# AR13 **Set 01**

**Code: 13CE2001**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Regular Examinations, January, 2015**
**STRENGTH OF MATERIALS-I**
**(CIVIL ENGINEERING)**

**Time: 3 hours** **Max. Marks: 70**

**PART – A**

**Answer all Questions** [10X1=10M]

1. a) What is the relation between modulus of elasticity(E) and modulus of rigidity(G)
   b) A bar of length 'L', thermal co efficient 'α' is allowed to expand freely, if temperature changes to 'ΔT'. What is the stress in the bar
   c) What do you mean by Overhang Beam.
   d) A simply supported beam is subjected to point load (P) at its midpoint. What is the maximum bending moment, If the length of the beam is 'L'.
   e) How the shear stress varies along the cross section?
   f) What is the ratio of maximum shear stress to average shear stress in a rectangular cross section.
   g) Define Neutral axis.
   h) A rectangular cross section subjected to positive bending moment. Draw the bending stress distribution.
   i) What is the maximum deflection at the midpoint of a simply supported beam subjected to uniformly distributed load (W), length (L)?
   j) What are the boundary conditions for simply supported beam?

**PART – B**

**Answer one question from each unit** [5X12=60 M]

**UNIT – I**

2. Figure No.2 shows a bar consisting of 3 lengths. Find the stresses in 3 parts and total extension of the bar. Take E = $2x10^5$ MPa. [12M]

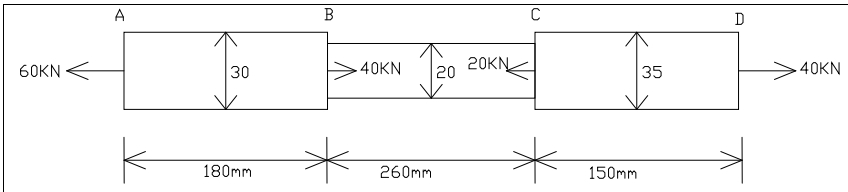



Fig for Question No.2

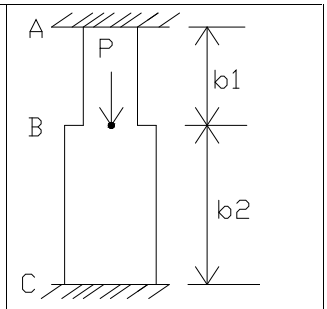



Fig for Question No.3

**(OR)**

3. A Steel bar AB having two different cross sectional areas $A_1$ and $A_2$ is held between rigid supports and loaded at C by a force P as shown in the Fig No.3. Determine the reactions $R_A$ and $R_B$ at the supports. [12M]

**UNIT – II**

4. Draw the shear force and bending moment diagram of a cantilever beam loaded as shown in the Fig No 04. Find the points where the shear force and bending moments are maximum?

[12M]

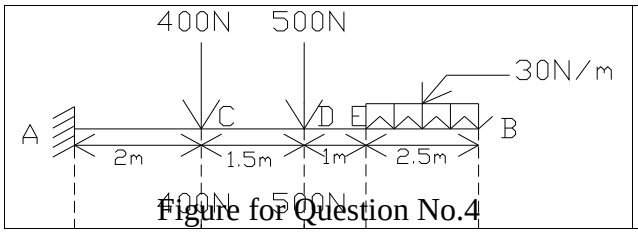



Figure for Question No.4

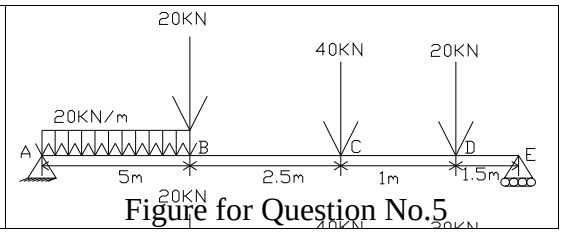


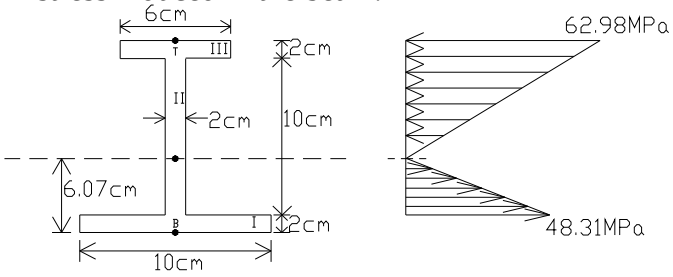

Figure for Question No.5

**(OR)**

5. Draw the shear force and bending moment diagram for the simple beam loaded as shown in the Fig No 05. [12M]

**UNIT – III**

6. A beam of I section shown in Fig. is subjected to a bending moment of 10KNm at its neutral axis. Find the maximum stress induced in the beam. [12M]




**(OR)**

7. A timber beam of rectangular cross section of length 8m is simply supported. The beam carries a UDL of 12KN/m over the entire length and a point load of 10KN at 3m from the left support. If the depth is two times the width and the stress in the timber is not to exceed 8MPa, find the suitable dimensions of the section. [12M]

**UNIT – IV**

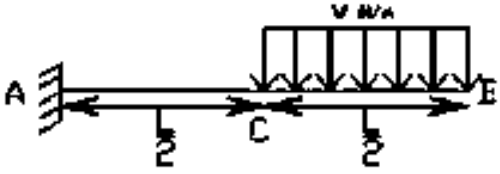
8. A cantilever beam of length 2m subjected to a point load of 15KN at its free end. The cross section of the beam 150X200mm. Find the shear stresses at points located 25mm, 50mm, 75mm and 100 mm from top. [12M]

**(OR)**

9. The section of T beam consists of a flange 150mm x 50 mm and a web 150 x 50mm. If it carries a load of 15 kN/m over simply supported beam of 3.0m span. Calculate the shear stress and draw the distribution over the cross section. [12M]

**UNIT – V**

10. Obtain the deflection and slope at points B and C for the cantilever beam loaded as shown in the Fig. [12M]




**(OR)**

11. A simple beam subjected to two point loads of 120KN, 80KN at 3m, 4.5m, from the two ends respectively. The total length of the beam is 14m. Take E = 210 GPa and I = $16x10^4$ $cm^4$. Find the deflection and slope of beam under the two loads. [12M]

# AR13 **Set 02**

**Code: 13EC2003**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Regular Examinations, January, 2015**
**SWITCHING THEORY AND LOGIC DESIGN**
**(Common to EEE & ECE)**

**Time: 3 hours** **Max. Marks: 70**

## PART – A

**Answer all Questions** [10X1=10M]

1. a) Convert $(101101.10101)_2$ to base 10.
   b) Convert $(247.36)_8$ to base 16
   c) Show NAND junction using NOR junction
   d) Express xy+x'y'z'+x'yz' in standard SOP form ?
   e) What is the disadvantage of K map?
   f) Write the differences between Combinational and sequential circuits?
   g) Draw the circuit diagram of full adder?
   h) Define multiplexer?
   i) Define ripple counter?
   j) Define shift register?

## PART – B

**Answer one question from each unit** [5x12=60M]

### UNIT-I

2.a) Find the 2's complement of the following numbers [4X2=8M]
i) 01100100 ii)10010010 iii)11011000 iv)01100111

b) i) convert 365 to BCD and binary [2M]
ii) find 9's complement for $(5250)_{10}$ [2M]

**(OR)**

3.a) What is meant by hamming code ? [2M]

b) The hamming code 101101101 is received . correct if any errors. there are four parity bits and odd parity is used ? [10M]

# AR13 **Set 02**

## UNIT-II

4.a) Simplify the following Boolean functions to a minimum number of literals [4X2=8M]
i) x+x'y ii) x(x'+y) iii)x'y'z+x'yz+xy' iv) xy+x'z+yz

b) Express the Boolean function f=A+B'C in a sum of min terms [4M]

**(OR)**

5. a) Draw the truth tables for AND , OR, NAND, NOR, XOR and NOT gates [6M]

b) i) define universal gates? [2M]
ii) draw the logic circuit for the given expression Y=AB+BC+ABC [2M]
iii) using NAND gate implement XOR gate [2M]

## UNIT-III

6) Reduce the following function using K-map technique
i) F(A,B,C,D,E)=∑m(0,2,3,10,11,12,13,16,17,18,19,20,21,26,27) [7M]
ii) F(W,X,Y,Z)= ∑m(0,1,2,4,5,6,8,9,12,13,14) [5M]

**(OR)**

7) Reduce the expression using Quine MC cluskey or tabulation method.F(A,B,C,D)= $\sum_m(0,1,3,7,8,9,11,15)$ [12M]

## UNIT-IV

8) Design a full SUBTRACTOR? Realize full subtractor using 2-half subtractor and explain the circuit operation? [12M]

**(OR)**

9) Design a combinational circuit that converts BCD to 7 segment display decoder [12M]

## UNIT-V

10) Analyse the working of clocked JK flipflop and explain about the race around condition [12M]

**(OR)**

11) Design a MOD-10 asynchronous counter using T-Flipflops and implement it? [12M]

**Code: 13ME2004**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Regular Examinations, January, 2015**
**MECHANICS OF SOLIDS**
**(MECHANICAL ENGINEERING)**

**Time: 3 hours** **Max. Marks: 70**

## PART – A

**Answer all Questions** [10X1=10M]

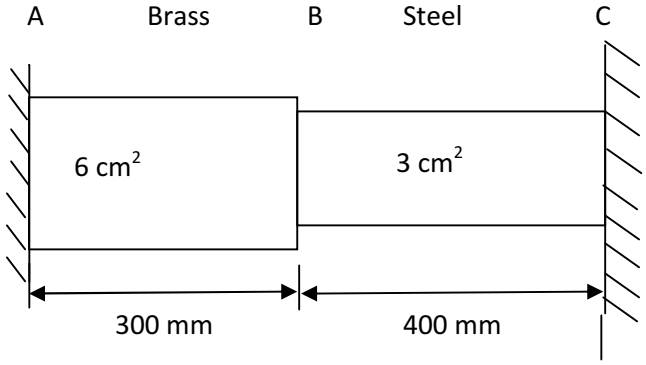
1. a) Draw the stress-strain curve for cast iron material.
   b) Write the relation between young's modulus, bulk modulus and poisson's ratio.
   c) Write an equation for shear stress on principle plane.
   d) List out different types of beams
   e) Define point of contra flexure
   f) Write torsion equation
   g) What is the maximum bending moment in a simply supported beam of length (L) carrying point load (W) at mid span.
   h) Define neutral axis.
   i) Write an equation for longitudinal stress in thin cylinder.
   j) Write an equation for hoop stress in thin cylinder.

## PART-B

**Answer one question from each unit.** **[5 X 12=60M]**

### UNIT-I

2. a) Define the following terms.
   a) Factor of Safety b) poisson's ratio c) percentage of elongation [4 M]
   b) A bar made of brass and steel as shown in figure is held between two rigid support at A and C. Find the stresses in each material if temperature rise by $40^0$C. Take $E_s$=200 GPa & $E_b$=100 GPa, $\alpha_b$ = 19 X $10^{-6}$ /$^0$C & $\alpha_a$ = 12 X $10^{-6}$ /$^0$C. [8 M]




**(OR)**

3. The stress on two mutually perpendicular planes through a point in a body are 30 Mpa and 15 MPa, both tensile along with a shear stress of 25 MPa. Determine
   1) The magnitude and direction of principle stresses.
   2) The planes of maximum shear stresses
   3) The normal and shear stress on the planes of Max. shear stress [12 M]

### UNIT-II

4. A simply supported beam of 8m length carries point loads 8 KN, 4 KN and 10 KN at 2m, 5m, and 6m respectively from the left end support. Draw the shear force and bending moment diagrams. [12 M]

**(OR)**

5. A simply supported beam of AB of span 8m carrying point loads 3 KN, 4 KN at distances of 5m, 6m respectively from the left end support. Calculate the values of shear force and bending moment at salient points and draw shear force and bending moment diagrams. [12 M]

## UNIT-III

6. A cast iron beam T- section having overall depth 150 mm, flange 100 mm thickness and web 30mm is used as a bracket. The length of the bracket is 300 mm. If the tensile stress is restricted to 200 $Kg/cm^2$, what point load can be placed at the tip of the bracket? What will then be the compressive stress developed? Center of gravity of the T section lies at 56 mm from the top of the flange. [12 M]

**(OR)**

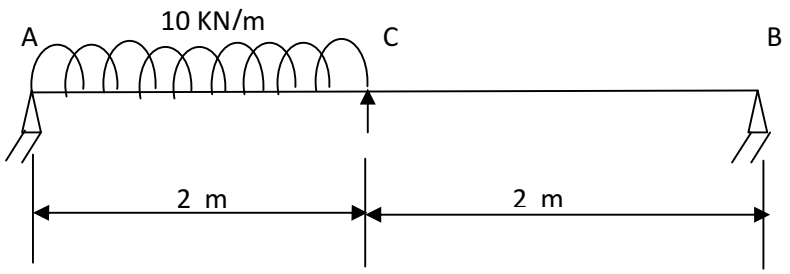
7. A beam of rectangular section 400 X 200 mm. Calculate the maximum intensity of shear stress across the section and sketch the shear stress distribution across the section of the beam, if it carries a shearing force of 300 KN at a section. [12 M]

## UNIT-IV

8. A simply supported beam of length 4m and cross section 200X400 mm is loaded with 10 KN and 20 KN at a distance of 1m from left end and 2m from right end respectively. Find (1) the deflection under the loads (2) Maximum deflection of the beam. Take E= 2 X $10^4$ $N/mm^2$. [12 M]

**(OR)**

9. Find the maximum deflection at the simply supported beam as shown in figure.
Take E= 2 X $10^4$ $N/mm^2$ & I= 1.1 X $10^9 mm^4$. [12 M]




## UNIT-V

10. a) A hallow cylindrical drum is of diameter 800mm, thickness 8mm and length 4m. The drum is subjected to an internal pressure of 5 $N/mm^2$. Find the circumferential and longitudinal stresses induced and also change in dimensions of the shell. Take E=2 X$10^5$ $N/mm^2$ and poission's ratio = 0.3. [6 M]

(b) A cylindrical shell is 3m long, 1.5m internal diameter and 20mm thickness. Calculate the intensity of maximum shear stress induced and also change in dimensions of the shell, if it is subjected to an internal pressure of 2 $N/mm^2$. Take E=0.2 X$10^6$ $N/mm^2$ and poission's ratio = 0.3. [6 M]

**(OR)**

11. A thick cylinder of 200 mm outside diameter and 140mminside diameter is subjected to an internal pressure of 40 Mpa and external pressure of 24 MPa. Determine the hoop stresses induced in the material of the cylinder at the inside and outside diameter. [12 M]

# AR13 **Set 01**

**Code: 13CS2003**

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI**
**(AUTONOMOUS)**
**II B.Tech I Semester Regular Examinations, January, 2015**
**MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE**
**(Common to CSE and IT)**

**Time: 3 hours** **Max. Marks: 70**

## PART – A

**Answer all Questions** [10X1=10M]

1. a) Define the terms: i) tautology ii) contingency?
   b) What is the difference between 'Proposition' and 'Predicate'?
   c) What is a POSET?
   d) What is meant by '*primality*' testing?
   e) State the Fermat's theorem?
   f) What is meant by chromatic number?
   g) What is meant by Isomorphic – graphs?
   h) Define the terms: i) in – degree and ii) out-degree of the vertex?
   i) Define the homomorphism of the semi group?
   j) Solve the recurrence relation $a_n=a_{n-1}+n, a_0=2$ by substitution?

## PART– B

**Answer one Question from each unit** **[5 X 12 = 60 M]**

### UNIT– I

2. Prove the following are tautologies or not:

   a) ~(p v q) v [(~p) ^ q ] v p (Using truth table) [6 M]

   b) [ (p → q) ^ (r→s) ^ (p v r) ] →(q v s) (Using rules of propositions) [6 M]

**(OR)**

3. Determine the following Inference pattern is valid or invalid: [6M+6M]

   a) ~ r → (s→ ~t)
      ~r v w
      ~p →s
      w
      ———————
      t → p

   b) ~p
      p → q
      q → r
      ———————
      ~r

### UNIT– II

4. a) State and Prove the Euler's theorem with suitable example? [6 M]
   b) Discuss the Euclidean Algorithm with suitable example? [6 M]

**(OR)**

5. a) Use Principle of Mathematical Induction to Prove that : $3n^5 + 5n^3 + 7$ n is divisible by 15 for each +ve integer. [6 M]
   b) Use Principle of Mathematical Induction to Prove that:
   $1^3 + 3^3 + 5^3 + \ldots + (2n-1)^3 = n^2 (2n^2 - 1)$. [6 M]

## UNIT– III

6. a) What is meant by Adjacency – Matrix? Give the adjacency matrix for the Wheel graph $W_5$. [6 M]
   b) What is meant by Spanning tree? Discuss Kruskal's minimum spanning tree algorithm with suitable examples [6 M]

**(OR)**

7. a) Find the Chromatic – Number for the "Wheel" graph? [6 M]
   b) State and explain Euler's Formula for planar graph? [6 M]

## UNIT– IV

8. a) Define the terms: i) lattice? Ii) Join – semi lattice iii) Meet – semi lattice [3 M]
   b) Draw the Hasse – diagram for the post $[D_{12};/]$. Where '/' is the divisibility relation. Determine this poset is lattice or not [9 M]

**(OR)**

9. Explain Semi groups and monoids with suitable examples**?** [12M]

## UNIT– V

10. a) In$(1+X^5+X^9)^{10}$ find the coefficient o f $X^{23}$ and $X^{32}$ . [6 M]
    b) Find the coefficient of $X^{12}$ in [6 M]

$$\frac{1 - X^4 - X^7 + X^{11}}{(1-X)^5}$$

**(OR)**

11. Solve the following recurrence relations:
    a) $a_n=a_{n-1}+2n+1$ where $a_0=1$( using simple iterative method) [6 M]
    b) $a_n-7a_{n-1}+16a_{n-2}-12a_{n-3}=0$ where $a_0=1$ $a_1=4$ ,$a_2=8$ [6 M]