Hall Ticket Number :										

R-19

Code: 19AC21T

I B.Tech. II Semester Supplementary Examinations March 2021

Differential Equations and Vector Calculus

(Common to All Branches)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

Marks

UNIT–I

1. a) Solve $\frac{d^2y}{dx^2} - 3\frac{dy}{dx} + 2y = xe^{3x} + \sin 2x$ 7M

b) Solve $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ 7M

OR

2. Using method of variation of parameters, solve

$\frac{d^2y}{dx^2} + y = x\sin x$ 14M

UNIT–II

3. Solve $(2x+3)^2\frac{d^2y}{dx^2} - (2x+3)\frac{dy}{dx} - 12y = 6x$ 14M

OR

4. An uncharged condenser of capacity C is charged by applying an e.m.f. $\frac{E\sin t}{\sqrt{LC}}$, through leads of self-inductance L and negligible resistance. Prove that at any time t, the charge on one of the plates is $\frac{EC}{2}\left\{\sin\frac{t}{\sqrt{LC}} - \frac{t}{\sqrt{LC}}\cos\frac{t}{\sqrt{LC}}\right\}$. 14M

UNIT–III

5. a) Form the partial differential equation by eliminating the arbitrary constants a, b and c from $(x-a)^2 + (y-b)^2 + z^2 = c^2$ 7M

b) Solve $2xz - px^2 - 2qxy + pq = 0$ by Charpit's method. 7M

OR

6. a) Form the partial differential equation by eliminating the arbitrary function f from $z = y^2 + 2f\left(\frac{1}{x} + \log y\right)$ 7M

b) Solve by the method of separation of variables $\frac{\partial u}{\partial x} = 4\frac{\partial u}{\partial y}$, given that $u(0, y) = 8e^{-3y}$. 7M

UNIT–IV

7. Prove that $\nabla^2\left(r^n\right) = n(n+1)r^{n-2}$ 14M

OR

8. a) What is the directional derivative of ¤ $= xy^2 + yz^3$ at the point (2, -1, 1) in the direction of the normal to the surface $x\log z - y^2 = -4$ at (-1, 2, 1). 7M

b) Find the work done in moving a particle in the force field $\overline{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$, along the straight line from (0,0,0) to (2,1,3). 7M

UNIT–V

9. Verify Green's theorem for $\int_C \left(x^2ydx + x^2dy\right)$ where C is the boundary described counter clockwise of triangle with vertices (0, 0) , (1, 0) , (1, 1). 14M

OR

10. Verify Stoke's theorem for the vector field $\overline{F} = (2x - y)\bar{i} - yz^2\bar{j} - y^2z\bar{k}$ over the upper half surface of $x^2 + y^2 + z^2 = 1$, bounded by its projection on the xy-plane. 14M

*****

Hall Ticket Number :										

R-19

Code: 19A321T

I B.Tech. II Semester Supplementary Examinations March 2021

Engineering Graphics-II

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

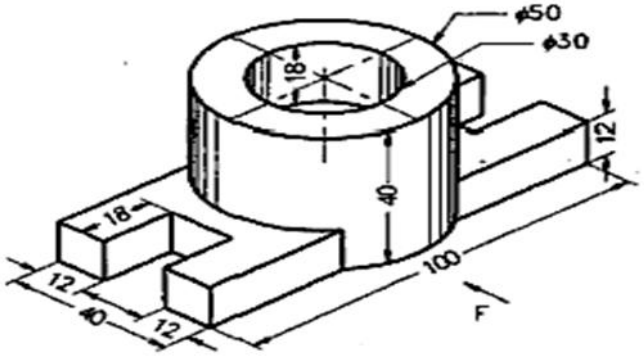
****

			Marks	CO	Blooms Level
		UNIT–I			
1.		A hexagonal prism of side of base 25 and length of axis 75, is resting on a corner of its base on H.P. with the longer edge containing that corner, inclined to H.P at 30^0. It is cut by a section plane parallel to H.P and passing through the mid-point of the axis. Draw the front and sectional top views of the solid.	14M	CO1	L4
		OR			
2.		A cone, base 75 mm diameter and axis 100 mm long, has its base on the H.P.A section plane, parallel to one of the end generators and perpendicular to the V.P., cuts the cone intersecting the axis at a point 75 mm from the base. Draw the sectional top view and project another top view on a plane parallel to the section plane showing the shape of the section clearly.	14M	CO1	L4
		UNIT–II			
3.		A hexagonal pyramid with side of base 30 mm and height 75 mm stands with its base on H.P. and an edge of the base parallel to V.P. It is cut by a plane perpendicular to V.P, inclined at 45^0 to H.P. and passing through the midpoint of the axis. Draw the sectional top view and develop the lateral surface of the truncated pyramid.	14M	CO2	L3
		OR			
4.		A cone of base diameter 40 mm and axis height 60 mm is kept on the ground on its base .An auxiliary plane inclined at 45^0 to the HP cuts the cone through the midpoint of the axis. Draw the development of the bottom portion of cone.	14M	CO2	L3
		UNIT–III			
5.		A horizontal cylinder of diameter 40 mm penetrates into a vertical cylinder of diameter 60 mm. The axes of the cylinders intersect at right angles. Draw the curves of intersection when the axis of the horizontal cylinder is parallel to the V.P.	14M	CO3	L4
		OR			
6.		A vertical cone, diameter of base 75 mm and axis 100 mm long, is completely penetrated by a cylinder of 45 mm diameter. The axis of the cylinder is parallel to the H.P and the V.P. and intersects the axis of the cone at a point 28 mm above the base. Draw the projections of the solids showing curves of intersection.	14M	CO3	L4
		UNIT–IV			
7.	a)	Draw the isometric view of the cylinder with the axis horizontal. Cylinder diameter 90 mm and Axis 100 mm.	7M	CO4	L4
	b)	Draw the isometric view of pentagonal pyramid with side of base 30 mm and axis 70 mm long. The pyramid is resting on its base on H.P with an edge of the base parallel to V.P.	7M	CO4	L4
		OR			

8. A hexagonal prism having the side of base 26 mm and the height of 60 mm is resting on one of the corner of the base and its axis is inclined to 30^0 to the H.P. Draw its projections and also prepare the isometric view of the prism in the above stated condition. 14M CO4 L4

UNIT–V

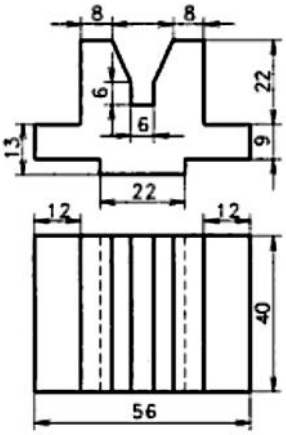
9. Draw the Front view, Top view and side view for the following figure.



14M CO5 L4

OR

10. Draw the Isometric view for the following figure.



14M CO5 L4

****

Hall Ticket Number :										

R-19

Code: 19A322T

I B.Tech. II Semester Supplementary Examinations March 2021

Engineering Mechanics

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

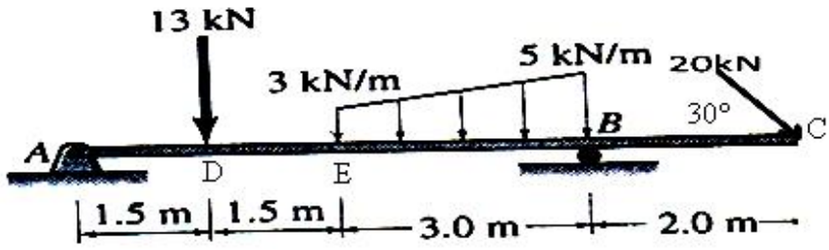
Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

		Marks	CO	Blooms Level

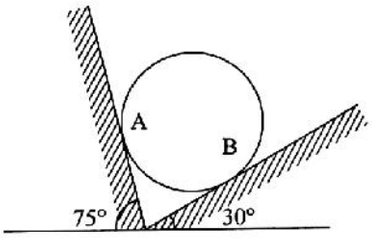
UNIT–I

1. a) Find the reactions at supports A and B for the force system acting on the beam as shown in figure.



10M CO1

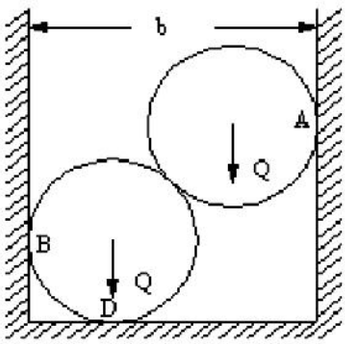
b) A 20 kg homogeneous smooth sphere rests on two inclined planes as shown in figure. Determine the contact forces at A and B.



4M CO1

OR

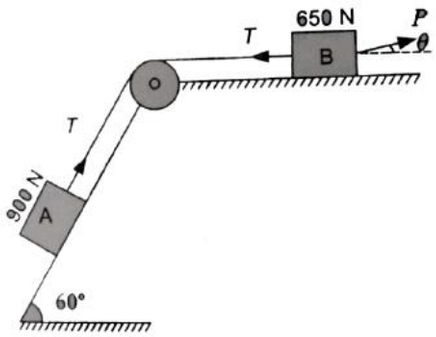
2. Two smooth spheres, each of radius r and weight Q, rest in a horizontal channel having vertical walls, the distance between which is 'b'. Find the pressures exerted on the walls and floor at the points of contact A, B and D. The following numerical data are given: r = 25 cm. b = 90 cm. Q = 100 N. as shown in figure.



14M CO1

UNIT–II

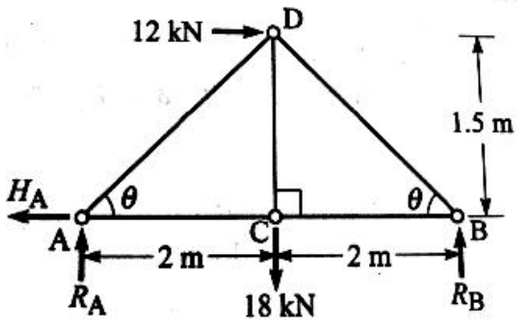
3. What is the least value of P to cause motion of the system shown in figure towards the right? Also find θ. Assume coefficient of friction to be 0.2. Body A and B weighs 900 N and 650 N respectively.



14M CO2

OR

4. a) Find the forces in all members of a truss as shown in figure which carries a horizontal load of 12kN at the point D and a vertical load of 18kN at the point C.

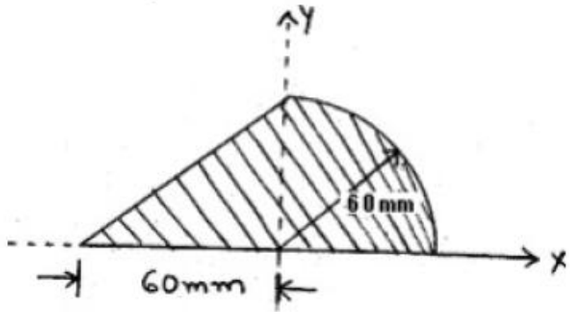


7M CO2

b) A ladder 5m long and of 250N weight is placed against a vertical wall in a position where its inclination to the vertical is 30^0. A man weighing 800N climbs the ladder. At what position will he induce slipping? The co-efficient of friction for both the contact surfaces of the ladder viz. with the wall and the floor is 0.2. 7M CO2

UNIT–III

5. a) Find the moment of inertia of the shaded area, as shown in figure about its centroidal axes parallel to x-axis.

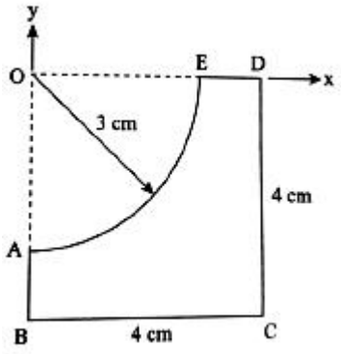


9M CO3

b) From the first principle find the centroid of a right angle triangle of height *h* and breadth *b*. 5M CO3

OR

6. a) Calculate the polar moment of inertia of the area shown in figure about point O.



5M CO3

b) Derive the mass moment of inertia of a solid cylinder of radius r, height h and mass m about centroidal x and y axes. 9M CO3

UNIT–I

7. a) A stone is dropped into a well and falls vertically with constant acceleration g=9.81 m/s^2. The sound of impact of the stone on the bottom of the well is heard 6.5 sec after it is dropped. If the velocity of sound is 340 m/s, find the depth of the well. 5M CO4

b) Two bodies of weight WA = 800N and WB = 400N are connected to the two ends of light inextensible string, passing over smooth pulley. The weight WA is placed on rough horizontal surface whose coefficient of friction is 0.25 and WB is hanging vertically in air. If the system is released from rest and block 'B' falls through a vertical distance of 2m, determine the velocity attained by 'B'. 9M CO4

OR

8. a) The acceleration of a particle in rectilinear motion is defined by the relation $a=25-4s^2$ where 'a' is expressed in m/sec^2 and 's' is position coordinate in metres. The particle starts with no initial velocity at the position s = 0. Determine

10) the velocity when s = 3metres

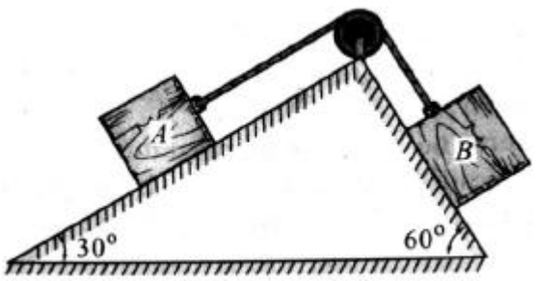
ii) the position where the velocity is again zero

iii) the position where the velocity is maximum. 9M CO4

b) Two trains P and Q leave the same station on parallel lines. Train P starts at rest with uniform acceleration of 0.2 rad/s^2 attains a speed of 10 m/s. Further the speed is kept constant. Train Q leaves 30 seconds later with uniform acceleration of 0.5 m/s^2 from rest and attains a maximum speed of 20 m/s, when will train Q overtake train P. 5M CO4

UNIT–I

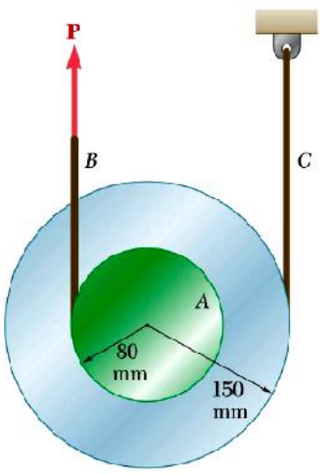
9. Two blocks A and B are placed on inclined planes as shown in figure. The block A weighs 1000N. Determine minimum weight of the block B for maintaining the equilibrium of the system. Assume that the blocks are connected by an inextensible string passing over a frictionless pulley. Coefficient of friction μ_A between the block A and the plane is 0.25. Assume the same value for μ_B.



14M CO5

OR

10. The double pulley shown in figure 9 has a mass of 3 kg and a radius of gyration of 100 mm. knowing that pulley is at rest, a force of 24 N is applied to cord B, determine the velocity of the centre of the pulley after 1.5 sec and tension in cord C.



14M CO5

****

Hall Ticket Number :										

R-19

Code: 19AC23T

I B.Tech. II Semester Supplementary Examinations March 2021

Engineering Physics

(Common to CE & ME)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.	a)	What is angular momentum? Describe the conservation of angular momentum	6M	2	BTL4
	b)	What are the inertial and non-inertial reference frames? Explain Newton's laws in inertial and non-inertial frames of reference	8M	2	BTL3
		OR			
2.	a)	What is rigid body? Explain	4M	2	BTL2
	b)	Derive an equation for angular velocity of rigid body.	10M	2	BTL4
		UNIT–II			
3.	a)	Explain in detail the factors affecting the acoustics of a building and their remedies.	7M	3	BTL2
	b)	Explain the method to determine the absorption coefficient of a material.	7M	3	BTL2
		OR			
4.	a)	Describe acoustic grating and show it can be used to determine the velocity of ultrasonic wave.	10M	3	BTL4
	b)	Write a short note on Sonogram.	4M	3	BTL2
		UNIT–III			
5.	a)	Derive the Claussius-Mossotti equation. How can it be used to determine the radius of the molecule?	10M	2	BTL4
	b)	Write few applications of dielectrics.	4M	2	BTL2
		OR			
6.	a)	What is the origin of Magnetism? Describe the different types of magnetic materials.	4M	2	BTL3
	b)	Discuss Weiss theory of ferromagnetism.	10M	2	BTL4
		UNIT–IV			
7.	a)	What is LASER? Describe properties of Laser beam.	5M	3	BTL2
	b)	With neat sketch explain the construction and working of Semiconductor Laser.	9M	3	BTL5
		OR			
8.	a)	Distinguish between step index and graded index fibres.	4M	3	BTL4
	b)	Describe the optical fibre optic communication with the help of Block diagram. Write few medical applications of fibres.	10M	3	BTL3
		UNIT–V			
9.	a)	What are passive and active sensors? Describe the strain and pressure sensors.	10M	3	BTL2
	b)	Write a short note on smoke and fire detectors	4M	3	BTL4
		OR			
10.	a)	What are magnetostrictive materials? Describe how these materials can be used as sensors	7M	3	BTL4
	b)	What are Pyroelectric materials? Describe how these materials can be used as sensors.	7M	3	BTL4

*****

Hall Ticket Number :										

R-19

Code: 19A521T

I B.Tech. II Semester Supplementary Examinations March 2021

Python Programming

(Common to CE, ME & CSE)

Max. Marks: 70 Time: 3 Hours

Answer *all five* units by choosing one question from each unit (5 x 14 = 70 Marks)

****

			Marks	CO	Blooms Level
		UNIT–I			
1.		Examine the various control structures in python with suitable examples	14M	CO1	L3
		OR			
2.	a)	Describe the following operation in tuples, i) Maxima ii) Minima iii) Sum of two tuples iv) Duplicate a tuple v) Slicing operator	7M	CO1	L1
	b)	Show how an input and output function is performed in python with an example.	7M	CO1	L1
		UNIT–II			
3.	a)	Describe the syntax and rules involved in the return statement in python	7M	CO2	L1
	b)	What is the major advantage and disadvantages of sets over lists? Describe a Python program to demonstrate differences between normal and frozen set	7M	CO2	L1
		OR			
4.		Examine the following **a**) Creating the List **b**) Accessing values in the Lists **c**) Updating the Lists **d**) Deleting the list Elements	14M	CO2	L3
		UNIT–III			
5.	a)	How to access characters of a string?	7M	CO3	L3
	b)	Define file handling. Illustrate with an example of closing a file.	7M	CO3	L3
		OR			
6.	a)	Examine the importance of user – defined Exceptions	7M	CO3	L3
	b)	Write a python program for reading text from a file	7M	CO3	L3
		UNIT–IV			
7.	a)	Show the importance of encapsulation in python. Explain with example.	7M	CO4	L3
	b)	List the companies which employ python and quote the areas in which python is used extensively nowadays.	7M	CO4	L3
		OR			
8.		Illustrate the concept of classes in python with suitable program.	14M	CO4	L3
		UNIT–V			
9.		Describe the concept of stack implementation using python list.	14M	CO5	L1
		OR			
10.		Define Single linked list and examine (**i**) traversing (**ii**) searching operations with example program	14M	CO5	L1&L3

*****