AR18

CODE: 18EST103 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Regular Examinations, April- 2019

ENGINEERING MECHANICS

(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. a) Differentiate between resultant and equilibrant. 5M

   b) A weight Q is suspended from a small ring C, supported by two cords AC and BC (Figure.1). The cord AC is fastened at A while the cord BC passes over a frictionless pulley at B and carries the weight P as shown. If $P = Q$ and $\alpha = 50°$, find the value of the angle β. 7M

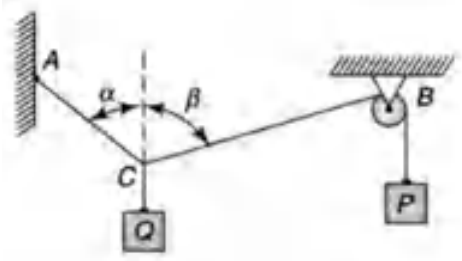


Figure.1

(OR)

2. a) State and explain Lami's theorem with a neat sketch. 5M

   b) Two identical rollers each of weight $Q = 445$ N, are supported by an inclined plane and a vertical wall as shown in Figure.2. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. 7M

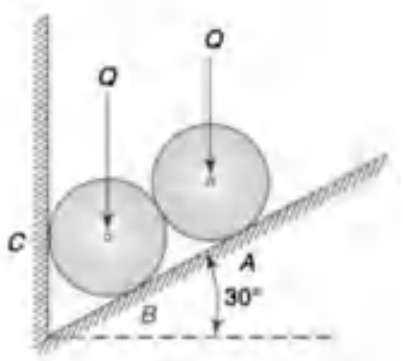
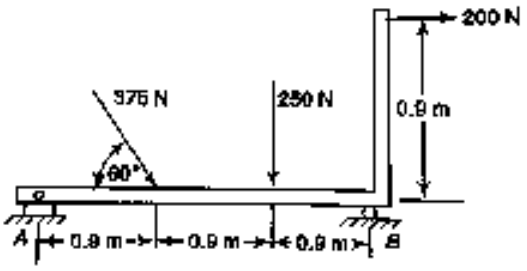


Figure.2

UNIT-II

3. a) Explain the moment and couple with an example. 6M
   b) Find the reactions at A and B for the beam loaded as shown in below diagram. 6M



(OR)

4. a) State and explain the varignon's theorem. 5M
   b) A rigid bar *AB* is supported in a vertical plane and carries a load *Q* at its free end as shown in Figure.4. Neglecting the weight of the bar itself, compute the magnitude of the tensile force *S* induced in the horizontal string *CD*. 7M

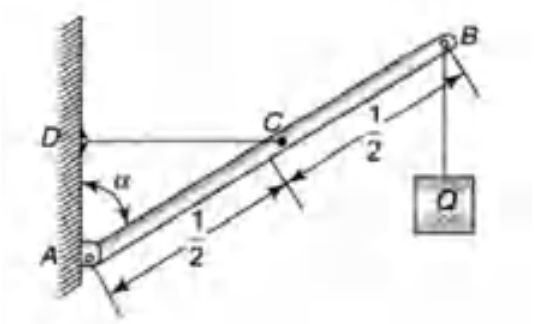


Figure.4

UNIT-III

5. a) Explain the angle of friction with a neat sketch? 5M
   b) Two blocks connected by a horizontal link *AB* are supported on two rough planes as shown in Figure.5. The coefficient of friction for block *A* on the horizontal plane is $\mu = 0.4$. The angle of friction for block B on the inclined plane is $\varphi = 15°$. What is the smallest weight *W* of block A for which equilibrium of the system can exist? 7M

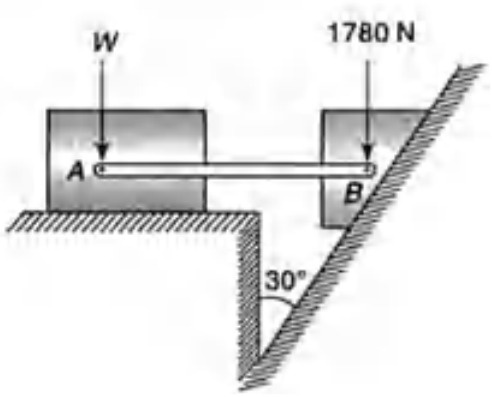


Figure.5

(OR)

6. a) State the assumptions made in the analysis of a truss? 3M
   b) Determine the axial force in each bar of the plane truss loaded as shown in Figure.6. 9M

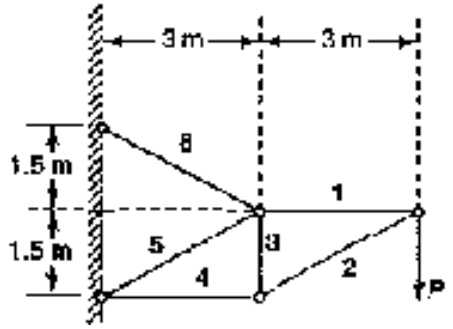


Figure.6

UNIT-IV

7. a) Determine the centroid of the rectangle of width '*b*' and height '*h*' by integration method. 6M
   b) Locate the centroid *C* of the shaded area obtained by cutting a semicircle of diameter *a* from the quadrant of a circle of radius *a* as shown in Figure.7. 6M

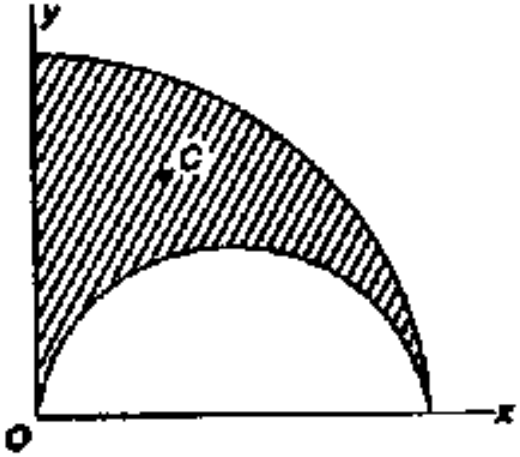


Figure.7

(OR)

8. a) State perpendicular axis theorem with a neat sketch? 6M
   b) Calculate the moment of inertia of the shaded area in Figure.8 with respect to a centroidal axis parallel to the *x*-axis. 6M

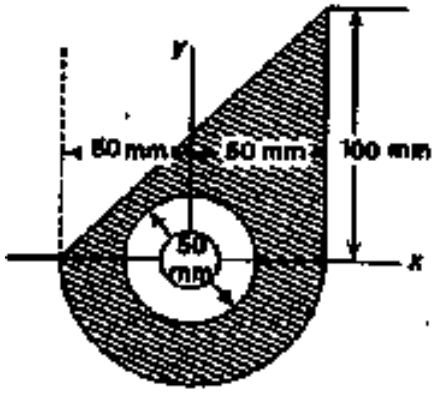


Figure.8

UNIT-V

9. a) Tyre marks of the vehicle shows that a car travelling along a straight level street had skidded a total distance of 30 m after the brakes were applied. If the coefficient of friction between the tyres and the pavement is estimated to be μ = 0.5, what was the probable speed of the car when brakes were applied. 6M
   b) A train is moving down a slope of 0.008 with a velocity of 48 kmph. At a certain instant, the engineer applies the brakes and produces a total resistance to motion equal to one-tenth of the weight of the train. What distance *x* will the train travel before stopping? 6M

(OR)

10. a) Distinguish between kinetics and kinematics with examples? 4M
    b) Two blocks of weights *P* and *Q* are connected by a flexible but inextensible cord and supported as shown in Figure.9. If the coefficient of friction between the block *P* and the horizontal surface is μ and all other friction is negligible, find (i) the acceleration of the system and (ii) the tensile force *S* in the cord. The following numerical data are given: *P*= 53.4 N; *Q*=26.7 N; μ=1/3. 8M

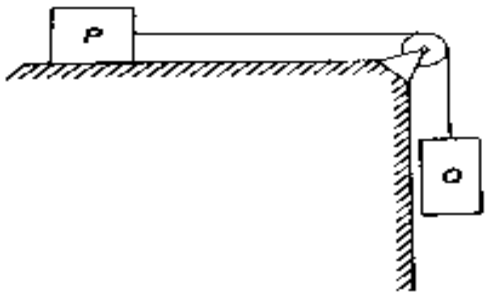


Figure.9

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AR18

CODE: 18EST102 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Regular Examinations, April-2019

PROGRAMMING FOR PROBLEM SOLVING

(Common to EEE, ME Branches)

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 about data types in C.	6M
	b)	Explain the structure of C program.	6M
		(OR)	
2.	a)	Write an algorithm to find the GCD of two integers.	6M
	b)	List all the operators in C along with their precedence and associatively.	6M

UNIT-II

3.	a)	Explain the concept of nested if else with an example.	7M
	b)	Illustrate the difference between break and continue statements using example programs.	5M
		(OR)	
4.	a)	Write a C program to accept a number and reverse it.	6M
	b)	Explain the switch statement with an example.	6M

UNIT-III

5.	a)	Differentiate between Iterative and Recursive functions. Write an iterative function to generate first 10 Fibonacci numbers.	6M
	b)	What are the storage classes in C. Explain?	6M
		(OR)	
6.	a)	Write a program to accept any two matrices and find the sum.	6M
	b)	Explain call by value and call by reference with an example program.	6M

UNIT-IV

7.	a)	Write a program to remove duplicate elements in an array. Pass the array as pointer to a function.	6M
	b)	Give the pros and cons of using pointers.	6M
		(OR)	
8.	a)	Discuss in detail on pointer arithmetic.	6M
	b)	Explain about pointer to pointer with example.	6M

UNIT-V

9.	a)	Create a structure containing student information such as name, number, marks etc. Write a program to read student data and display the same.	7M
	b)	Give the syntax and description of the following. i) rewind(), ii) ftell(), iii) fseek().	5M
		(OR)	
10.	a)	Write a program to copy the contents of one file into another.	6M
	b)	Write a program to add two complex numbers using structure concept.	6M

AR18

CODE: 18ECT102 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Regular Examinations, April- 2019

NETWORK THEORY

(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) Compute the value of Current flowing through 3Ω resistor using Thevenin's theorem. [5M]

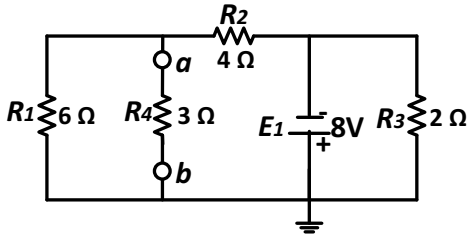


Fig-1

b) Compute the value of I_2 by using Super Position Theorem. [7M]

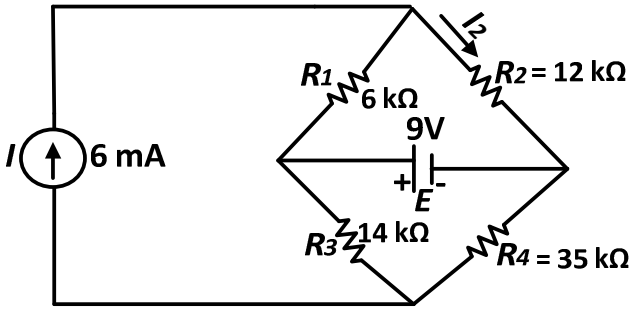


Fig-2

(OR)

2. a) Compute the Norton's Equivalent between a-b. [5M]

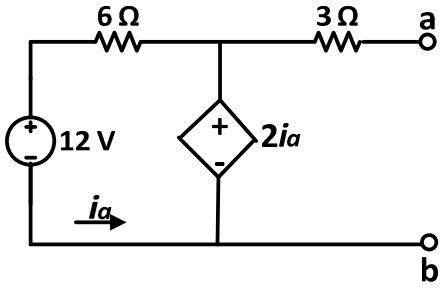


Fig-3

b) Use nodal analysis to Determine v_x in the circuit. [7M]

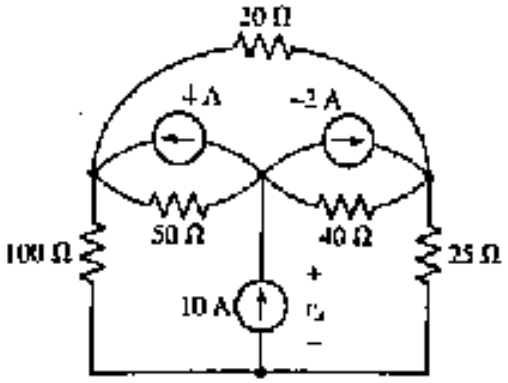


Fig-4

UNIT-II

3. a) Derive the condition for maximum power transfer with DC excitation and Compute the value of R_L such that the power transferred to R_L is maximum for the circuit shown in Fig-5. [6M]

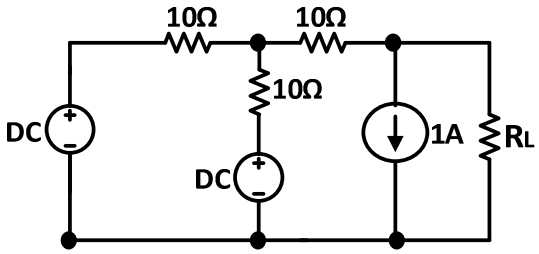


Fig-5

b) Verify the Tellegen's Theorem for the following circuit shown in Fig-6. [6M]

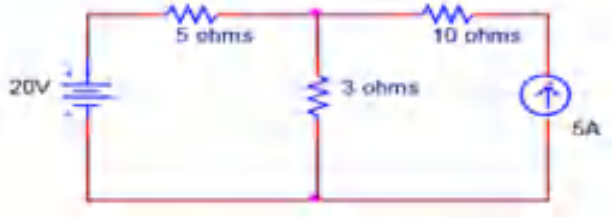


Fig-6

(OR)

4. a) State and explain Millman's theorem [4M]

b) Calculate current **I** in the following circuit shown in Fig-7 using Milliman's theorem. [8M]

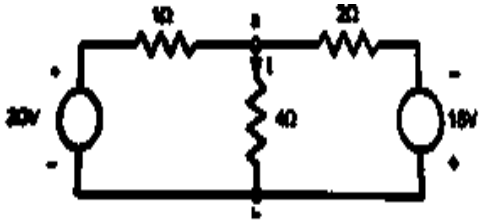


Fig-7

UNIT-III

5. a) Find the Z-parameters for the Lattice network shown in fig-8. [6M]

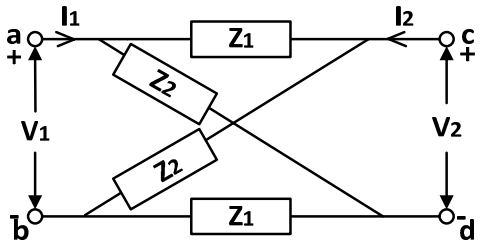


Fig-8

b) Derive the hybrid parameters in terms of impedance parameters and also find h-parameters for the above problem (Fig-8) if Z_1=2 Ω and Z_2=4 Ω. [6M]

(OR)

6. a) Obtain Z parameters of the following networks shown in Fig-9. [6M]

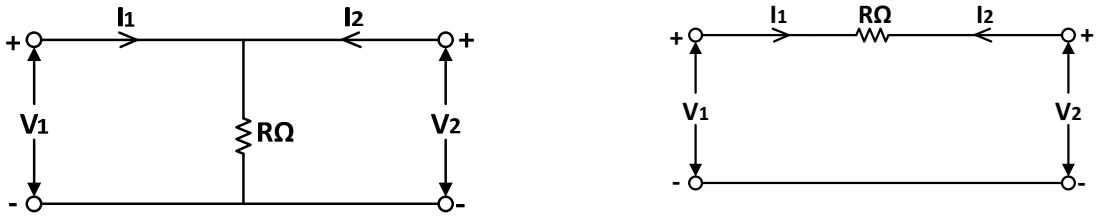


Fig-9

b) Derive the Transmission parameters if the two two-port networks are connected in Cascade connection. [6M]

UNIT-IV

7. a) A series RLC circuit has the following properties: R = 4 Ω, ω_0 = 4000 rad/sec, and the BW = 100 rad/sec. Determine the values of L and C. Also compute the cut-off frequencies(f_1 & f_2). [6M]

b) Derive the expression for Bandwidth for series RLC circuit [6M]

(OR)

8. a) An impedance Z_1= (10+j10) Ω is connected in parallel with another impedance of resistance 8.5Ω and variable capacitance connected in series. Find capacitance 'C' such that the circuit is resonant at 5 KHz. [6M]

b) A series RLC circuit has a quality factor of 5 at 50 rad/sec. The current flowing through the circuit at resonance is 10A and the supply voltage is 100V.The total impedance of the circuit is 20Ω.Find the circuit constants. [6M]

UNIT-V

9. a) The circuit shown in fig-10 consists of Resistance, inductance and capacitance in series with a 50V constant source, when the switch is closed at t=0 find the current response using Laplace transform method. [6M]

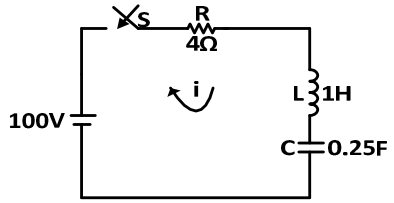


Fig-10

b) In an R-L circuit shown in fig-11, switch S is in position 1 long enough to establish steady state conditions. At t=0, the switch is transferred to position 2; find i(t). [6M]

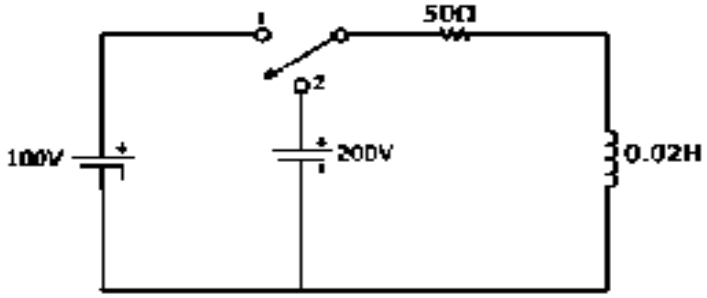


Fig-11

(OR)

10. a) In the RLC series circuit shown in fig-12; find i(0+), $\frac{di}{dt}$ and $\frac{di^2}{dt^2}$ at t=0+, if the switch is closed at t=0. [6M]

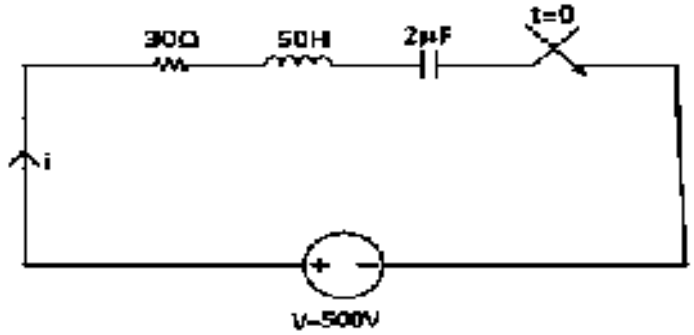


Fig-12

b) For the circuit shown in fig-13; the capacitor has an initial charge of 1mC. The switch S is closed at t=0. Find the transient current. [6M]

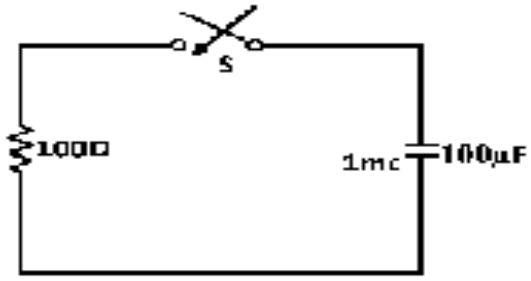


Fig-13

AR16

CODE: 16ME1002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MECHANICS

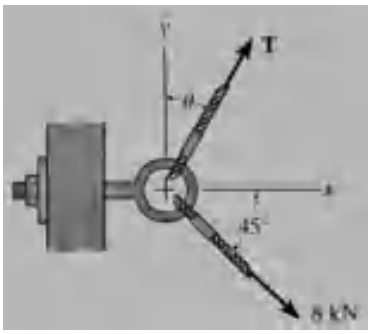
(Common to CE, CSE & IT Branches)

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

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

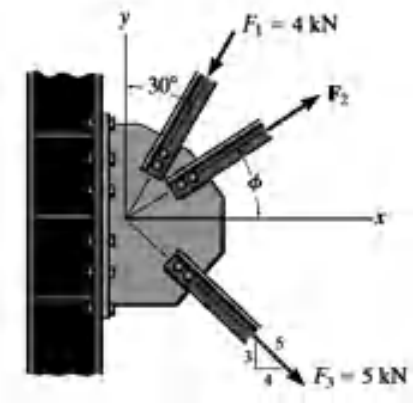
UNIT-I

1. If $\theta=30^0$ and T=6 kN, determine the magnitude of force acting on the eyebolt and its direction measured clockwise from the positive x axis. 14



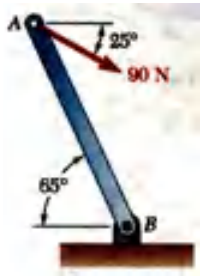
(OR)

2. Determine the magnitude of the resultant force acting on the plate and its direction θ measured clockwise direction from the positive x axis. Given that If $\phi=30^0$ and F_2=3kN. 14



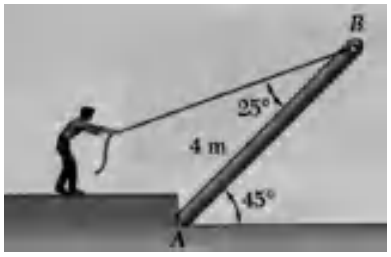
UNIT-II

3. A 90 N force is applied to the control rod as shown. Knowing that the length of the rod is 225 mm, determine the moment of the force about point B by resolving the force into components along AB and in a direction perpendicular to AB 14



(OR)

4. A man raises a 10 kg joist, of length 4m, by pulling on a rope. Find the tension T in the rope and the reaction at A 14

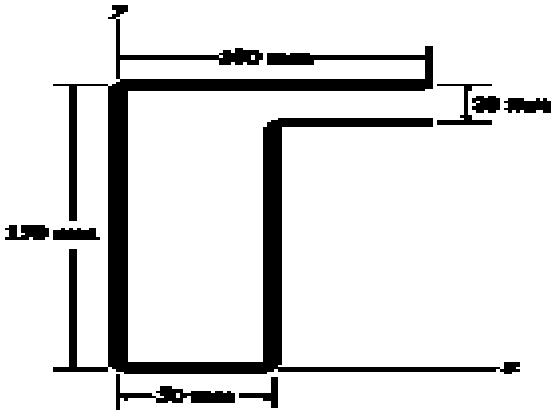


UNIT-III

5. Determine the minimum horizontal force P required to hold the crate from sliding down the plane, which is inclined at 30^0 to the ground. The crate has a mass of 50 kg and the coefficient of static friction between the crate and the plane μ_s=0.25 14

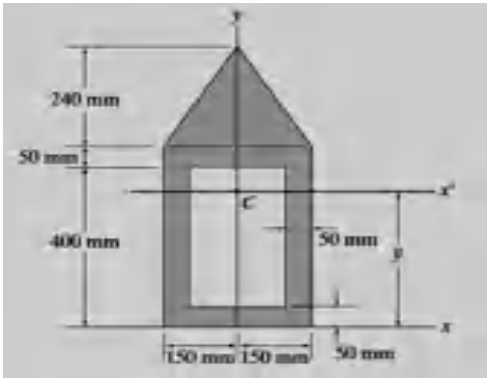
(OR)

6. Locate the X and Y coordinates of the centroid of the uniform wire bent in the shape as shown in the figure. 14



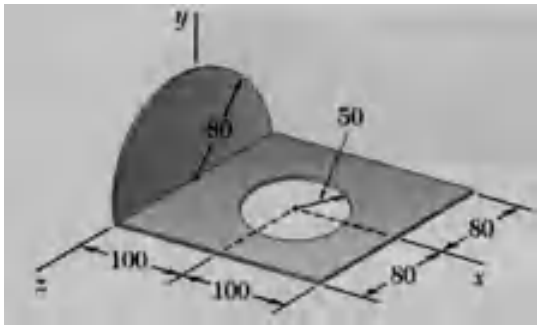
UNIT-IV

7. Determine the moment of inertia of the composite area about the centroidal y axis. 14



(OR)

8. A thin steel plate which is 4 mm thick is cut and bent to the form the machine part shown. Knowing that the density of steel is 7850 kg/m^3, determine the mass moments of inertia of the machine part with respect to the coordinate axes 14



UNIT-V

9. a An aeroplane goes into a vertical power drive directly over its target at constant velocity of 1000 km/hr. an anti-aircraft gun fires a shell vertically upwards with an initial velocity of 683 m/s, when the plane is at 1920 m elevation. Find the elevation at which the shell hits the plane and therefore the time required. Neglect air resistance. 7

   b In problem 9(a), if the shell missed the plane and the plane released the bomb at 1500 m elevation, how long thereafter would the bomb reach the target at zero elevation and with what velocity does the bomb strike the target. 7

(OR)

10. A homogeneous solid cylinder of weight 100 N whose axis is horizontal rotates about its own axis, in frictionless bearings under the action of the weight of a 10N block which is carried by a rope wrapped round the cylinder. What will be the angular velocity of the cylinder two seconds after the motion starts? Assume diameter of cylinder as 100 cm. Neglect the weight of the rope. 14

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AR16

CODE: 16ME1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING DRAWING

(Common to EEE & ECE)

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

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. Construct a Vernier scale to read metres, decimetres and centimetres and long enough to measure up to 4m. The RF of the scale in 1/20. Mark on it a distance of 2.28 m. 14M

(OR)

2. A ground is in the shape of a rectangle 120 m X 60 m. Inscribe an elliptical lawn in it to a suitable scale by Concentric circles Method 14M

UNIT-II

3. A top view of a 75 mm long line AB measures 65 mm, while the length of its front view is 50 mm. It's one end A is in the H.P. and 12 mm in front of the V.P. Draw the projections of AB and determine its inclination with H.P. and the V.P. 14M

(OR)

4. A point P is 15 mm above the H.P. and 20 mm in front of the V.P. Another point Q is 25 mm behind the VP and 40 mm below the H.P. Draw the projections of P and Q keeping the distance between their projectors equal to 90 mm. draw straight lines joining (1) their top views and (2) their front views. 14M

UNIT-III

5. A regular hexagon of side 20 mm has one of its sides inclined at 30° to VP. Its surface makes an angle of 60° with the ground. Draw its projections. 14M

(OR)

6. A semi-circular plate of 80 mm diameter has its straight edge in the VP & inclined at 45^0 to the HP. The surface of the plate makes an angle of 30^0 with the VP. Draw its projections. 14M

UNIT-IV

7. a) A cube of side length 60mm is resting on one of its faces on HP with a vertical face inclined at 40 degrees to VP. 7M

b) A cylinder resting on one of its generators on HP with axis parallel to VP. Cylinder base diameter 60mm and axis length 80mm. Draw its projections. 7M

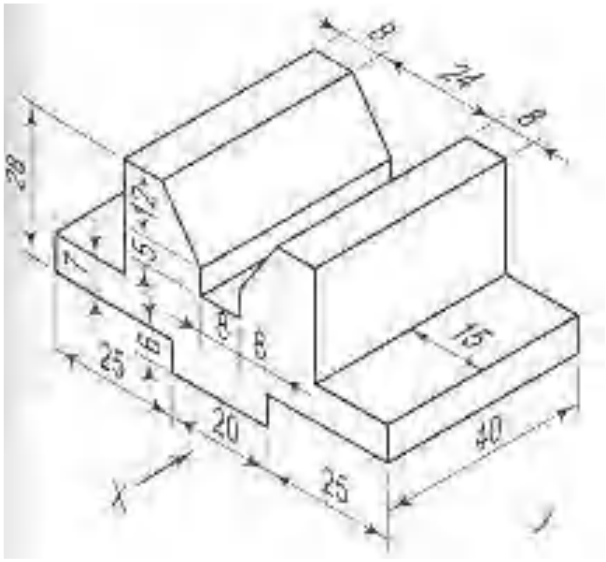
(OR)

8. a) Draw the projections of a cone, base 75 mm diameter and axis 100 mm long, lying on the H.P. on one of its generators with the axis parallel to the V.P. 7M

b) A cylinder 50mm base diameter 80mm long is having its axis parallel to VP and inclined 30 degrees to HP. Draw its projections. 7M

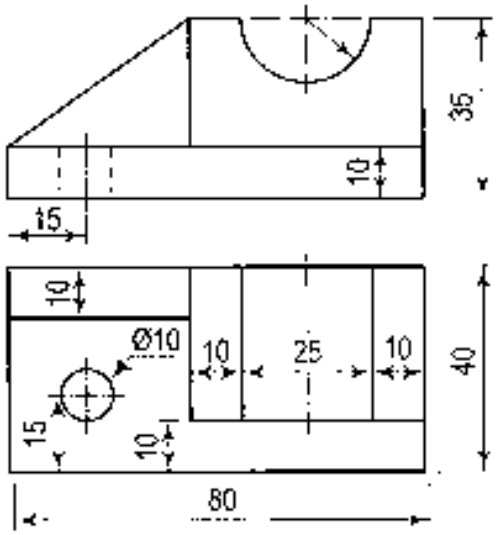
UNIT-V

9. Draw the front view, top view and left hand side view of the block shown in figure shown below. 14M



(OR)

10. Draw the isometric view of the block whose orthographic projections are shown in figure below 14M



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AR16

CODE: 16ME1004 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI

(AUTONOMOUS)

I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MECHANICS (DYNAMICS)

(Mechanical Engineering)

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

Answer ONE Question from each Unit

All Questions Carry Equal Marks

All parts of the question must be answered in one place only

UNIT-I

1. a) Determine the Centre of Gravity of a right circular cone from the first principles. Assume radius of cone at base is 'r' and altitude height 'h' and ρ mass density **8M**

   b) A brass cone is mounted on top of an aluminum cylinder as shown in fig.01. The density of brass is 8500 kg/m^3 and that of aluminum is 2560 kg/m^3. Determine the centre of gravity of the system. **6M**

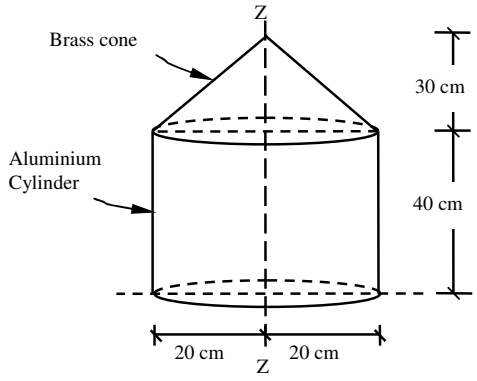

Fig. 01

(OR)

2. a) Determine the mass moment of inertia of a homogeneous triangular plate of weight 'W' with respect to its base by using first principles. Assume 'b' as base of triangle and 'h' as height of triangle. **8M**

   b) Determine the moment of inertia I_{ZZ} of the frustum of cone which has conical depression as shown in Fig.02. Density of material is 200 kg/m^3 **6M**

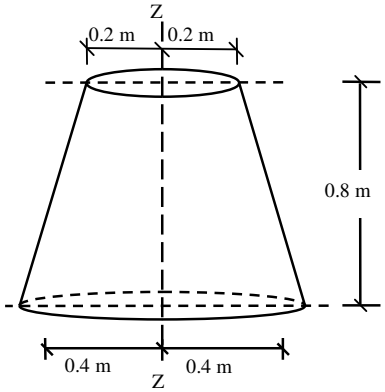

Fig. 02

UNIT-II

3. a) A bullet, moving at the rate of 250 m/sec is fixed into a lag of wood .The bullet penetrates to a depth of 40cm. If the bullet moving with the same velocity is fixed into a similar piece of wood 20cm thick, with what velocity would it emerge outside ?Take the resistance is same uniform in both cases **8M**

   b) A particle moves along a straight line with a velocity given by the equation $v=2t^3-t^2-2t+4$. Where v is the velocity in m/s and t is the time in seconds. When t = 2 seconds, the particle is to be at a distance of 10m from a station A. Determine the acceleration and displacement of the particle after 6 seconds **6M**

(OR)

4. a) A car starts from rest on a curved road of 250 m radius and accelerates at a constant tangential acceleration of 0.6 m/sec^2. Determine the distance and the time for which car will travel before the magnitude of total acceleration attained by it becomes 0.75 m/sec^2 **7M**

   b) Derive the expression for maximum height and horizontal range for a projectile is projected with an initial velocity V_0 at an angle of α . **7M**

UNIT-III

5. a) Explain the concept of D'Alemberts principle **4M**

   b) Two blocks in fig have weights P=44.5N, Q=22.5N and the coefficient of friction between P and the horizontal plan is μ =0.25 .If the system is released from rest and block Q falls vertical distance h= 0.6m, what velocity 'υ' will it achieve? Neglect friction in the pulley and extensibility of the string. **10M**

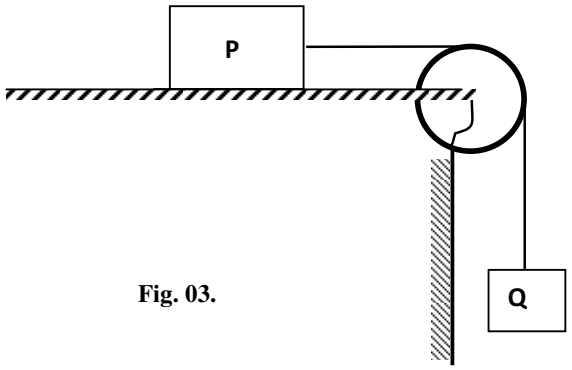

Fig. 03.

(OR)

6. a) A small block starts from rest at A and slides down the inclined plane as shown in Fig.04. .What distance along horizontal plane will it travel before coming to rest? The coefficient of kinematic friction between block and either plane is 0.3.Assume that the initial velocity with which it starts to move along BC is of the same magnitude as that gained in sliding from A to B. **7M**

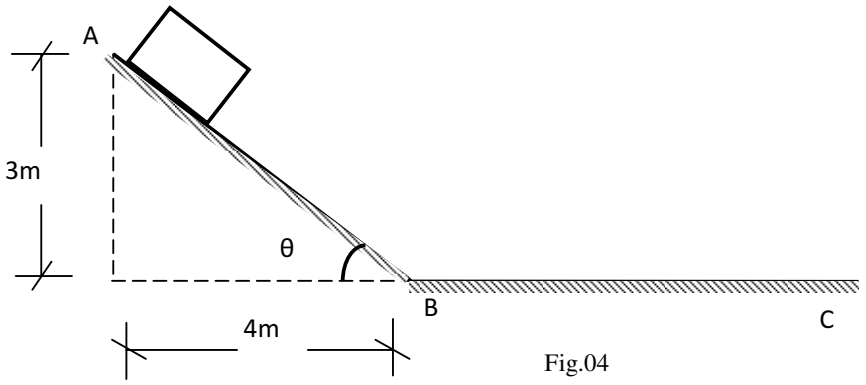

Fig.04

b) A 60grm bullet was fired horizontally with a 50kg sand bag suspended on a rope 900mm long as shown in fig.05., it was calculated from the observed angle θ that the bag with bullet embedded in it swing to a height of 30mm.With what velocity the bullet entered the bag? **7M**

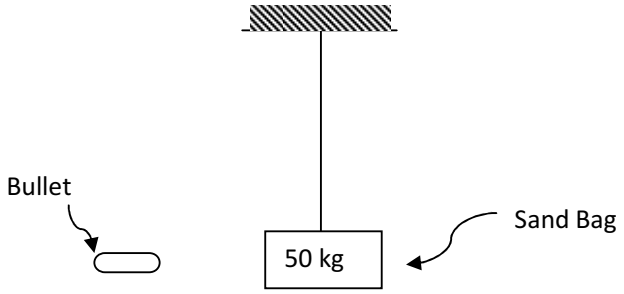

Fig.05.

UNIT-IV

7. a) Write short notes on relative velocity and instantaneous centre **4M**

b) Crank OA rotates at 60 r.p.m in clockwise sense. In the position shown θ =40^0 shown in Fig.05., determine angular velocity of AB and velocity of B which is constrained to move in a horizontal cylinder. **10M**

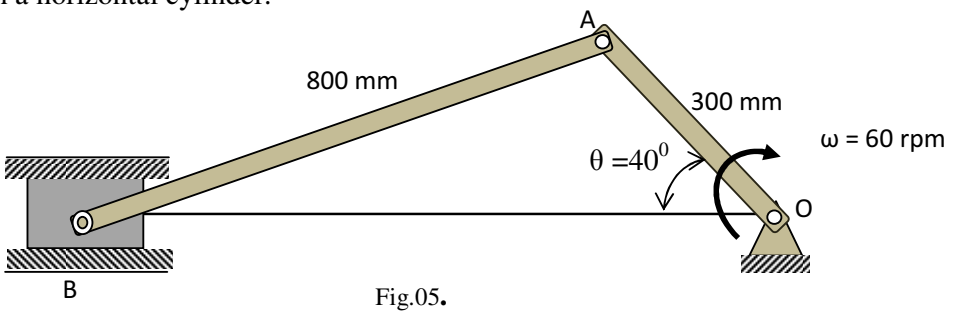

Fig.05.

(OR)

8. a) If the system in the Fig.08 is released from rest in the configuration shown, find the velocity 'υ' of the following weight P as a function of its displacement x.Neglect friction and inertia of the pulleys and assume the following data.P=Q=44.5N, r_1=150mm, r_2=100mm and x=3m. **8M**

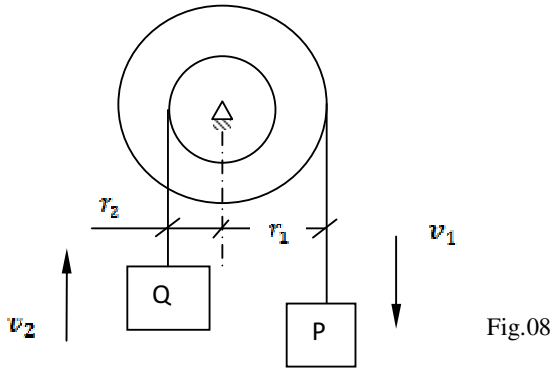

Fig.08

b) Derive from basic the principle of Work Energy equation for plane motion? **6M**

UNIT-V

9. a) A pile having a weight of 5000 N is driven into the ground by dropping a hammer of Weight 3180 N at a height of 2.7 m. The pile is driven into the ground by 0.15m. Calculate the average resistance of the soil. **8M**

b) A ball is dropped from a height of 9m upon a horizontal surface if it rebounds to a height of 5.76cm, show that the coefficient of restitution is 0.8. **6M**

(OR)

10. a) A wheel rotating about a fixed axis at 20 revolutions per minute is uniformly accelerated for 70 seconds during which it makes 50 revolutions. Find the i) angular velocity at the end of this interval and ii) time required for the velocity to reach 100 revolutions per minute **7M**

b) A cylindrical weighing 500N is welded to a 1m long uniform bar of 200 N shown in fig.09.Determine the acceleration with which the assembly will rotate about point A, if released from the rest in horizontal position .determine the reaction at A at this instant. **7M**

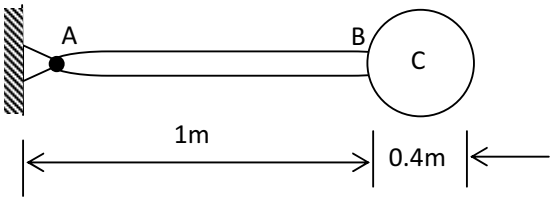

Fig.09

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AR13

CODE: 13ME1003 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, April-2019

ENGINEERING MECHANICS
(Common to CE, CSE & IT)

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

PART-A

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

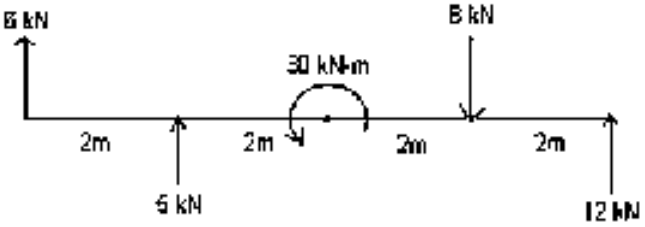
1. a) Write moment of a force about a point in vector form.
   b) State the principle of superposition
   c) What is free body diagram?
   d) What are equations of equilibrium for coplanar force system?
   e) What is limiting friction
   f) Define centroid of a plane area.
   g) Define the term product of inertia.
   h) Radius of gyration of a circular area of radius 'r' about its diametral axis is ……....
   i) State 'D' Alembert's principle
   j) What is general plane motion

PART-B

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

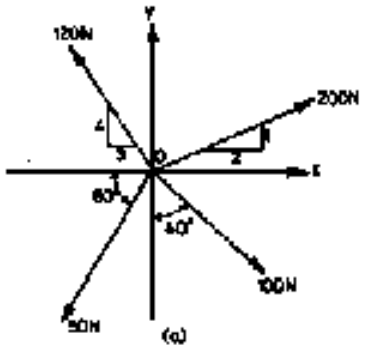
UNIT-I

2. a) State and prove parallelogram law of forces
   b) Determine and locate the resultant 'R' of the forces and one couple acting on the beam as shown in below diagram



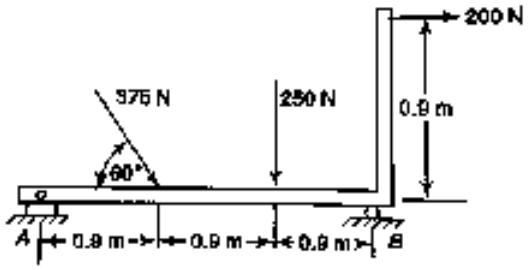
(OR)

3. Determine the magnitude and direction of resultant of the following force system.



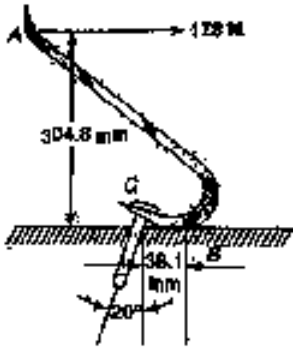
UNIT-II

4. a) State and prove Varignon's theorem
   b) Find the reactions at A and B for the beam loaded as shown in below diagram.



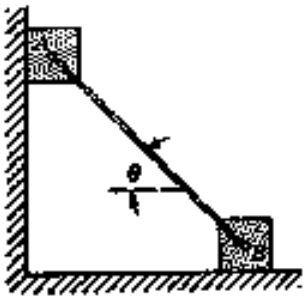
(OR)

5. a) Discuss the analytical method for equilibrium of coplanar force systems.
   b) Find the magnitude of the pull P exerted on the nail C shown in figure, if a horizontal force of 178 N is applied to handle of the wrecking bar as shown below.



UNIT-III

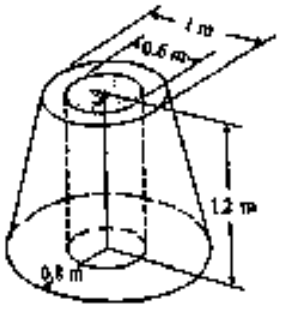
6. a) What are laws of friction? Explain.
   b) Two identical blocks A and B are connected by a rod and rest against vertical and horizontal planes, respectively as shown in below diagram. If sliding impends when θ=45°, determine coefficient of friction 'μ', assuming it to be same at both floor and wall.



(OR)

7. a) Derive the expressions for coordinates of centroid of a right angled triangle of base 'b' and height 'h'.

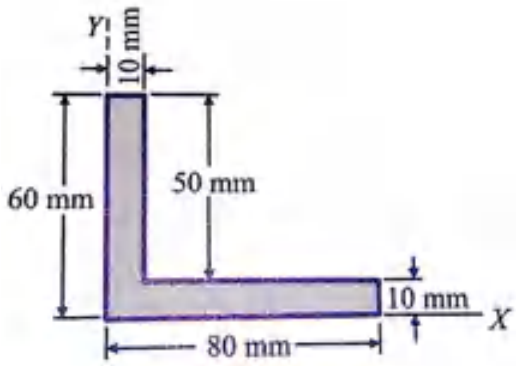
b) Determine the volume of the solid that was formed by removing a cylinder from frustum as shown in below diagram using theorems of Pappus.



UNIT-IV

8. a) What is Transfer formula for product of Inertia? Explain

b) Find area moment of inertia of L section shown in figure about centroidal 'X' axis.



(OR)

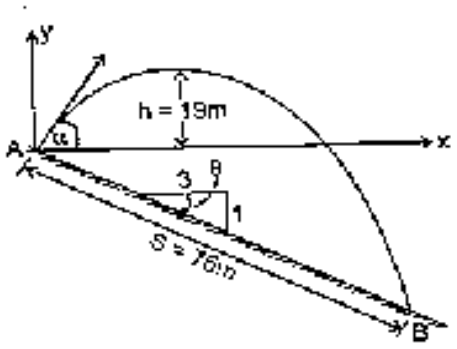
9. a) What is mass moment of inertia? Explain.

b) Determine mass moment of inertia of the right circular cone having base b and height h.

UNIT-V

10. a) What are normal and tangential components of acceleration? Explain.

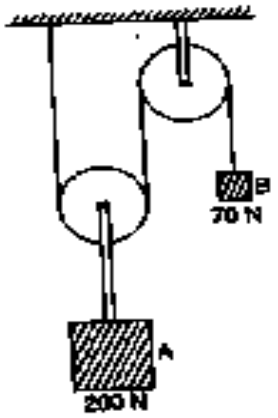
b) A ball rebounds at A and strikes the inclined plane at point B at a distance S= 76 m as shown in figure. If the ball rises to a maximum height h= 19 m above the point of projection, compute the initial velocity and the angle of projection α.



(OR)

11. a) Derive kinetic equation of motion for fixed axis rotation.

    b) Determine the tensions in the strings and accelerations of blocks A and B weighing 200 N and 70 N connected by a rope, frictionless and weightless pulley as shown in figure.



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AR13

CODE: 13ME1001 **SET-2**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, April-2019
ENGINEERING DRAWING
(Common to EEE & ECE)

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

PART-A

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

1. a) What is the advantage of Diagonal scale over plane scale?
   b) When the ellipse is generated with respect to sectioning of right circular cone?
   c) Write the position of point in third quadrant?
   d) Define a straight line?
   e) What is the position of plane, if front & top view of the plane is straight lines?
   f) If the plane is inclined to V.P and one of corner rests on V.P, What is the position of plane to be assumed in simple position?
   g) Define the term Tetrahedron?
   h) List any two positions of solids, when solid in simple position?
   i) Write the major advantage of Orthographic over Isometric projection?
   j) What is the ratio of isometric scale to true scale?

PART-B

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

UNIT-I

2. Draw a vernier scale of R.F.=1/25 to read centimeters up to 4 meters and on it, show lengths representing 2.39 m and 0.91 m. 12M

(OR)

3. To construct a parabola, when the distance of the focus from the directrix is 50 mm. Also draw tangent and normal from any point on the curve. 12M

UNIT-II

4. a) A point D is 30 mm below HP and 40 mm in front of V.P. Draw its projections? 4M
   b) A line CD 30 mm long is parallel to both the planes. The line is 40 mm above HP and 20 mm in front of V.P. Draw its projection. 8M

(OR)

5. A line AB, 65 mm long has its end A 20 mm above the H.P. and 25 mm in front of the V.P. The end B is 40 mm above the H.P. and 65 mm in front of the V.P. Draw the projections of AB and show its inclinations with the H.P. and the V.P. 12M

UNIT-III

6. a) A square ABCD of 40 mm side has a corner on the H.P. and 20 mm in front of the V.P. the horizontal diagonal inclined at 45^0 to the H.P. and parallel to the V.P. Draw its projections 4M
   b) A regular pentagon of 25 mm side has one side on the ground. Its plane is inclined at 45° to the H.P and perpendicular to the V.P. Draw its projections 8M

(OR)

7. A thin 30°-60° set-square has its longest edge in the V.P. and inclined at 30° to the H.P. Its surface makes an angle of 45° with the V.P. Draw its projections. 12M

AR13

CODE: 13ME1001 SET-2

UNIT-IV

8. a) Draw the projections of a triangular prism, base 40 mm side and axis 50 mm long, resting on one of its bases on the H.P. with a vertical face perpendicular to the V.P. 4M

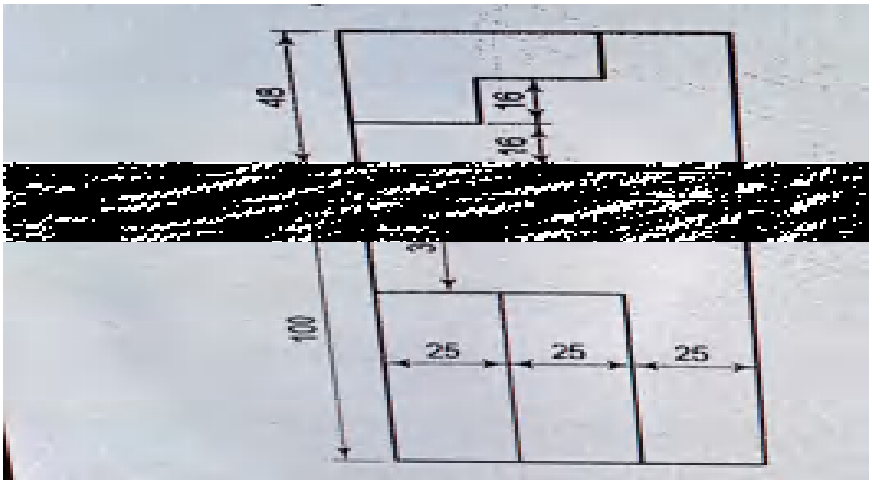
   b) A hexagonal pyramid, base 25 mm side and axis 50 mm long, has an edge of its base on the ground. Its axis is inclined at 30° to the ground and parallels to the V.P. Draw its projections. 8M

(OR)

9. A pentagonal pyramid, base 25 mm side and axis 50 mm long has one of its triangular faces in the V.P. and the edge of the base contained by that face makes an angle of 30° with the H.P. Draw its projections. 12M

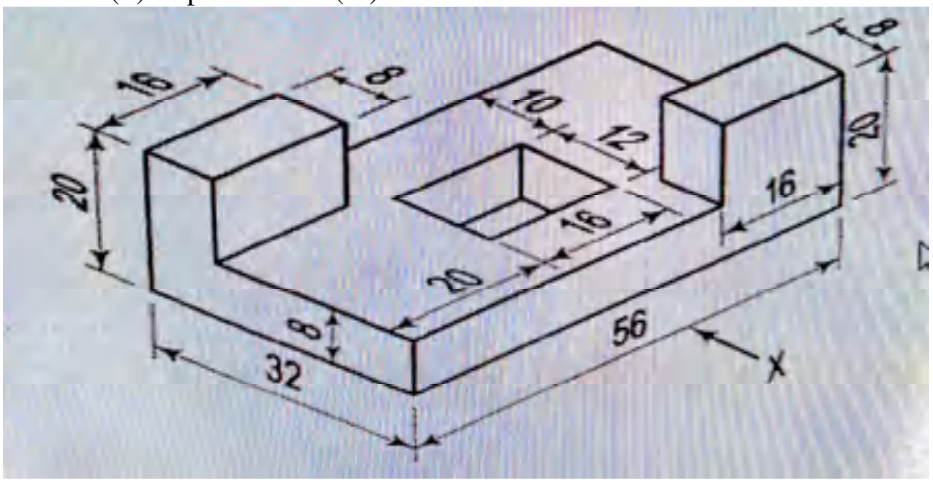
UNIT-V

10. Draw the isometric view of the model of steps, two views of which are shown in fig. below 12M



(OR)

11. Draw the following views of the block shown pictorially in below fig. Draw (i) Front view. (ii) Top view and (iii) side view 12M



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AR13

CODE: 13ME1002 **SET-1**

ADITYA INSTITUTE OF TECHNOLOGY AND MANAGEMENT, TEKKALI
(AUTONOMOUS)
I B.Tech II Semester Supplementary Examinations, April-2019
CLASSICAL MECHANICS
(Mechanical Engineering)

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

PART-A

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

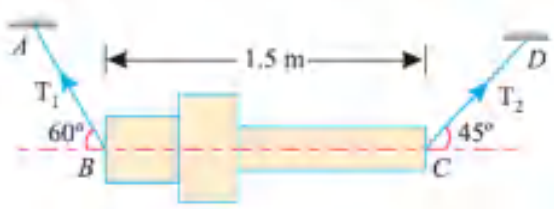
1. a) What is lami's theorem
   b) What is free body diagram
   c) Write any two types of force system?
   d) What do you mean by perfect trusses?
   e) Explain about method of joints?
   f) What is meant by polar moment of inertia?
   g) Define the terms of moment of inertia and radius of gyration
   h) Represent the diagram Velocity-Time curve (v-t curve)
   i) Equations of linear kinetic energy and rotational kinetic energy?
   j) Define D'alemberts principle?

PART-B

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

UNIT-I

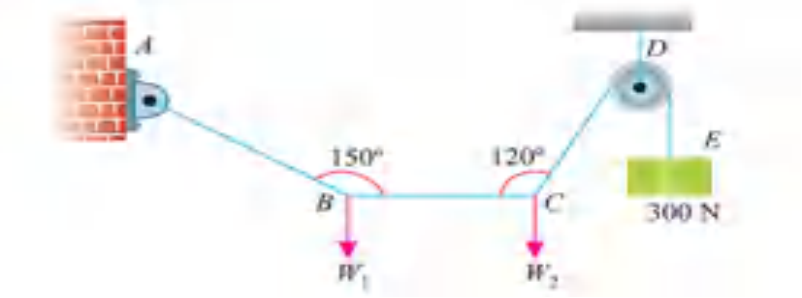
2. a A machine component 1.5 m long and weight 1000 N is supported by two ropes AB and CD as shown in Fig.given below. Calculate the tensions T1 and T2 in the ropes AB and CD. 6M



b The following forces acting at a point 6M
   i) 20N inclined at 30^0 towards North of East.
   ii) 25N towards North
   iii) 30N towards North West
   iv) 35N inclined at 40^0 towards South of West.
   Find the magnitude and direction of the resultant force.

(OR)

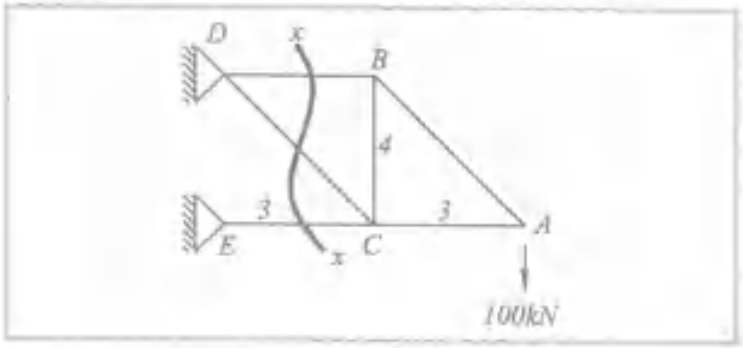
3. a A light string ABCDE whose extremity A is fixed, has weights W1 and W2 attached to it at B and C. It passes round a small smooth peg at D carrying a weight of 300 N at the free end E as shown in Fig If in the equilibrium position, BC is horizontal and AB and CD make 150° and 120° with BC, find (i) Tensions in the portion AB, BC and CD of the string and (ii) Magnitudes of W1 and W2.. 8M



b Briefly explain various types of force systems. 4M

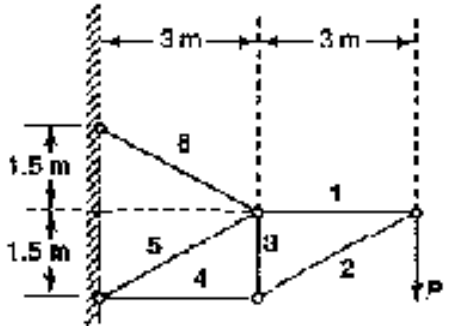
UNIT-II

4. Determine force members BD, Cd and CE of the cantilever truss shown in fig. 12M



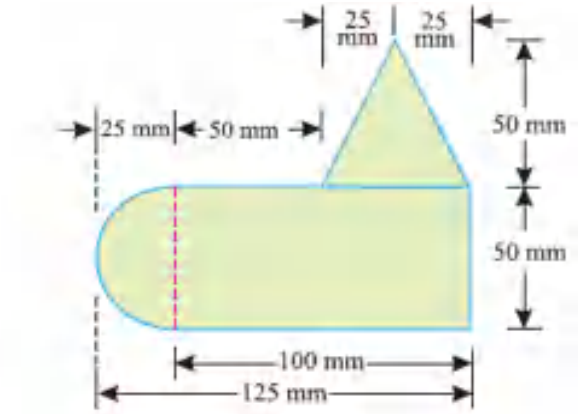
(OR)

5. Determine the axial force in each bar of the plane truss loaded as shown in Figure. 12M

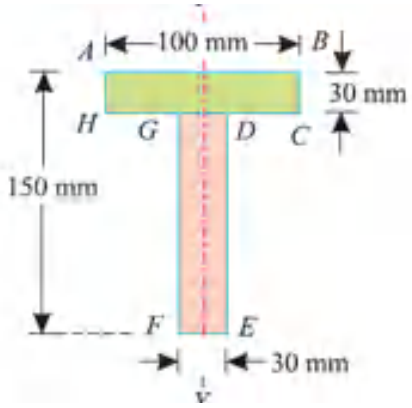


UNIT-III

6. a A uniform lamina shown in Fig. consists of a rectangle, a circle and a triangle. Determine the centre of gravity of the lamina. All dimensions are in mm. 6M



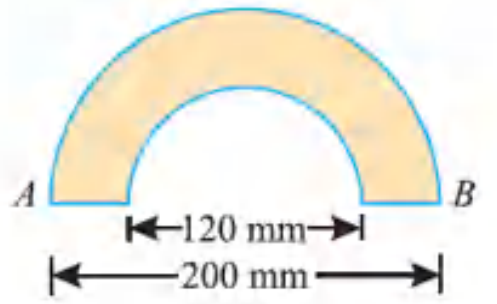
b Find the centre of gravity of a 100 mm × 150 mm × 30 mm T-section. 6M



(OR)

7. a Find the moment of inertia of a hollow rectangular section about its centre of gravity if the external dimensions are breadth 60 mm, depth 80 mm and internal dimensions are breadth 30 mm and depth 40 mm respectively. 6M

b A hollow semicircular section has its outer and inner diameter of 200 mm and 120 mm respectively as shown in Fig. 6M



UNIT-IV

8. a A man of mass 60 kg dives vertically downwards into a swimming pool From a tower of height 20 m. He was found to go down in water by 2 m and then started rising. Find The average resistance of the water. Neglect the air resistance. 6M

   b A train travelling at 27 km.p.h is accelerated at the rate of 0.5 m/s2. What is the distance travelled by the train in 12 second. 6M

(OR)

9. On turning a corner, a motorist rushing at 20 m/s, finds a child on the road 50 m ahead. He instantly stops the engine and applies brakes, so as to stop the car within 10 m of the child. Calculate (i) retardation, and (ii) time required to stop the car. 12M

UNIT-V

10. A locomotive draws a train of mass 400 tonnes, including its own mass, on a level ground with a uniform acceleration, until it acquires a velocity of 54 km.p.h in 5 minutes. If the frictional resistance is 40 newtons per tonne of mass and the air resistance varies with the square of the velocity, find the power of the engine. Take air resistance as 500 Newtons at 18 km.p.h. 12M

(OR)

11. An elevator of mass 2500 kg is moving vertically downwards with a constant Acceleration. Starting from rest, it travels a distance of 35 m during an interval of 10 seconds. Find the cable tension during this time. Neglecting all other resistances to motion, what are the limits of cable tension? 12M

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