

AR18

CODE: 18BST204

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February, 2021

**COMPLEX VARIABLES AND STATISTICAL METHODS
(Civil Engineering)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. Determine the analytic function 12M

$$f(z) = u + iv, \text{ if } u - v = \frac{\cos x + \sin x - e^{-y}}{2(\cos x - \cosh y)} \text{ and } f\left(\frac{\pi}{2}\right) = 0.$$

(OR)

2. a) An electrostatic field in the xy -plane is given by the potential function 6M
 $\phi = 3x^2y - y^3$, find the stream function.
- b) Determine p such that the function $f(z) = 0.5 \log(x^2 + y^2) + i \tan^{-1}\left(\frac{px}{y}\right)$ is an 6M
analytic function.

UNIT-II

3. a) Evaluate $\oint_C \frac{\sin^2 z}{(z - \pi/6)^3} dz$, where C is the circle $|z| = 1$. 6M

- b) Obtain the integral value of 6M

$$f(2) \text{ where } f(a) = \oint_C \frac{z^2 - z - 2}{z - a} dz \text{ and C is the circle } |z| = 2.5$$

(OR)

4. a) Evaluate $\oint_C \frac{z^2 - z + 1}{z - 1} dz$, where C is the circle (i) $|z| = 1$ (ii) $|z| = \frac{1}{2}$. 6M

- b) Evaluate $\int_0^{2+i} (\bar{z})^2 dz$ along the line $y = x/2$. 6M

UNIT-III

5. a) A factory has three machines A, B and C producing 500, 1000 and 2,000 bulbs per day, respectively. Machine A produces 1.25% defective bulbs, machine B produces 2.5% defective bulbs and machine C produces 2.5% defective bulbs. At the end of the day, a bulb is drawn at random and is found to be defective. Obtain is the probability that this defective bulb has been produced by machine C? 6M
- b) The probability density function of the random variable X is given by 6M

$$f(x) = \begin{cases} \frac{k}{\sqrt{x}}, & 0 < x < 4 \\ 0, & \text{else where} \end{cases} \text{ Find (i) } k \quad \text{(ii) } P(X < 1).$$

6. a) An automobile safety engineer claims that 1 in 10 automobile accidents is due to driver fatigue. If this is true, what is the probability that (i) exactly 2 of 5 automobile accidents are due to driver fatigue? (ii) at most 4 of 5 automobile accidents are due to driver fatigue? 6M
- b) In a certain industrial facility, accidents occur infrequently. It is known that the probability of an accident on any given day is 0.005 and accidents are independent of each other. Consider a year time period (365 days). (i) Find the probability that exactly one accident occurs in a year? (ii) Obtain the probability that at least one accident occurs in a year? 6M

UNIT-IV

7. 1000 Students at college level were graded according to their I.Q and the economic Conditions of their homes. Use Chi-square test to find out whether there is any association between economic conditions at home and I.Q. 12M

I.Q			
Economic conditions	High	Low	Total
Rich	460	140	600
Poor	240	160	400
Total	700	300	1000

(OR)

8. The mean yield of wheat from a district A was 210 pounds of S.D. 10 pounds per acre from a sample of 100 plots. In another district the mean yield was 220 pounds with S.D. 12 pounds from a sample of 150 plots. Test whether there is any significant difference between the mean yield of crops in the two districts. 12 M

UNIT-V

9. Fit a straight line $y=ax+b$ 12M

X	1	2	3	4	5	6
Y	2	3	4	5	6	7

(OR)

10. Compute the coefficient of rank correlation between sales and advertisement expressed in thousands of dollars from the following data: 12M

Sales	90	85	68	75	82	80	95	70
Advertisement	7	6	2	3	4	5	8	1

AR18

CODE: 18EST103

SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February, 2021

**ENGINEERING MECHANICS
(Electrical and Electronics Engineering)**

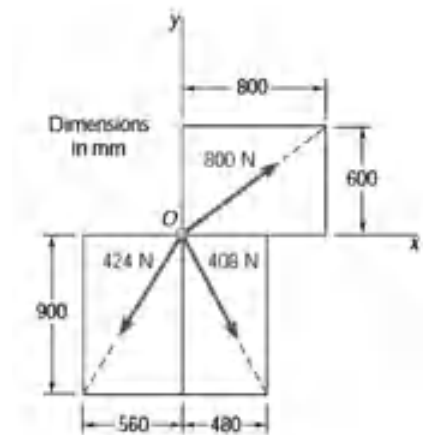
Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit
All Questions Carry Equal Marks
All parts of the Question must be answered at one place

UNIT-I

1. a) List out the different methods to calculate resultant of a 3M coplanar concurrent system with an example.
- b) Determine the x and y components of each of the forces as 9M shown in Figure.



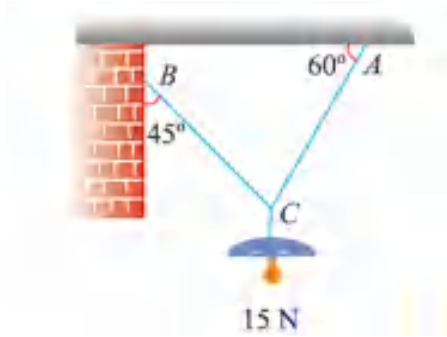
(OR)

2. a) Explain parallelogram law of forces 3M
- b) Four forces equal to P , $2P$, $3P$ and $4P$ are respectively acting 9 M along the four sides of square ABCD taken in order Find the magnitude, direction and position of the resultant force.

UNIT-II

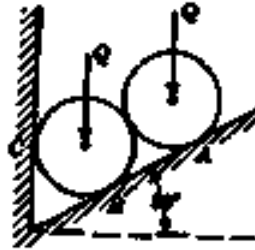
3. a) State and prove Lami's theorem 6M

- b) An electric light fixture weighting 15 N hangs from a point C. by two strings AC and BC. The string AC is inclined at 60° to the horizontal and BC at 45° to the horizontal as shown in Fig. Determine the forces in strings AB and BC



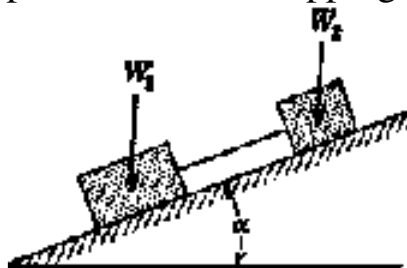
(OR)

4. a) Discuss concept of equilibrium 3M
 b) Two identical rollers of each weight $Q = 100\text{ N}$ are supported by a vertical wall and an inclined plane as shown in Figure. Determine the reactions at the point of supports A, B and C. 9M



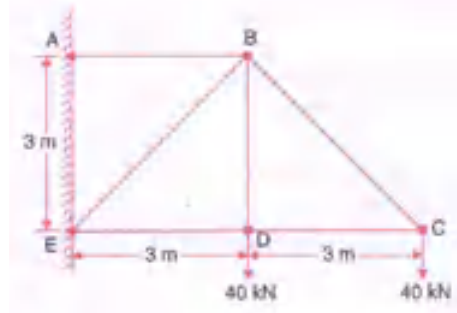
UNIT-III

5. a) Explain about laws of friction 3M
 b) Two blocks of weight $W_1 = 50\text{ N}$ and $W_2 = 50\text{ N}$ rest on a rough inclined plane and connected by a string as shown in the fig. The coefficient of friction between the inclined plane and W_1 and W_2 are $\mu_1 = 0.3$ and $\mu_2 = 0.2$ respectively. Find the inclination of the plane for which slipping will impend. 9M



(OR)

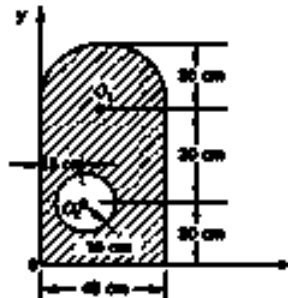
6. a) Find the forces in all the members of the truss shown in figure. 9M



- b) Explain about perfect and imperfect trusses 3M

UNIT-IV

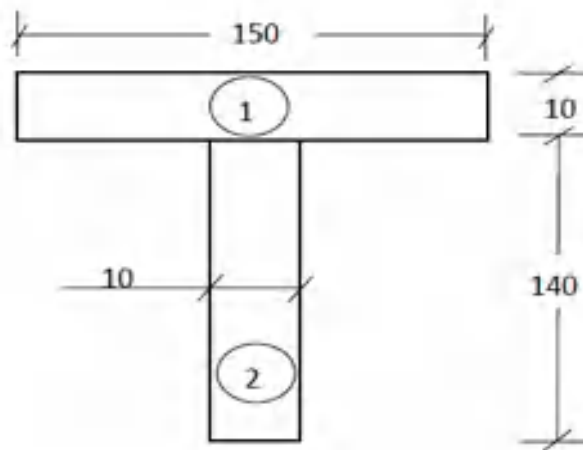
7. a) Locate the centroid of the given composite area as shown 6M



- b) Derive the equation for centroid of area of circular sector having included angle 2α and radius 'r' 6M

(OR)

8. a) Derive the moment of inertia of triangular area about its base 6M
 b) Find the M.I of T-Section as shown in Figure about centroidal horizontal axes. All dimensions are in mm. 6M

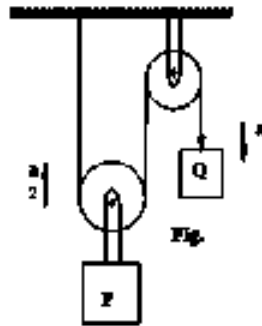


UNIT-V

9. a) Driver of a car travelling at 72km/hour observes the light 300 m ahead of him turning red. The traffic light is timed red for 20 sec before it turns green. If the motorist wishes to pass the lights without stopping to wait for it to turn green, determine (i) the required uniform acceleration of the car (ii) the speed with which the motorist crosses the traffic light. 6M
- b) A stone is dropped from the top of a tower 50 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25 m/sec. what distance from the top and after how much time the two stones cross each other? 6M

(OR)

10. a) Two weights P and Q are connected by the arrangements shown in Fig. neglecting friction and inertia of pulleys and cord, find the acceleration 'a' of the weight Q. Assume $P=20\text{kg}$ and $Q=15\text{kg}$ 6M



- b) A lift has an upward acceleration of 1.225 m/sec^2 6M
- What pressure will a man weighting 500N exert on the floor of the lift
 - What pressure would he exert if the lift had an acceleration of 1.225 m/sec^2 downwards
 - What upward acceleration would cause his weight to exert a pressure of 600N on the floor? Assume $g=9.81 \text{ m/sec}^2$.

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SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February, 2021

**STRENGTH OF MATERIALS
(Mechanical Engineering)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

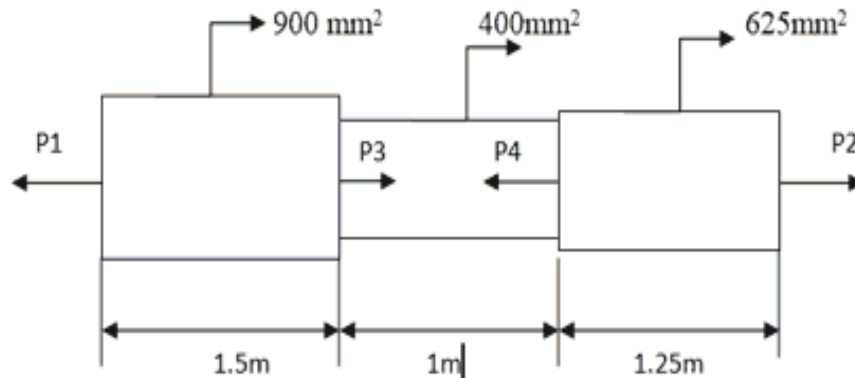
All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) A member ABCD is subjected to loading system as shown in the figure. Determine the net change of the length. Take $E=2 \times 10^5 \text{ N/mm}^2$. 8M

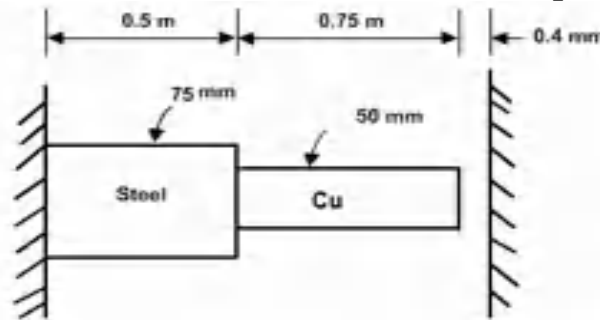
$P_1=120 \text{ kN}$, $P_2=220 \text{ kN}$, $P_3=50 \text{ kN}$, $P_4=150 \text{ kN}$



- b) A bar 20mm diameter is tested in tension. It is observed that when a load of 37.3 kN is applied the extension over a gauge length at 200mm is 0.12mm and the contraction in diameter is 0.0036mm. Find poisson's ratio and elastic moduli. 4M

(OR)

2. A rod consists of two parts that are made of steel and copper 12M as shown in figure below. The elastic modulus and coefficient of thermal expansion for steel are 200 GPa and 11.7×10^{-6} per $^{\circ}\text{C}$ respectively and for copper 70 GPa and 21.6×10^{-6} per $^{\circ}\text{C}$ respectively. If the temperature of the rod is raised by 75°C , determine the forces and stresses developed in the rod.



UNIT-II

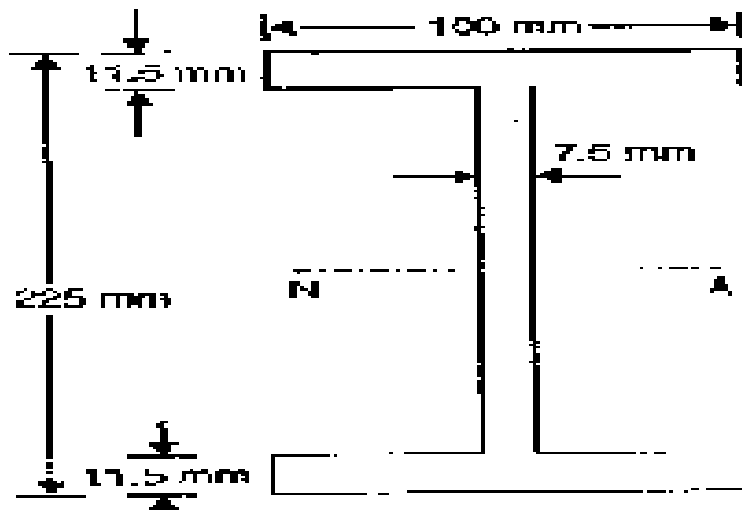
3. a Draw SFD and BMD of a simply supported beam subjected to UDL over its entire span 6M
 b Draw SFD and BMD of a cantilever beam subjected to UDL over its entire span 6M

(OR)

4. A beam AB 10m long has supports at its ends A and B. it carries a point load of 5kN at 3m from A and a point load of 5 kN at 7m from A, a UDL of 1 kN/m between the point loads. Draw Shear force and Bending moment diagrams for the beam. 12M

UNIT-III

5. What are the assumptions of theory of simple bending, and derive the equation $\sigma/Y = M/I = E/R$. 12M
- (OR)
6. A simply supported beam of I cross sectional area has a span length of 12m. It is carrying a shear force of 50kN. Draw the shear stress distribution across the section. 12M



UNIT-IV

7. Two shafts of the same material have the same length, one is hallow with inside diameter is 0.8 times outside diameter. Other one is a solid with diameter 'd'. If both the shafts are subjected to the same torque. Determine the ratio of their weights also find the percentage of saving of material if the maximum shear stress developed in each shaft is same. 12M
- (OR)
8. Derive torsion equation for a circular shaft subjected to pure torque and also list the assumptions. 12M

UNIT-V

9. Derive the expressions for slope and deflection of a simply supported beam of span L carrying a uniformly distributed load of w kN/m over the entire length. 12M
- (OR)
10. A cantilever beam of length 2m carries a point load of 20kN at the free end and another point load of 30kN at its centre. If $E=210 \text{ Gpa}$ and $I=10^8 \text{ mm}^4$ for the cantilever then determine slope and deflection at free end by using moment area method. 12M

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SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February, 2021

**ANALOG COMMUNICATIONS
(Electronics and Communication Engineering)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) What is the need for modulation? Explain 4M
b) Explain the communication system with the help of block diagram 8M
- (OR)
2. a) Explain generation of AM signal using square law modulator 6M
b) Derive an expression for AM wave. 6M

UNIT-II

3. a) Explain the frequency discrimination method for generating SSB waves. 6M
b) Explain the detection of SSB waves with the help of block diagram and waveforms 6M
- (OR)
4. a) Explain DSBSC generation using ring modulator. 6M
b) Explain about DSBSC using filter method. 6M

UNIT-III

5. a) Compare PM and FM 6M
b) Explain about Wide band FM. 6M
- (OR)
6. a) Explain Time Division Multiplexing with block diagram 6M
b) Explain Frequency Division Multiplexing with block diagram 6M

UNIT-IV

7. a) Explain the operation of super heterodyne receiver with block diagram 6M
b) Compare AM and FM receivers 6M
- (OR)
8. a) Explain AM transmitter with low level modulation scheme. 6M
b) Explain the operation of Variable reactance type FM transmitter 6M

UNIT-V

9. a) What is the need for pre-emphasis and de-emphasis? 4M
b) Discuss noise in AM receivers using envelope detection for different cases 8M
- (OR)
10. a) Compare PAM, PWM and PPM. 6M
b) Explain the principle of operation of basic transistor PAM modulator with a circuit. 6M

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SET-1

**ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)**

II B.Tech II Semester Supplementary Examinations, February, 2021

**COMPUTER ORGANIZATION & ARCHITECTURE
(Common to CSE AND IT)**

Time: 3 Hours

Max Marks: 60

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

UNIT-I

1. a) Describe the basic components of a computer system with a neat sketch. 8 M
- b) Describe bus organization with neat sketch. 4 M

(OR)

2. Illustrate the different types of addressing mode with an example each. 12 M

UNIT-II

- 3 Explain restoring and non restoring division algorithm with an example 12M

(OR)

4. a) Illustrate a 4-bit adder/subtractor which performs addition if $M=0$ and subtraction if $M=1$. Assume $A=1010$, $B=1011$ and the initial carry $C_{in}=1$. 6 M
- b) Explain booth multiplication algorithm with an example. 6 M

UNIT-III

5. a) Briefly discuss the single level cache memory organization. 8 M
- b) Determine the Tag, Line and Word values in hexadecimal format for a direct-mapped cache. The main memory addresses in hex format is given by 222222 and 555555. 4 M

(OR)

6. a) Illustrate how the performance of the computer system is improved by memory hierarchy. 6 M
- b) Explain the different cache replacement algorithms with its merits. 6 M

UNIT-IV

7. a) Interpret the operation of isolated I/O device with neat sketch. 8 M
- b) A person got the specification of a computer like this. Report your understanding on each of the following specifications 4 M

i) Processor - Intel Core i5-750(8MB Smart Cache, 2.5 GT/S, 64-Bit)

ii) Integrated PCT 10/100/1000 Mbps Gigabit Ethernet Controller

iii) RAM ->8GB DDR – III expandable

iv) Ports: 1x Parallel, 1x Serial, 1x V G A, 1x R J 45, 1x PS/2 Keyboard, PS/2 Mouse, 4xUSB, 1x Line in, 2x Line out, Mic, Speaker.

(OR)

8. Illustrate the step-by-step account of actions taken during the DMA. 12 M

UNIT-V

9. a) Discuss the following techniques used for the data transfer in a processor 6 M
- i) source-initiated transfer ii) destination-initiated transfer
- b) Illustrate the concept of structural hazards in a pipelined system. 6 M

(OR)

10. Describe how parallel processor is used to increase the speed of the processor. 12 M