AR13

CODE 13CE2001 **SET-I**

ADITYA INSTITUTE OF TECHNOLOGY AND ANAGEMENT,TEKKALI

(Autonomous)

II B.Tech I Semester Regular/Supplementary Examinations, November-2016

STRENGTH OF MATERIALS

(CIVIL ENGINEERING)

Time : 3 Hours **Max Marks :70M**

Answer ALL questions from PART-A & ONE question from Each unit of PART-B

PART-A **1X10M=10M**

1. a. Define Modulus of Rigidity?
   b. Write the relation between three Elastic constants?
   c. Draw the Bending moment diagram of simply supported overhang beam with UDL?
   d. Draw the Shear force diagram of simply supported beam with uniformly varying load?
   e. Draw the shear stress diagram of T-beam section, which is simply supported with UDL?
   f. What is meant by theory of "pure bending"?
   g. Define section modulus?
   h. Draw the shear stress variation for a unsymmetrical I-Section of a simply supported subjected to central concentrated load?
   i. Define elastic line of the beam?
   j. What are the methods to calculate deflection of beams?

UNIT-I

2 a) Define Rupture strength? (2M)

b) A copper rod of 20mm diameter encased in a steel tube of 22mm internal diameter and 28mm external diameter The ends are rigidly attached .The composite bar is 800mm long, and subjected to axial pull 50kN. Find the stresses induced both in the rod and tube? Assume Young's modulus (E) for steel $2x10^5$ N/mm^2 and copper $1.2x10^5$ N/mm^2. (10M)

(OR)

3 a) Define Yield point? What is it's importance? (3M)

b) A conical steel bar tapers uniformly from diameter 40mm to 80mm in a length of 600mm. If an axial tensile force 60kN applied at each end, then determine the elongation of the bar. Assume Young's modulus for steel (Es) $2x10^5$ N/mm^2 (9M)

UNIT-II

4. a) Write different types of support conditions with sketch and show the reactions? (4M)

b) A horizontal simply supported overhang beam of 20m long carries UDL 20kN/m over the span and applied a point load 5kN at 6m from left support. The supports are arranged at left end and 3m from right end. Draw the bending moment and shear force diagram and locate the salient values? (8M)

(OR)

5 a) Write the relation between the shear force and bending moment? (2M)

b) A simply supported beam of 6 m long carries uniformly varying load intensity of zero at left end and 4kN/m at right end.. In addition 5kN point load acting at mid span of beam. Draw the bending moment and shear force diagram and locate the salient values? (10M)

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UNIT-III

6 a) Write the basic assumptions made in the theory of pure bending? (4M)
b) A simply supported beam of rectangular section 300x600mm carries UDL 20kN/m over the entire span of 8m.Find the maximum bending stress at 3 m and 5m from left end? (8M)

(OR)

7 a) Define modulus of rupture ? What is it's significance? (4M)
b) A steel beam of 6m span subjected to UDL 8kN/m over the span and 3kN point load at mid span.Design a square section beam if permissible stress in steel 150N/mm^2. (8M)

UNIT-IV

8 a) Derive a relation between average and maximum shear stress for triangula beam? (5M)
b) A rectangular-beam section width 200 mm and depth 400mm is subjected to shear force 120kN. Draw shear stress distribution diagram with salient values. Also find out the maximum shear stress? (7M)

(OR)

9 a) T-beam section with flange width 250 mm and thickness 20mm and web length 400mm and thickness 12mm subjected to shear force 80kN. Draw shear stress distribution diagram with salient values and find out the maximum shear stress and it's location? (9M)
b) What is meant by economical section in the design of flexural beam? (3M)

UNIT-V

10 a) Derive an expression for a cantilever beam of span **L**, carries uniformly varying load zero at free end and **W.** per meter at fixed end. Find the slope , deflection at mid span? Assume Young's modulus=E and moment of Inertia of section=I (6M)

b) A simply supported beam 150x300 mm depth carries UDL 3kN/m over the span of 8m. Find out the slope and deflection at 3 m from left end? Assume E =2.1x10^5 N/mm^2 (6M)

(OR)

11 a) Derive an expression to find the slope and deflection for a simply supported beam of span **L**, which carries point load **W** at mid span? Also calculate deflection at **L/4** from left end support? (6M)
b) A cantilever beam 200x300 mm depth carries UDL 5kN/m over the span of 6m. Find out the slope and deflection at 4 m from left end? Use moment area method.. (6M)
Assume Young's modulus of elasticity E =2.1x10^5 N/mm^2

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CODE: 13EC2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016
SWITCHING THEORY AND LOGIC DESIGN
(COMMON TO EEE & ECE)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Determine the values of base x in the following $(16)_{10} = (100)_x$.
   b) Why r's complement system is preferred in computer arithmetic
   c) Define prime implicants and essential prime implicants.
   d) Minimize f= $\prod M(0,1,3,4,5)$ using K-map.
   e) What are the advantages of tabulation method over k-map method for the simplification of logic functions
   f) Explain Half-Adder with logic Diagram.
   g) Distinguish between decoder & demultiplexer.
   h) Name the error detection codes.
   i) Draw the schematic of R-S flip-flop with NOR gates.
   j) Explain what you understand by a lock out in a counter.

PART-B

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

UNIT-I

2. a) Using 2's complement representation method find the result of (01100 -00011) **6M**
   b) Perform the following arithmetic operations using 8-bit registers. Use binary signed 1's complement notation, indicate overflow/underflow, if any (i) 29+(-49) (ii) 27 -101 (iii) -28 + (-100) **6 M**

(OR)

3. a) Check for the errors in received hamming code is 101101101 if even parity is used. **6 M**
   b) Find the value of x in the following **6 M**
   i) $(2CA5.B)_{16} = (x)_2$ ii) $(326.77)_8 = (x)_{16}$

UNIT-II

4. a) Find the simplified expression for the Boolean function **6 M**
   F(A,B,C,D)= ∏ (1,3,5,7,13,15)
   b) Implement the function F=A'BD+A'CD+B'CD'+ABC'D using universal gates. **6 M**

(OR)

5. a) Implement the Boolean function F (A,B,C,D)=AC+BC+D with NOR gates only. **6 M**
   b) Verify the following Boolean algebraic manipulation and justify each step with reference to a theorem or postulate. (X+Y□+XY)(XY+X□Z+YZ)=XY+X□Y□Z. **6 M**

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UNIT-III

6. a) Use the tabulation method to determine the set of prime implicants and obtain the possible minimal expression for **6 M**
   $f(A,B,C,D) = \sum m(0,4,5,6,7,8,9,13) + \sum d(1,3,11)$
   b) Find the simplified Boolean function in SOP form using K- Map **6 M**
   $F(A, B, C) = \sum m(0,2,4,5)$.

(OR)

7. a) Determine the prime implicants of $F(W,X,Y,Z)= \sum m(1,4,6,7,8,9,10,11,15)$ using tabular method. **7M**

b) Simplify the following function and implement using NAND gates **5M**
F=(X Z□+X Y□+XYZ)

UNIT-IV

8. a) Obtain the NAND logic diagram of a full adder from the Boolean function **7M**
   C=XY+XZ+YZ S= $X \oplus Y \oplus Z$
   b) Design a full adder using two 4x1 MUX's for realizing sum and carry. **5M**

(OR)

9. a) Design a combinational circuit that accepts a three bit number and generates an output binary number equal to the square of the input number. **6M**
   b) Design a BCD to Decimal decoder having 4 input and 10 output lines. **6M**

UNIT-V

10. a) Why is J-K flip flop called as the universal flip flop? And also derive the characteristic equation from the three variable K-map methods. **7M**
    b) Design an asynchronous ripple counter to count up to 11 in 8,4,2,1 code. Assume that the Flip-flops have asynchronous set and reset terminals. **5M**

(OR)

11. a) Explain characteristics table for SR flip flop which is useful for analysis and defining the operation of flip flop **6M**
    b) Design a Mod 12 counter using D- flip flop. **6M**

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CODE: 13ME2004 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016

MECHANICS OF SOLIDS
(MECHANICAL ENGINEERIG)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

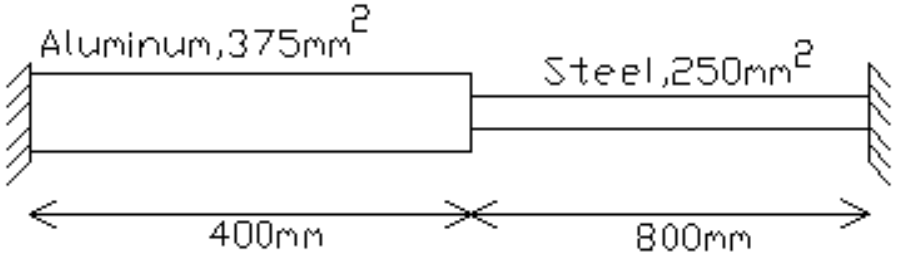
1. a) Define Strain Energy
   b) What is the angle between principal planes and the planes of maximum shear stress?
   c) A simply supported beam is subjected to point load at its midpoint. What is the maximum bending moment?
   d) What do you understand by shear force in beams?
   e) Define deflection in beams
   f) How the torsional shear stress does vary along the circular cross section of a shaft?
   g) What is the maximum deflection of a cantilever beam subjected to point load at its free end.
   h) What is the formula to find the section modulus?
   i) Write the expression for the hoop stress in a thin cylindrical shell?
   j) Define thermal stress

PART-B

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

UNIT-I

2. Compute stresses in steel and aluminium in the structure shown in the figure if the temperature is raised by 40^0C. Given that E_S = 200GPa, E_A = 90GPa, $\alpha_S = 12x10^{-6}$ /^{0}C, $\alpha_A = 20x10^{-6}$ /^{0}C. **12M**

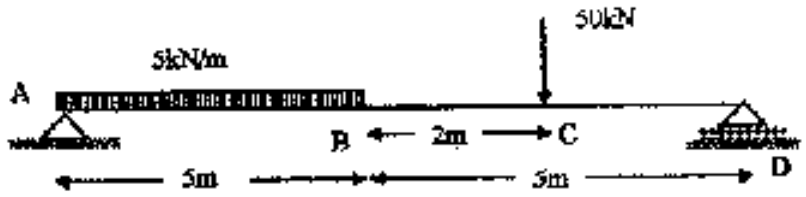


(OR)

3. A rectangular block of material is subjected to a tensile stress of 110N/mm^2 on one plane and a tensile stress of 47 N/mm^2 on the plane at right angle to the former plane. Each of the above stress is accompanied by a shear stress of 63 N/mm^2 Find (i) The direction and magnitude of each of the principal stress (ii) Magnitude of greatest shear stress **12M**

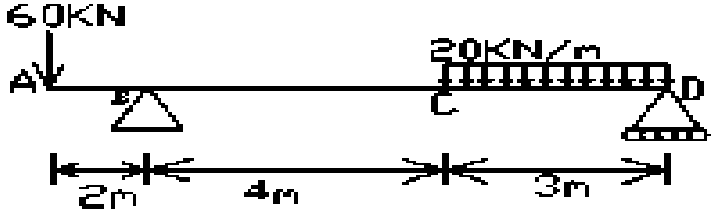
UNIT-II

4. Draw the shearing force and bending moment diagrams for the beam in figure and identify salient features. **12M**



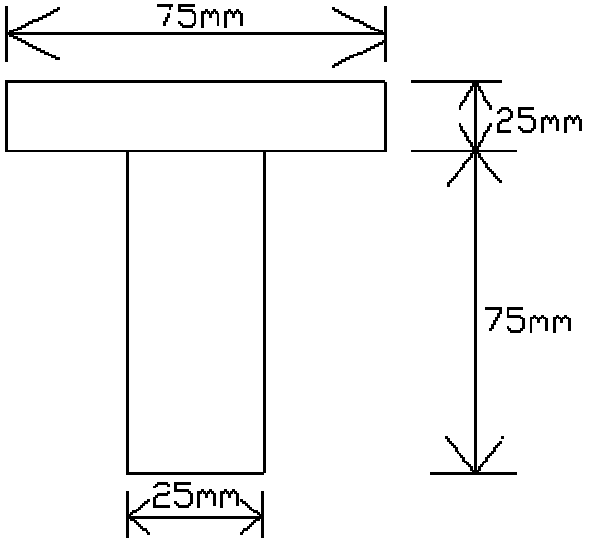
(OR)

5. Draw the shear force and bending moment diagrams for an overhang beam loaded as shown in the Figure. **12M**



UNIT-III

6. Determine the maximum tensile, compressive bending stress caused by a concentrated load of 5.4KN acting at the free end on a cantilever beam of span 3m. The cross section as shown in the Figure. **12M**

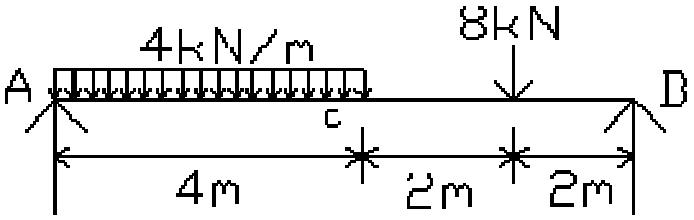


(OR)

7. Find the maximum shear stress for equal leg I-cross section. Both the flange's width is 200mm and thickness of 20mm. The width of the web is 10mm and overall depth is 500mm. Shear force is 200kN. **12M**

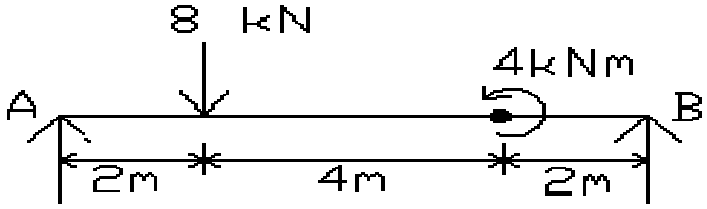
UNIT-IV

8. A simply supported beam loaded as shown in the Figure. Determine the deflection at the midpoint and slope at the supports E = 210 GPa and I = 180 x 10^6 mm^4. **12M**



(OR)

9. Determine the Deflection and slope under the load and moment of a simple beam loaded as shown in the figure. Take E = 210 GPa and I = 180 x 10^6 mm^4. **12M**



UNIT-V

10. A hollow cylindrical drum of 600 mm diameter and a wall thickness of 10mm. and is subjected to an internal pressure of 3MPa. E = 2x10^5 MPa, μ=0.3 and length is 3m. Find **12M**

    a. Circumferential stress
    b. Longitudinal stress
    c. Change in diameter
    d. Change in Length

(OR)

11. A hollow cylindrical drum of 650 mm diameter and a wall thickness of 15 mm. If the drum is subjected to an internal pressure of 4 MPa, find the increase in diameter and volume. Take E = 2x10^5 MPa, μ=0.3 and length is 5m **12M**

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CODE: 13CS2003 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
II B.Tech I Semester Regular/Supplementary Examinations, November-2016
MATHEMATICAL FOUNDATIONS OF COMPUTER SCIENCE
(Common to CSE and IT)

Time: 3 Hours **Max Marks: 70**

PART-A

ANSWER ALL QUESTIONS **[1 x 10 = 10 M]**

1. a) Define the terms: i) tautology ii) contingency
   b) If the universe of the discourse is the set $\{a,b,c\}$ eliminate the quantifier from $(x)R(x)$
   c) State the fundamental theorem of arithmetic
   d) Find the GCD(18, 30)
   e) Define Isomorphism of two graphs.
   f) Is there a tree with degree sequence $(1, 2, 2, 3)$? Give reason
   g) Define monoid
   h) Define lattice
   i) Find a generating function for a_r = the number of nonnegative integral solutions of $e_1 + e_2 + \cdots + e_n = r$ where $0 \le e_i \le 1$.
   j) Find the coefficient of X^3 in $\frac{1}{(1-X)^3}$

PART-B

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

UNIT-I

2. **a** Show that $\neg Q \wedge (P \to Q) \Rightarrow \neg P$ **6M**

   b Determine PCNF of $(\neg P \to R) \wedge (Q \Leftrightarrow P)$, in turn find PDNF from the obtained PCNF. **6M**

(OR)

3. **a** Show that $R \to S$ can be derived from the premises $P \to (Q \to S)$, $\neg R \vee P$, and Q **6M**

   b Show the following using indirect method **6M**
   $(R \to \neg Q), (R \vee S)(S \to \neg Q), (P \to Q) \Rightarrow \neg P$

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UNIT-II

4. **a** Using Fermat's theorem find $3^{31} \bmod 7$ **6M**

b Prove that $\mathbf{1^2 + 2^2 + 3^2 + ... + n^2 = n\,(n + 1)\,(2n + 1)/\,6}$, for all positive integers n. **6M**

(OR)

5. a Let a, b$\in$ Z so that 2a+3b is multiple of 13. Prove that 13 divides 5a+b **6M**

b Use the mathematical induction to prove that $3^n > n^2$ for n a positive integer greater than 2. **6M**

UNIT-III

6. **a** In every graph, show that i) the sum of degrees of all the vertices is twice the number of edges. ii) The number of vertices of odd degree is even. **6M**

b Prove that a tree with n vertices has exactly n - 1 edges. **6M**

(OR)

7. a Explain Kruskal's algorithm with an example **6M**

b Prove that a nondirected multigraph has an Euler path iff it is connected and has 0 or exactly 2 vertices of odd degree. In the latter case, the two vertices 'of odd degree are the endpoints of every Euler path in the multigraph. **6M**

UNIT-IV

8. **a** Define a group. Give an example of a set which is (i). a group (ii). Not a group (define the binary operation accordingly) **6M**

b Let $\mathrm{P}(A)$ be the Power set of a non empty set A. Is the algebraic system $(\mathrm{P}(A), \cup)$ an abelian group? ($\cup$ is a union of sets) **6M**

(OR)

9. **a** In a lattice $(L, \leq)$, for any $a, b, c \in L,$ prove that $b \leq c \Rightarrow a \vee b \leq a \vee c$ *and* $a \wedge b \leq a \wedge c$ **6M**

b Draw the Hasse diagram for the poset (I_{36}, /) draw a poset diagram and determine all maximal and minimal ements where I_{36} denotes the set of all divisors of 36 and / is divisibility relation. **6M**

UNIT-V

10. **a** Find a generating function for a_r = the number of nonnegative integral solutions of $e_1 + e_2 + \cdots + e_n = r$ where $e_i \geq 0$. **6M**

b Express $\dfrac{1}{6 - 5X + X^2}$ as formal power series. **6M**

(OR)

11. **a** Solve the recurrence relation $a_n - 7a_{n-1} + 16a_{n-2} - 12a_{n-3} = 0$ for $n \geq 3$ with the initial conditions $a_0 = 1, a_1 = 4$ and $a_2 = 8$. **6M**

b Find the coefficient of X^{20} in $(X^3 + X^4 + X^5 \ldots)^5$. **6M**

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