X^2 + X^4$

b) Explain in detail BCH decoding.

c) The generator polynomial of a (7, 4) cyclic code is

   $g(X) = 1 + X^2 + X^3$

   Find all the code words in nonsystematic form.

6. Attempt **any two** : **10**

a) Draw the encoder for (7, 3) RS code. Find encoded data if message is $\left(\alpha^1 \ \alpha^3 \ \alpha^5 \right)$.

b) Draw the trellis diagram for given encoder whose generator sequences are $g_1 = 1111$, $g_2 = 1011$.

c) Explain encoding and decoding in Reed-Muller codes.

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Seat
No.

M.E. (E and TC) (Semester – I) Examination, 2014
Paper – III : ADVANCED NETWORK SYSTEM

Day and Date : Friday, 2-1-2015   Total Marks : 70

Time : 10.00 a.m. to 1.00 p.m.

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

1. Attempt **any two** :   **12**

   a) What is address resolution problem ? How it is resolved through dynamic mapping ? Explain in detail.

   b) With transition diagram explain working of DHCP.

   c) What is resolver ? Explain name to address mapping with suitable example.

2. Attempt **any two** :   **12**

   a) How flow control and error control is carried out in TCP ? Explain.

   b) Explain communication over control and data connection in FTP. Which well known port numbers are used for these connection ?

   c) What is MIME ? Draw header format and explain each field.

3. Write short notes on **(any three)** :   **12**

   a) TFTP

   b) DNS

   c) IPV6

   d) User Agent.

4. Attempt **any two** : **12**

   a) What are different functions of ATM layer ? Explain.

   b) Draw and explain Gigabit Ethernet architecture.

   c) What are four general techniques to improve Quality of Service ?

5. Attempt **any two** : **12**

   a) Draw ATM cell structure and ATM cell header format.

   b) Draw physical layer architecture of Gigabit Ethernet.

   c) What is RSVP ? Explain working with neat schematic.

6. Write short notes on **(any two)** : **10**

   a) B-ISDN reference model

   b) Firewall

   c) MPLS

   d) IEEE 802.3z.

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Seat No.

M.E. (E&TC) (Semester – I) Examination, 2014
RANDOM PROCESSES (Paper – IV)

Day and Date : Monday, 5-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

Instructions : 1) **All** questions are **compulsory**.
               2) Figures to the **right** indicate **full** marks.
               3) **Assume** suitable data **wherever** necessary.
               4) **Use** of standard area under normal curve is **allowed**.

1. Answer **any two** :

   a) State the properties of Expectation and prove that $\sigma_x^2 = E(x^2) - [E(X)]^2$.   **5**

   b) $f(x) = \begin{cases} cx & \text{if} \quad 0 \leq x < 2 \\ 2c & \text{if} \quad 2 \leq x < 4 \\ 6c - cx & \text{if} \quad 4 \leq x < 6 \end{cases}$

   Find the distribution function of X i.e $F_x(x)$. Also find $P(3 \leq X \leq 5)$.   **5**

   c) Find moment generating function of normal random variable. Also find its expectation.   **5**

2. Answer **any two** :

   a) $f_x(x) = \begin{cases} Cx^2, & 0 < x < 3 \\ 0, & \text{otherwise} \end{cases}$

      i) Find value of 'C' .   **5**
      ii) Find $P(1 < x \leq 2)$.

   b) $f_x(x) = \begin{cases} 3x^2, & 0 < x < 1 \\ 0, & \text{otherwise} \end{cases}$

   Find values of 'k' and 'α' such that $P(X \leq k) = P(X > k)$ and $P(X > \alpha) = 0.1$.   **5**

   c) If $X \sim N[2, 1]$

   Find $f_y(y)$ if $Y = 3X + 2$.   **5**

3. Answer **any two** :

   a) Two coins are given such that '1' is written on either and '2' is written on another side of each coin. Where X = sum of top surfaces of two coins and Y= difference of top surfaces of two coins (top surface of Coin 1 – Top Surface of coin 2). Find joint PMF function, joint CDF function and marginal PMF of X, Y. **7.5**

   b) $f_x(x) = \dfrac{x}{a^2} e^{-\left(x^2/2\alpha^2\right)} U(X)$ and $f_y(y) = \dfrac{y}{\beta^2} e^{-\left(y^2/2\beta^2\right)} U(Y)$.

   If $Z = \dfrac{X}{Y}$, if X and Y are independent ; Show that $f_z(z) = \dfrac{2\alpha^2}{\beta^2}\left[\dfrac{z}{\left(z^2 + \dfrac{2\alpha^2}{\beta^2}\right)^2}\right] U(Z)$. **7.5**

   c) $U = 3X + 4Y$, $V = 2X + 5Y$; $\mu_x, \mu_y, \sigma_{X^2}, \sigma_{Y^2} = 3, 6, 2, 2$ respectively. COV[X, Y] = 4 ; Find the coefficient of correlation. **7.5**

4. Answer **any two** :

   a) $X \sim$ poission (λ)
      $P(x = 2) = 9p(x = 4) + 90p(x = 6)$; Find var(x). **7.5**

   b) The Autocorrelation function of random process X(t) is $R_{xx}(\tau) = 3 + 2e^{-4\tau^2}$. Find the power spectral density and average power in X(t). **7.5**

   c) State the properties of Autocorrelation Function and prove that Rxx (0) is maximum. **7.5**

5. Answer **any two** :
   a) Derive the expression for average number of customers in the System and average waiting time of customer in the M/G/1 queuing system. **5**
   b) Derive the expression for average number of customers in the queue and average waiting time of customer in the M/M/1/N queuing system. **5**
   c) Prove that Sum of two independent Poisson Process is again Poisson process. **5**

6. Answer **any two** :
   a) Explain Markov Chain, Transition Matrix and Recurrent State. **5**
   b) Define WSS, Ergodic, Markov Processes. **5**
   c) Draw the state transition diagram for M/M/m/m and find the value of Po and Pn. **5**

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Seat No.	

M.E. (Civil-Structures) (Semester – II) Examination, 2014
FINITE ELEMENT METHOD (Paper – VII)

Day and Date : Thursday, 1-1-2015   Total Marks : 70
Time : 10.00 a.m. to 2.00 p.m.

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

SECTION – I

1. a) Using Rayleigh-Ritz method, determine the expression for displacement and stress in fixed bar subjected to axial force P as shown in Fig. Draw the displacement and stress variation diagram. Take 3 terms in displacement function.   **13**
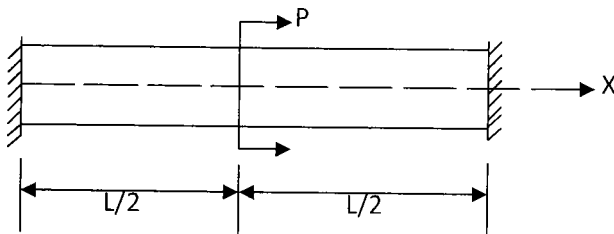
   b) Explain in brief 'Principle of minimum Potential Energy'.   **5**

2. a) Write about Pascal's Triangle in FEM.   **4**

   b) Using an appropriate polynomial for a 2 node straight prismatic beam.   **13**
     ➢ Find shape functions for the beam
     ➢ Using shape functions derive equivalent nodal force of the beam when it is subjected to uniformly distributed load of intensity q/m for the entire length of the beam.

3. a) Find Shape functions of a 5 node bar element using Lagrange polynomial function, Plot the variation of shape functions. **7**

   b) Use a suitable displacement function develop strain displacement matrix(B) of a Constant Strain Triangle (CST) element. **10**

SECTION – II

4. a) Assemble Jacobian matrix of a 4 node isoparametric quadrilateral element with nodes (0, 0), (60, 0), (65.7735,10),(5.7735,10) at Gauss point (0.57735, 0.57735) **12**

   b) Explain Natural and Cartesian Co-ordinate systems and how the co-ordinates can be mapped from one system to other system. **6**

5. a) Derive Stiffness matrix of a triangular plate bending element. **13**

   b) What is axis symmetric problem, explain with various examples ? **4**

6. a) Write lumped mass matrix and consistent mass matrix of a 2 node bar element. Using shape functions of a 2 node bar element, derive consistent mass matrix of a 2 node bar element. **10**

   b) Derive the stress strain relation of a 3D isotropic material with 3D elasticity matrix (D). From this relation, write conditions and derive elasticity matrix of a plane stress problem and plane strain problem. **7**

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Seat
No.

M.E. (E and TC) (Semester – I) Examination, 2014
DIGITAL DATA COMPRESSION (Elective – I) (Paper – V)

Day and Date : Wednesday, 7-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

N.B. : 1) **All** questions are **compulsory**.

2) Figure to the **right** indicates **full** marks.

SECTION – I

1. Attempt **any one** :   **8**

   a) What do you mean by coding redundancy ? Explain with one example.

   b) Explain Shanon-fano algorithm with one example.

2. Attempt **any one** :   **9**

   a) How update procedure preserves the sibling property in Adaptive Huffman coding ?

   b) Decode the following binary string using decoding procedure of adaptive Huffman coding.

   00000 | 0 | 000 | 00000 | | 000 | 0 | | 0

3. Attempt **any two** :   **18**

   a) Compare lossless and lossy compression.

   b) What is static compression ? Explain diagram coding.

   c) What is entropy ? Explain its role in compression.

P.T.O.

SECTION – II

4. Attempt **any one** :   **8**

   a) Explain Linear predictive coder with reference to speech compression.

   b) What is companded quantization ? Explain with example.

5. Attempt **any one** :   **9**

   a) What is differential pulse code modulation (DPCM) encoding system ? Explain.

   b) With block diagram, explain MPEG audio coding.

6. Attempt **any two** :   **18**

   a) Explain MPEG1 video standard.

   b) Compare sub-band coding with transform based coding.

   c) Explain any one motion estimation algorithm.

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Seat No.

M.E. (Electronics & Telecommunication Engg.) (Semester – II) Examination, 2014
Paper – VI : RF AND MICROWAVE CIRCUIT DESIGN

Day and Date : Tuesday, 30-12-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 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 expression for transmission coefficient and reflection coefficient of transmission line.

    b) Explain the construction and characteristics of GaAs MESFET.

    c) State and prove Poynting theorem.

2. Solve **any one** question :   **(7×1=7)**

    a) Derive the equation of transmission lines with the help of uniformly distributed circuit theory in case of lossy and lossless line.

    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 ε_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.

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) ZL = (75 + j50) Ω connected to a transmission line with characteristic impedance of 50 Ω. Find the corresponding reflection coefficients and transmission coefficients.

c) Discuss in brief about RF filters configurations and design parameters.

d) Write a note on linear and non-linear mixer operation.

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.

d) Explain about design of high frequency microwave oscillator.

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 the Kurda's first and second identity with the help of ABCD parameters.

6. Attempt **any three** questions : **(6×3=18)**

a) Write short note on Input Output stability circles in microwave amplifier design.

b) Explain class A RF transistor amplifier design.

c) Derive the expressions for various gain factors G_T, G_{avs}, G_{avn}. For microwave RF Amplifier.

d) Design a T-type matching network that transforms load impedance $Z_L = (60 - j30)\,\Omega$ into a $Z_{in} = (10 + j20)\,\Omega$ 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 = 1GHz.

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Seat
No.

M.E. (Electronics and Telecommunication Engg.) (Semester – II) Examination, 2014
Paper – VII : WIRELESS COMMUNICATION

Day and Date : Thursday, 1-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 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 the Rayleigh fading distribution and show that the Rayleigh distribution uniformly distributed. **5**

   b) Discuss channel assignment strategies and handoff strategies. **5**

   c) Compute the SNR in dB of wireless communication system for BER $= 10^{-6}$. **4**

2. a) Explain indoor and outdoor propagation model. **7**

   b) Assume the transmitter power is 1 W at 60 GHz fed into the transmitter antenna. Using horn antenna with dimensions of 4.6 cm × 3.5 cm at both transmitter and receiver : **7**

      i) Calculate the free space path loss at 1 m, 100 m and 1000 m.

      ii) Calculate the received signal power at these distances.

      iii) What is the rms voltage received at the antenna if the receiver antenna has purely real impedance of 50 Ω and is matched to the receiver ?

3. a) Explain the Wireless Local Loop (WLL) technology. **7**

   b) Explain statistical model for multipath fading channel. **7**

4. a) Write a note on IEEE 802.11 standard. **7**

   b) Explain ISDN with a suitable block diagram. What is broadband ISDN ? **7**

5. a) Compare FDMA and SDMA techniques. **7**

   b) The Pacific Digital Cellular (PDC) TDMA system uses a 42 Kbps data rate to support three users per frame. Each user occupies two of the six time slots per frame. **7**

      i) What is the raw data rate provided for each user ?

      ii) If the frame efficiency is 80% and the frame duration is 6.667 ms, determine the number of information bits sent to each user per frame.

      iii) If the half rate speech coding is used, six users per frame are accommodated. Determine the number of information bits provided for each user per frame.

      iv) What is the information data rate per user in half-rate PDC ?

6. a) List the advantages and drawbacks of wireless networking system. **7**

   b) Determine the number of analog channels per cell for the case of n = 2 and n = 4 propagation path loss, where the minimum acceptable C/I = 14 dB. What is the appropriate cluster size for the system ? Assume the channel bandwidth is 30 KHz and the total spectrum allocation is 20 MHz. **7**

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Seat No.

M.E. (Electronics and Telecommunication) (Semester – II) Examination, 2014
ADAPTIVE SIGNAL PROCESSING (Paper – VIII)

Day and Date : Saturday, 3-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

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

   a) Specify the error surface for input correlation matrix

   $R = \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix}$ $P = \begin{bmatrix} 7 \\ 8 \end{bmatrix}$ $E\left(d_k^2\right) = 42$. Also find optimum weight values.

   b) Explain gradient search algorithm by steepest descent method. Draw learning curve.

   c) Consider an autoregressive process u(n) of order two described by difference equation u (n) = 2 u (n – 1) – 2u (n – 2) + v (n)

   v (n) is white noise with zero mean and variance 0.5 :

   　i) Write Yule-Walker equation

   　ii) Find r (1) and r (2)

   　iii) Find variance of u (n).

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

   a) Find eigen values and eigenvectors of input correlation matrix $R = \begin{bmatrix} 3 & 2 \\ 2 & 3 \end{bmatrix}$.

   b) Find cross co-relation between x (n) = {1, 2, –1, 0, 1} and h (n) = { 3, 2, 1, –1}.

   c) State and explain mean ergodic theorem.

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

   a) State different characteristics of adaptive signal processing.

   b) Check the singularity of correlation matrix

$$R = |\alpha|^2 \begin{bmatrix} 1 & \exp(jw) & \exp(j2w) \\ \exp(-jw) & 1 & \exp(jw) \\ \exp(-j2w) & \exp(-jw) & 1 \end{bmatrix}.$$

   c) Explain Gaussian moment factoring theorem.

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

   a) State principle of orthogonality and derive necessary and sufficient condition for obtaining minimum value of cost function.

   b) Explain block LMS algorithm. State the convergence properties of it.

   c) Explain regularization used in RLS algorithm.

5. Attempt **any two** :   **10**

   a) Define LMS algorithm. Compare it with steepest descent algorithm.

   b) Explain order recursive adaptive filter.

   c) Explain in brief sub-band adaptive filters.

6. Attempt **any two** :   **10**

   a) For the adaptive filter shown below. Find :

      i) H (z)

      ii) Frequency response.

$$w_0 = 1$$
$$w_1 = 0.5$$
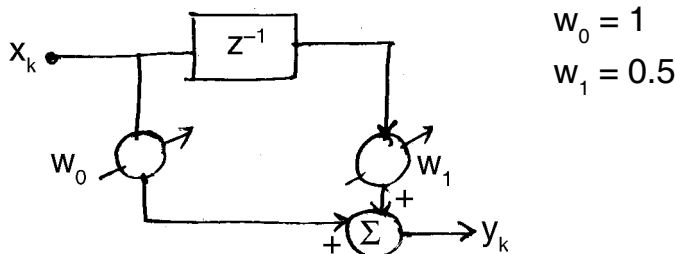
   b) Explain application of adaptive signal processing as adaptive interference cancelling.

   c) Describe matrix inversion lemma.

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Seat No.

M.E. (E and TC) (Semester – II) Examination, 2014
CRYPTOGRAPHY AND NETWORK SECURITY (Paper – IX) (Elective – II)

Day and Date : Tuesday, 6-1-2015   Total Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

1. Attempt **any two** :   **10**
   a) Explain different types of security attacks.
   b) Discuss with example substitution and transposition cipher.
   c) Discuss on playfair cipher.

2. Attempt **any two** :   **10**
   a) Explain with figure single round of DES algorithm.
   b) Explain with block diagram public key cryptosystems.
   c) Explain RSA and its implementation.

3. Attempt **any two** :   **15**
   a) Explain implementation of DH algorithm with example.
   b) Explain the four methods of public key distribution.
   c) Explain Secure Hash Algorithm (SHA).

4. Attempt **any two** :   **10**
   a) Explain authentication requirements and authentication function.
   b) Explain S/MIME functions, and list the algorithms used in S/MIME implementation.
   c) Illustrate and explain MD5 (Message Digest Algorithm).

5. Attempt **any two** :   **10**
   a) Explain Kerberos Realm, with diagram.
   b) Illustrate diagrammatically basic uses of MAC for message authentication, confidentiality and authentication tied to plaintext.
   c) List IP security applications and services.

6. Attempt **any two** :   **15**
   a) Discuss on PGP services in detail.
   b) Explain on firewall types, characteristics and limitations.
   c) Explain three classes of intruders.

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Seat
No.

M.E. (E & TC) (Semester – II) Examination, 2014
Paper – X : MOBILE COMPUTING (Elective – III)

Day and Date : Thursday, 8-1-2015   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. Solve **any three** :   (8×3=24)

   a) Explain the handover procedure in GSM system.

   b) Classify routing protocols based on routing information update mechanism.
      Explain distance vector routing protocol.

   c) With figure explain Sony's virtual IP proposal.

   d) Which software components are needed to support indirect transport protocols ?

2. a) Enlist characteristics of an ideal routing protocol for wireless networks.   **3**

   b) Draw and explain hiper LAN communication model.   **8**

                              OR

   b) What is adaptive location management ? Explain.   **8**

SECTION – II

3. Solve **any three** :   (8×3=24)

   a) What are the design choices for providing quality of service support ? Explain.

   b) What are the components of information security ? Explain.

   c) Explain 3GPP security framework architecture.

   d) Explain memory management in symbian OS.

4. a) What is RPC ?   **3**

   b) Explain cipher block chaining.   **8**

                              OR

   b) Explain MVC in symbian.   **8**

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Seat
No.

M.E. (Mechanical) (Manufacturing) (Part – I) (Semester – I) Examination, 2014
MATERIAL REMOVAL PROCESSES (Paper – I)

Day and Date : Monday, 22-9-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain the classification of machine tool on basic of generating motions. Also, explain types of cutting mechanism.   **10**

   b) Explain forces generation during cutting with Merchant's circle diagram.   **8**

2. a) Explain temperature distribution in metal cutting.   **8**

   b) Describe the tool represented by 10, 10, 6, 6, 8, 8, 1 and give significance of providing noseradius.   **9**

3. a) Explain the Taylor Tool Life Equation and forms of tool wear in metal cutting. **9**

   b) Differentiate between the action of coolants and the action of lubricants.   **8**

SECTION – II

4. a) Explain variation of costs with cutting speed.   **8**

   b) What is the classification of grinding machines ? And how are grinding wheels specified ?   **9**

5. a) Explain grinding wheel wear in detail.   **8**

   b) Explain the wire electrical discharge machining in detail.   **10**

6. a) Compare the chemical machining and electrochemical machining.   **9**

   b) Explain various types of surface alterations.   **8**

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Seat No.

M.E. Mechanical (Manufacturing) (Semester – I) Examination, 2014
MANUFACTURING PLANNING AND CONTROL (Elective – II) (Paper – V)

Day and Date : Saturday, 4-10-2014　　　　　　　　　　　Max. Marks : 70
Time : 10.00 a.m. to 1.00 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) Discuss the scope for batch manufacturing in industry. What are the benefits and limitations of batch manufacturing ? **9**

   b) What is cellular manufacturing ? Discuss the significance of classification and coding in cellular manufacturing. **8**

2. a) What is a plant layout ? Explain different types of plant layout with their scope of application. **10**

   b) Explain meaning and relevance of capacity planning. Discuss the basic techniques of capacity planning. **7**

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

   1) Forecasting

   2) Assembly line

   3) Methods of grouping parts in GT

   4) Economic analysis.

SECTION – II

4. a) What is line of balancing ? Explain the necessity of line of balancing in scheduling. **8**

   b) What is JIT ? Discuss the characteristics of JIT system. **9**

5. a) Explain the different phases in cost planning. **10**

   b) Discuss the components of Flexible Manufacturing System. **7**

6. a) Write short note on **(any three)** : **(3×6=18)**

   1) MRP

   2) Simulation analysis of Manufacturing Systems

   3) Dedicated FMS and Random-order FMS

   4) Techniques of quality control.

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

SECTION – I

1. a) Explain the classification of metal forming processes in detail with neat sketches. **10**

   b) Explain the yield criteria for isotropic material with assumptions.   **8**

2. a) Explain the properties of cold forming with advantages and limitations.   **9**

   b) What is warm forming ? Explain with suitable example.   **8**

3. a) What are slip lines ? What are Henkey's stress equation along slip line ?   **9**

   b) State upper bound theorem and explain its various terms.   **8**

SECTION – II

4. a) How elastic deformation affects cold rolling process ?   **8**

   b) A rectangular disc is forged between two flat dies. Describe how the metal
       flow ? Sketch the resulting shapes of the disc after forging. How these shapes
       would change if height of specimen is increased from strip to rectangular
       block ?   **10**

5. a) Explain lubrication in Extrusion.   **8**

   b) Explain the term barreling and bulging in connection with forging of Non
       circular shapes between two flat dies.   **9**

6. a) What is isothermal forging ? Explain the significance of it.   **9**

   b) Explain near-net-shape manufacturing.   **8**

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Seat No.

ME (Mechanical - Manufacturing Engineering)

PART-II (New-CGPA) Examination 2014

Finite Element Methods

Day and Date - 25/09/2014.
Time : 10.00 am to 1.00 pm

Total Marks:70

Instructions:

1) *Attempt **any three** questions from each section*

2) *Make **suitable assumptions** if necessary and state them clearly*

SECTION –I

1.	a.	Explain steps involved in finite element Method	6
	b.	Explain Rayleigh Ritz Method in FEM	6
2.	a.	Derive property matrix [D] for plane stress and plane strain condition	6
	b.	Explain Lagrangian shape function	5
3.	a.	Using potential energy method to derive the element stiffness matrix and element equation for a simple bar element	6
	b.	Use Finite element method , calculate the displacement and stresses of the bar as shown in figure (1)	5
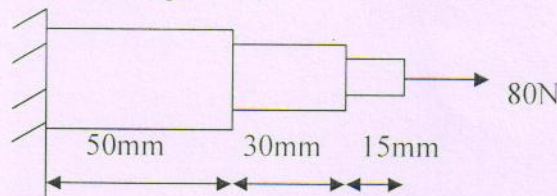
(Figure-1)

A_1=60 mm^2, A_2=30 mm^2, A_3=15 mm^2, E_1=E_2=180 x 10^3 N/mm^2, E_3=200x10^3 N/mm^2.

4.		Write short note on (**attempt any two**)	12
	a.	Software used in FEM	
	b.	Discritization of Finite element problem	
	c.	Collocation Method	

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 in brief Isoparametric, Subparametric and Superparametric elements along with its use.	6
6.	a.	Explain Galerkin approach for 1-D bar element	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.	Convergence of isoparametric Elements	
	b.	Formulation of axisymmetric field problems	
	c.	Geometric Nonlinearity	

Seat No.

M.E. Mechanical (Manufacturing) (Part – I) (Semester – I) Examination, 2014
Paper – II : CNC AND ADAPTIVE CONTROL

Day and Date : Wednesday, 24-9-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) What do you mean by CNC ? Explain the types of CNC with diagram which depicts the general configurations. Enumerate the advantages and limitations of CNC. **12**

   b) Discuss the accessories of a CNC milling machine. **5**

2. a) Explain the significance of APC in CNC. **6**

   b) What are the different types of position sensors ? Explain any three position sensors with diagram,. **11**

3. Write short note on **(any three)** : **(3×6=18)**

   1) Speed sensors

   2) Basic components of NC systems

   3) Features of modern CNC system

   4) Automatic tool changer.

SECTION – II

4. a) Explain the CAD/CAM based part programming. Enumerate the benefits of the same. **10**

   b) Discuss the significance of CNC machines in CIM. **7**

5. a) Explain the CNC program verification in detail. **8**

   b) Explain the significance of conversational and graphic based software in CNC. **9**

6. Write short note on **(any three)** : **(3×6=18)**

   1) Computer assisted part programming

   2) Adaptive control

   3) Part program format

   4) Utilisation of CNC machine.

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SLR-ME – 25

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) Differentiate between FMS and FMC. **8**

2. a) Discuss the significance of distributed numerical control in FMS. **9**

   b) Enumerate the FMS softwares. Explain any one with its application and limitation. **8**

3. Write short notes on (**any three**) : **(3×6=18)**
   1) FMS installation
   2) Hardware configuration in FMS
   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.

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Seat
No.

M.E. (Mech. Manufacturing Engg.) (Semester – II) Examination, 2014
Paper – IX : QUALITY CONTROL AND RELIABILITY (Elective – IV)

Day and Date : Tuesday, 30-9-2014   Max. Marks : 70
Time : 10.00 a.m. to 1.00 p.m.

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

SECTION – I

1. a) Explain briefly difference between conventional quality control and statistical
      quality control.   **6**

   b) What is T.Q.M. ? Enumerate the main objectives of T.Q.M.   **6**

2. a) State and explain in brief Crosby's the fourteen steps of quality improvement. **6**

   b) How to implement the Deming's philosophy in Quality management ?   **6**

3. a) What are basic techniques for statistical analysis ? Explain with one example. **6**

   b) Explain in brief about Crosby's Quality vaccine.   **6**

4. Write a short note on **any 2** :

   a) Valuable tools for quality

   b) KAIZEN management practice

   c) Frequency and probability distribution.   **12**

SECTION – II

5. a) How to develop operating characteristic curves explain with one example.   **6**

   b) Describe the life cycle curves and probability distribution in modeling
      reliability.   **4**

6. a) Explain in briefly about Quality Functions Development (QFD). **6**

   b) Explain in brief Taguchi's methods for quality controls. **4**

7. a) What are the different types charts used in statistical quality controls and state its applications ? **6**

   b) Describe the following in connection with S. Q. C. :

      1) Confidence intervals

      2) Hypothesis testing. **6**

8. Write short note on **any two** :

   a) Cost benefit analysis

   b) Block diagram brain storming

   c) Risk analysis scatter diagrams. **12**

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Seat
No.

M.E. Mechanical (Manufacturing) (Part – I) (Sem. – I) Examination, 2014
ADVANCED JOINING TECHNOLOGY (Paper – III)

Day and Date : Friday, 26-9-2014　　　　　　　　　　　　Total Marks : 70
Time :　10.00 a.m. to 1.00 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. Describe the following types of Welding process. 　　　**18**

　　i) EBW

　　ii) USW

　　iii) Diffusion bonding.

2. Explain in brief about welding of ceramics, plastic material and composites
　materials. 　　　**17**

3. Explain with neat sketches about heat sources and equipment used in welding. 　**17**

SECTION – II

4. Describe the following types of welding : 　　　**18**

　　i) Soldering and Brazing

　　ii) Adhesive bonding.

5. Explain in brief about heat treatment of welding joint and their testing. 　**17**

6. Write short notes on (**any two**) : 　　　**17**

　　a) Failure of welds.

　　b) Inspection codes for weldments.

　　c) NDT of welds.

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Seat No.

M.E. Mechanical (Manufacturing) (Sem. – I) Examination, 2014
Elective – I : MACHINE TOOL DESIGN (Paper – IV)

Day and Date : Monday, 29-9-2014   Total Marks : 70
Time : 10.00 a.m. to 1.00 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 **if clearly**.

SECTION – I

1. What are the essential requirements of machine tools ? Name the basic features of machine tool. Briefly explain any five.   **18**

2. What is a kinematic drive ? How is it obtained ? Explain in brief steped drive and stepless drive.   **17**

3. Describe the following types of bearing used in machine tool spindles with neat sketches.   **17**

   i) Ball and roller bearings

   ii) Plain bearings

   iii) Hydrostatic bearings.

SECTION – II

4. Explain brief various controlling systems in a machine tool with neat sketches.   **18**

5. Explain in brief various types of beds used in machine Tool – their construction and design features.   **17**

6. What do you know about micro feeding mechanisms explain any two micro-feeding mechanisms related to machine tools.   **17**

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