

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) Show that the function $u(x, y) = 2\log(x^2 + y^2)$ is harmonic and find its harmonic conjugate. 6M

- b) Find the analytic function whose real part is $e^x \cos y + y$ 6M

(OR)

2. If $f(z) = u + iv$ is an analytic function of z , find $f(z)$, 12M
if $2u + iv = e^{2x}((2x + y)\cos 2y + (x - 2y)\sin 2y)$

UNIT-II

3. Using Cauchy's integral formula to Evaluate ,
 $\int_c \left(\frac{z^3 - \sin 3z}{(z - \pi/2)^3} \right) dz$, around $C: |z| = 2$ 12M

(OR)

4. Evaluate $\int_c \left(\frac{e^z}{z^3} + \frac{z^4}{(z+i)^2} \right) dz$, where $c: |z| = 2$ using Cauchy's integral formula. 12M

UNIT-III

5. If x is a normal variate with mean 30 and standard deviation 5 find the probabilities that i) $26 < X < 40$ ii) $X > 45$. 12M

(OR)

6. A population consists of five numbers 2,3,6,8 and 11. 12M
Consider all possible samples of size two which can be drawn, with replacement from this population. Find
(a) The mean of the population
(b) The standard deviation of the population
(c) The mean of the sampling distribution of means and
(d) The standard deviation of the sampling distribution of means (i.e., the standard error of means.)

UNIT-IV

7. a) Average no. of accidents on any day on a national highway is 1.8. Determine the probability that the number of accidents are 6M

i) At least one ii) At most one

- b) The mean height of students in college is 155 cms and standard deviation is 15. What is the probability that the mean height of 36 students is less than 157 cms. 6M

(OR)

8. If the masses of 300 students are normally distributed with mean 68 kgs. and standard deviation 3kgs , how many students have masses 12M

- 1) Greater than 72kgs.
2) Less than or equal to 64 kgs.
3) Between 65 and 71 kgs.

UNIT-V

9. Fit a second degree polynomial of the following data 12M

X	0	1	2	3
Y	2	4	6	8

(OR)

10. Obtain the correlation coefficient for the following data 12M

X	68	64	75	50	64	80	75	40	55	64
Y	62	58	68	45	81	60	68	48	50	70

AR18

CODE: 18EST103

SET-2

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

II B.Tech II Semester Regular Examinations, November-2020

**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) State the triangular law of forces with a neat sketch. 3M
- b) A right circular roller of weight W rests on a smooth horizontal plane and is held in position by an inclined bar AC as shown in Figure.1. Find the tension T in the bar AC and the vertical reaction R_b at B if there is also a horizontal force P acting at Point C . Assume $\alpha=30^\circ$

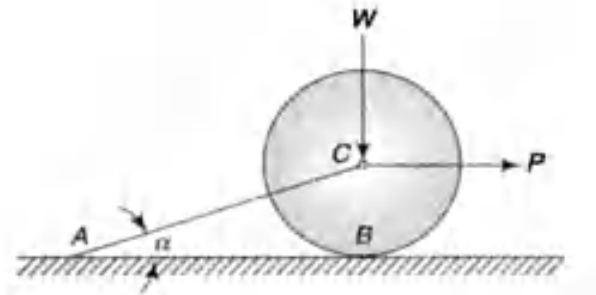


Figure.1

(OR)

2. a) List out the different methods to calculate resultant of a coplanar concurrent system with an example. 3M
- b) Determine the x and y components of each of the forces as shown in Figure.2

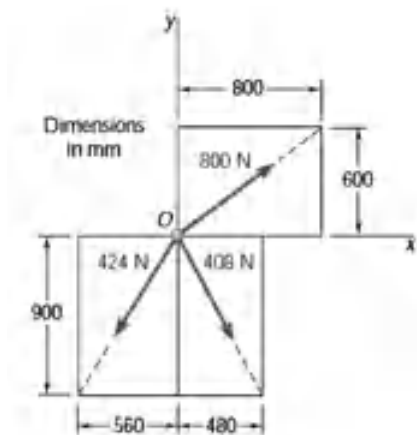


Figure.2

UNIT-II

3. a) Describe the equilibrium law with a neat sketch. 3M
b) A roller of radius $r = 304.8$ mm. and weight $Q = 2225$ N is to be pulled over a curb of height $h = 152.4$ mm by a horizontal force P applied to the end of a string wound around the circumference of the roller as shown in Figure.3. Find the magnitude of P required to start the roller over the curb.

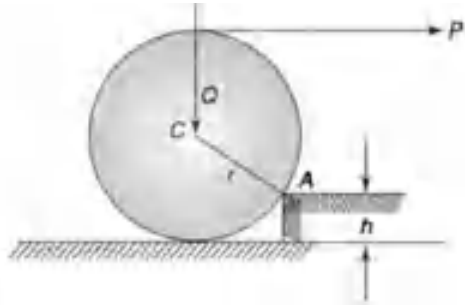


Figure.3

(OR)

4. a) Differentiate between moment and couple with an example. 3M
b) Two identical rollers of each weight $Q = 100$ 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.

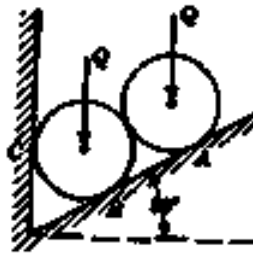


Figure.4

UNIT-III

5. a) Explain the following terms. 6M
i) Angle of friction ii) Cone of friction iii) Coefficient of friction .
b) A block of weight $W_1 = 890$ N rests on a horizontal surface and supports on top of it another block of weight $W_2 = 222.5$ N as shown in Figure.5. The block W_2 is attached to a vertical wall by the inclined string AB. Find the magnitude of the horizontal force P applied to the lower block as shown, that will be necessary to cause slipping to impend. The coefficient of static friction for all contiguous surfaces is $\mu = 0.3$.

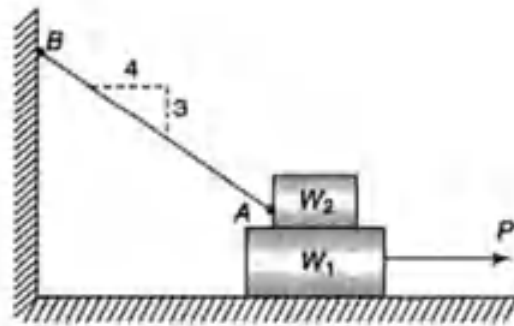
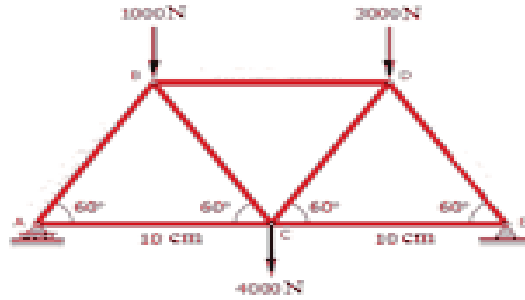


Figure.5

(OR)

6. a) Write the assumptions of plane truss. 3M
 b) Compute the force in each member of the truss using method of joints as shown in Figure. 9M



UNIT-IV

7. a) Determine the coordinates x_c and y_c of the centroid C of the length of a circular arc AB of radius r and central angle α as shown in Figure.7(a). 6M

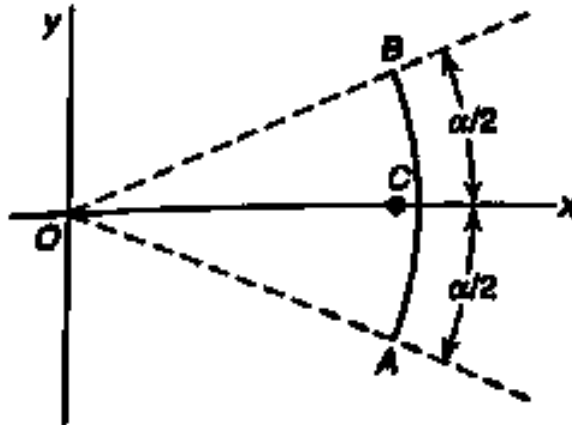


Figure.7(a)

- b) The coordinates of the centroid of the area obtained after removing a semi circle of radius 10 cm from a quadrant of a circle of radius 20 cm 6M

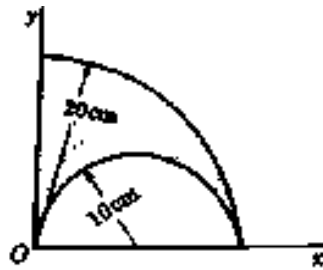
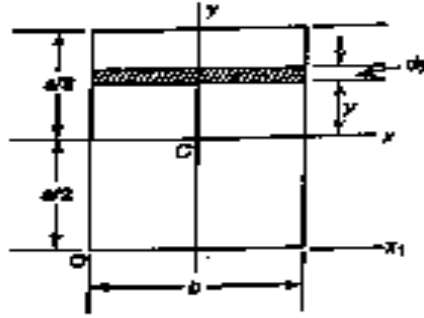


Figure.7(b)

(OR)

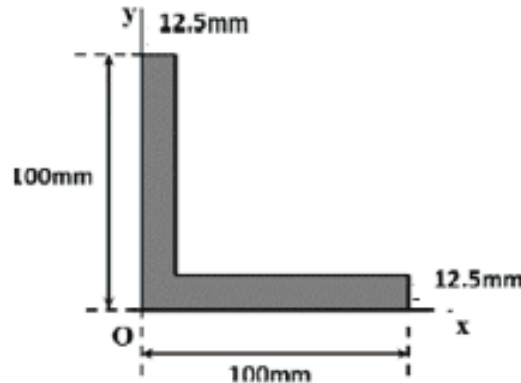
8. a) Find the moment of inertia of the rectangle in Figure.8(a) with respect to its base.



6M

Figure. 8(a)

- b) Calculate the moment of inertia of the area of the angle section having the dimensions shown in Figure.8(b) with respect to a centroidal axis parallel to the x axis.



6M

Figure.8(b)

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

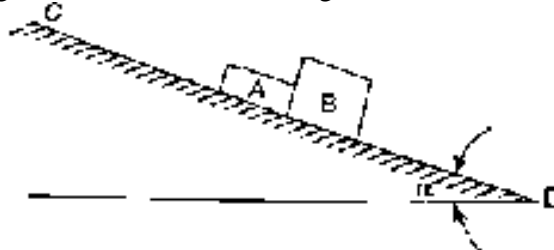
- b) A stone is dropped from the top of a tower 50 m high. At the same time another stone is thrown up from the foot of the tower with a velocity of 25 m/sec. what distance from the top and after how much time the two stones cross each other?

6M

(OR)

10. a) Describe the D'Alemberts principle with an example.
- b) Two blocks A and B slide under the action of gravity slide down the inclined plane CD that makes with the horizontal the angle $\alpha=30^\circ$ as shown in Figure.9. If the weights of the blocks are $W_a=44.5\text{N}$ and $W_b=89\text{N}$ and the coefficients of friction between them and the inclined plane are $\mu_a=0.15$ and $\mu_b=0.30$, find the pressure P existing between the blocks during the motion.

3M



9M

Figure.9

AR18

CODE: 18MET204

SET-2

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

II B.Tech II Semester Regular Examinations, November-2020

**STRENGTH OF MATERIALS
(Mechanical Engineering)**

Time: 3 Hours

Max Marks: 60

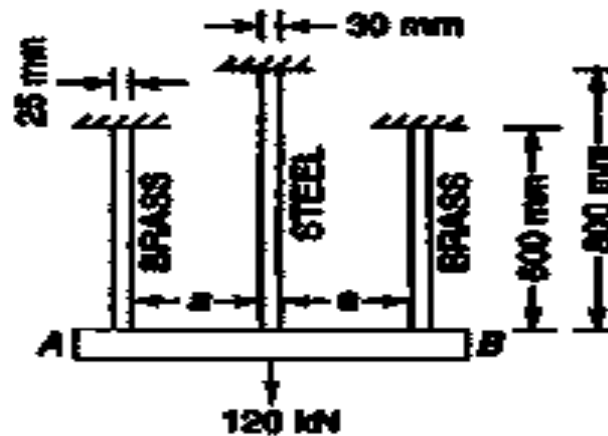
Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the Question must be answered at one place

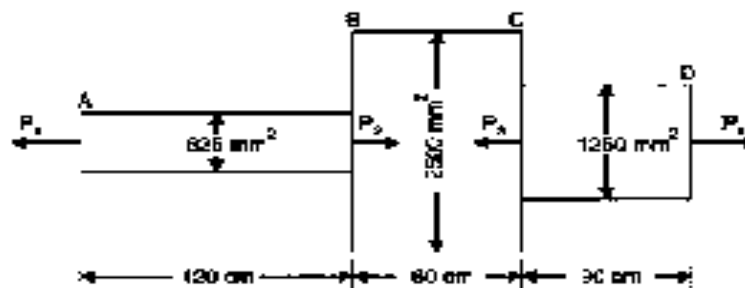
UNIT-I

1. Three equally spaced rods in the same vertical plane support a rigid bar AB. Two outer rods are of Brass, each 600 mm long and of 25 mm diameter. The central rod is 800 mm long and 30 mm in diameter and is made of steel. Determine the forces and stresses in the bars due to an applied load of 120 kN through the midpoint of the bar. The bar remains horizontal after the application of the load. Take $E_s/E_b=2$. The arrangement is as shown in the figure.



(OR)

2. A member ABCD is subjected to the loads as shown in Fig. Calculate the force P_2 necessary for equilibrium, if $P_1=45\text{kN}$, $P_3=450\text{kN}$ and $P_4=130\text{kN}$. Determine the total elongation of the member assuming the Modulus of Elasticity to be $2.1 \times 10^5 \text{ N/mm}^2$.



UNIT-II

3. A cylindrical vessel 2 m long and 500 mm in diameter with 10 mm thick plates is subjected to an internal pressure of 3 MPa. Calculate the change in volume of the vessel. Take $E = 200 \text{ GPa}$ and Poisson's ratio $= 0.3$ for the vessel material. 12M

(OR)

- 4 A beam of span 10m is simply supported at two points 6m apart with equal over hang on either side. Both the overhanging portions are loaded with a uniformly distributed load of 2 kN/m each and a concentrated load of 10 kN is applied at the mid span. Construct the SF and BM diagrams and locate the points of inflexion, if any 12M

UNIT-III

5. A beam of T section is used as cantilever with the flange uppermost. The flange is 10cm wide and 2.5cm deep and the web is 1.5cm wide and 15cm deep while the cantilever is 2m long. Determine the maximum permissible load which may be suspended from the end of the cantilever if the limiting stresses in tension and compression are 90 and 150 MN/m^2 . 12M

(OR)

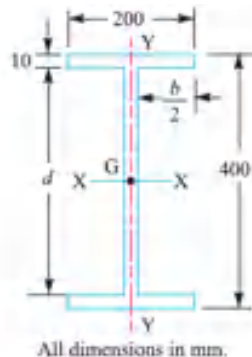
6. Derive an expression for shear stress in triangular section with base 'b' and height 'h', also draw the distribution. 12M

UNIT-IV

7. Write the assumptions in torsion of a circular shaft, also derive the expression $T/J = \tau/R = G\theta/L$. 12M

(OR)

8. An I-section $400 \text{ mm} \times 200 \text{ mm} \times 10 \text{ mm}$ as shown in Fig. is used as a strut of 6m length with its both ends fixed. Find Euler's crippling load. Take Young's modulus for the material of the section as 200 kN/mm^2 . 12M



UNIT-V

9. A beam of length 6m is simply supported at its ends and carries two point loads of 48 kN and 40 kN at a distance of 1 m and 3m respectively from the left support. Find i) deflection under each load, ii) maximum deflection and iii) the point at which maximum deflection occurs. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 85 \times 10^6 \text{ mm}^4$. 12M

(OR)

10. a) Write a short notes on moment area method. 6M
b) A beam is 10m long and is simply supported at the ends. It carries concentrated loads of 100kN at centre. Calculate the maximum deflection and slope Take $I = 18 \times 10^8 \text{ mm}^4$ and $E = 210 \text{ GPa}$. 6M

AR18

CODE: 18ECT208

SET-2

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

II B.Tech II Semester Regular Examinations, November-2020

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) Explain briefly about different blocks of Communication system. 6M
b) Explain the generation method of AM signal using switching modulator. 6M
(OR)
2. a) When the modulation percentage is 75, an AM transmitter produces 10KW. How much of this transmitted power, is carrier power. What would be the percentage power saving if the carrier and one of the side bands were suppressed? 6M
b) Explain the envelope detection method for AM signal. 6M

UNIT-II

3. a) Explain the generation method of DSB-SC which uses a square signal as carrier. 6M
b) Explain the demodulation of DSB-SC using Synchronous detection method. 6M
(OR)
4. a) Derive the time domain expression for a SSB-SC signal. 6M
b) Compare SSB and VSB modulation techniques. Give an application for each. 6M

UNIT-III

5. a) Convert PM to FM and FM to PM with the help of block diagrams. 6M
b) Compare Narrow band and Wide band FM. 6M
(OR)
6. a) A carrier is frequency modulated by a sinusoidal modulating signal of frequency 2 kHz, resulting in a frequency deviation of 5 kHz. What is the bandwidth occupied by the modulated waveform? The amplitude of the modulating sinusoid is Doubled and its frequency is halved. What is the new bandwidth? 6M
b) Explain FM demodulation using Frequency discrimination method with neat sketches. 6M

UNIT-IV

7. a) Explain about variable reactance type FM transmitter. 6M
b) Explain about the terms Selectivity, fidelity and Sensitivity with respect to a receiver. 6M
(OR)
8. a) Explain about various blocks of a superhetrodyne receiver. 6M
b) Draw the block diagram of FM receiver and explain about each block. 6M

UNIT-V

9. a) Compare PAM, PWM and PPM. 6M
b) Derive the expression for Figure of merit of DSB-SC receiver. 6M
(OR)
10. a) Explain the Demodulation method of Pulse position modulation. 6M
b) Explain how Pre-emphasis improves FM noise performance. 6M

AR18

CODE: 18CST205

SET-2

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

II B.Tech II Semester Regular Examinations, November-2020

**COMPUTER ORGANIZATION & ARCHITECTURE
(Common to CSE & 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) Explain various addressing modes with suitable diagrams. 6M
- b) Explain about Register Transfer Language. 6M

(OR)

2. a) Brief discussion about bus organization with neat sketch. 6M
- b) Explain how various registers and memory are connected using a common bus with diagram. 6M

UNIT-II

3. a) Model the hardware representation for signed magnitude addition and subtraction. 6M
- b) Apply Booth's algorithm to multiply the numbers 23 and 19 6M

(OR)

4. a) Write Booth algorithm for multiplication of signed 2's complement numbers. 6M
- b) Apply division algorithm to perform $7/3$? 6M

UNIT-III

5. a) Why do hierarchical memory systems are employed to achieve optimal performance by a computer system.? 6M
- b) Illustrate write through and write back methods of cache memory 6M

(OR)

6. a) A computer system has a cache with $T_c=8$ ns and Physical memory with $T_p=65$ ns. 6M
If the hit ratio is 75 percent, what is the average memory access time?
- b) Explain about memory interleaving? 6M

UNIT-IV

7. a) Describe Asynchronous data transfer using handshaking method?. 6M
- b) Explain DMA in detail with a neat sketch? 6M

(OR)

8. a) What is priority interrupt? Explain the Daisy Chaining Priority arrangement?. 6M
- b) Explain the following
i) I/O bus & interface – modules ii) Isolated I/O & Memory mapped I/O

UNIT-V

9. a) Describe various ways of handling branch hazards in instruction pipelining. 6M
- b) Explain parallelism in uni-processor system. 6M

(OR)

10. a) Explain the principle of pipelining with the help of space-time diagram. Derive an expression for speed up pipeline. 8M
- b) Describe any two techniques for dealing data dependencies in pipelined computers. 4M