Hall Ticket Number :										

R-19

Code: 19A334T

II B.Tech. I Semester Supplementary Examinations June 2024

Kinematics of Machinery

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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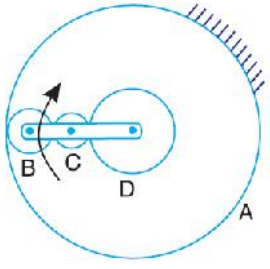
		Marks	CO	BL
	UNIT–I			
1.	Discuss various types of constrained motion	14M	1	2
	OR			
2.	Explain with sketches all inversions of quadric cycle chain.	14M	1	2
	UNIT–II			
3.	The crank of a slider crank mechanism rotates clockwise at a constant speed of 300 r.p.m. The crank is 150 mm and the connecting rod is 600 mm long. Determine : 1. Linear velocity and acceleration of the midpoint of the connecting rod, and 2. angular velocity and angular acceleration of the connecting rod, at a crank angle of 45° from inner dead centre position.	14M	2	3
	OR			
4.	In a slider crank mechanism, the crank is 480 mm long and rotates at 20 rad/s in the counter-clockwise direction. The length of the connecting rod is 2500mm. When the crank turns 60^o from the inner-dead centre, locate all instantaneous centres. Also determine (i) velocity of slider and (ii) angular velocity of connecting rod.	14M	2	3
	UNIT–III			
5.	Show with sketch how pantograph is used to trace the path to a larger or smaller scale of a given path.	14M	3	3
	OR			
6.	Draw a neat sketch of a Davis steering gear, and show that it satisfies the condition for correct steering in all positions.	14M	3	4
	UNIT–IV			
7.	Derive an expression for the minimum number of teeth required on the wheel in order to avoid interference in involute gear teeth.	14M	4	6
	OR			
8.	An epicyclic gear train, as shown in Fig, is composed of a fixed annular wheel A having 150 teeth. The wheel A is meshing with wheel B which drives wheel D through an idle wheel C, D being concentric with A. The wheels B and C are carried on an arm which revolves clockwise at 100 r.p.m. about the axis of A and D. If the wheels B and D have 25 teeth and 40 teeth respectively, find the number of teeth on C and the speed and sense of rotation of C. 	14M	4	3

UNIT–V

9.	A cam is to give the following motion to a knife-edged follower : 1. Outstroke during 60° of cam rotation ; 2. Dwell for the next 30° of cam rotation ; 3. Return stroke during next 60° of cam rotation, and 4. Dwell for the remaining 210° of cam rotation. The stroke of the follower is 40 mm and the minimum radius of the cam is 50mm. The follower moves with uniform velocity during both the outstroke and return strokes. Draw the profile of the cam when the axis of the follower passes through the axis of the cam shaft.	14M	5	6

OR

10.	Discuss various types of followers.	14M	5	2

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Hall Ticket Number :										

R-19

Code: 19A331T

II B.Tech. I Semester Supplementary Examinations June 2024

Mechanics of Solids

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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Marks

UNIT–I

1. A tensile test was conducted on a mild steel bar. The following data was obtained from the test:
   (i) Diameter of the steel bar = 3 cm (ii) Gauge length of the bar = 20cm
   (iii) Load at elastic limit = 250 kN (iv) Extension at a load of 150 kN = 0.21 mm
   (v) Maximum load = 380 kN (vi) Total extension = 60 mm
   (vii) Diameter of rod at failure = 2.25 cm
   Determine:
   (a) The Young's modulus (b) The stress at elastic limit
   (c) The percentage of elongation (d) The percentage decrease in area. 14M

OR

2. a) Prove that the maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually. 9M
   b) Define the term 'composite bar'. How will you find the stresses and load carried by each member of a composite bar? 5M

UNIT–II

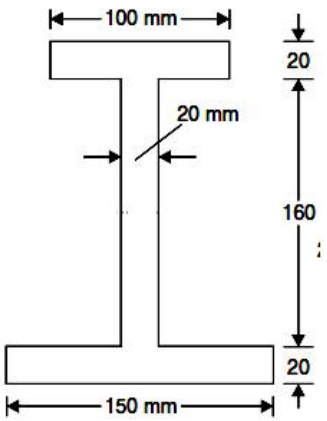
3. A horizontal beam is simply supported at its ends and carries a uniformly distributed load of 40 kN/m between the supports, which are 7.5 m apart. Counter kNm are applied to the two ends. Draw the B.M. diagram and find (i) the reactions at supports, and (ii) the position and magnitude of the greatest B.M. 14M

OR

4. a) What are the different types of beams? 5M
   b) Define the following :
   i) Bending Moment. ii) Shear force. iii) Point of contraflexure. 9M

UNIT–III

5. The unsymmetric I-section shown in Fig. is the cross-section of a beam, which is subjected to a shear force of 50 kN. Draw the shear stress variation diagram across the depth.



14M

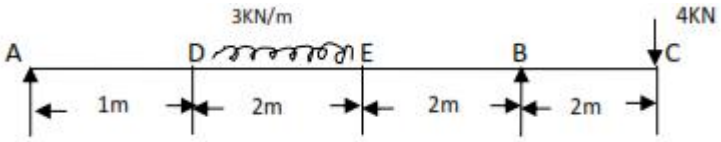
OR

6. a) Derive the section modules for (i) rectangular section and (ii) circular section 6M

   b) Prove that for a rectangular section the maximum shear stress is 1.5times the average stress. Sketch the variation of shear stress. 8M

UNIT–IV

7. An overhanging beam ABC is loaded as shown in figure. Determine the deflection at the free end, and the maximum deflection between A and B. Take I-600 cm^4 and $E=2X10^5$ N/mm^2.



14M

OR

8. a) Derive the relationship between slope, deflection and radius of Curvature of a simply supported beam. 7M

   b) Define Macaulay's method? And find out Deflection of a simply supported beam with an Eccentric point load 7M

UNIT–V

9. Derive the crippling load for a column with one end fixed and the other end free. 14M

OR

10. What are the stresses induced in the thin cylindrical shell subjected to internal pressure? Explain and derive them. 14M

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Hall Ticket Number :										

R-19

Code: 19AC31T

II B.Tech. I Semester Supplementary Examinations June 2024

Partial Differential Equations and Complex Variables

(Common to CE, EEE, ME & ECE)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	Find $L\left\{\frac{e^{-at}-e^{-bt}}{t}\right\}$	7M	CO1	L1
	b)	Find $L\left\{\frac{1-e^{t}}{t}\right\}$	7M	CO1	L1
		OR			
2.	a)	Find the Laplace Transform of $e^{2t}+4t^3-2\sin 3t+3\cos 3t$	7M	CO1	L1
	b)	Find the L.T of $\left(t^2+1\right)^2$	7M	CO1	L1
		UNIT–II			
3.		Using L.T, solve the differential equation $\frac{d^2y}{dt^2}+2\frac{dy}{dt}+5y=e^{-t}\sin t$, Given that $Y(0)=0, Y'(0)=1$	14M	CO2	L3
		OR			
4.	a)	Find $L^{-1}\left\{\frac{3\left(s^2-2\right)^2}{2s^5}\right\}$	7M	CO2	L1
	b)	Find the inverse L.T of $\frac{4}{(s+1)(s+2)}$	7M	CO2	L1
		UNIT–III			
5.		Obtain the Fourier cosine series for $f(x)=x\sin x,\ 0<x<®$ and Show that $\frac{1}{1.3}-\frac{1}{3.5}+\frac{1}{5.7}-\frac{1}{7.9}+\text{--------}=\frac{®-2}{4}$.	14M	CO3	L3
		OR			
6.		Express $f(x)=x-®$ as Fourier series in the interval $-®<x<®$	14M	CO3	L2
		UNIT–IV			
7.		Solve $\frac{\partial^2 u}{\partial x^2}+\frac{\partial^2 u}{\partial y^2}=0$ with $u(0,y)=0=u(x,0),\ u(l,y)=0\ \ and\ \ u(x,a)=\sin\left(\frac{n®x}{l}\right)$	14M	CO4	L3
		OR			
8.		Solve by the method of separation of variables $\frac{\partial^2 z}{\partial x^2}=\frac{\partial z}{\partial y}+2z$	14M	CO4	L3
		UNIT–V			
9.		Evaluate $\int_c \frac{z^3-\sin 3z}{\left(z-\frac{®}{2}\right)^3}dz$ *with* $C:\lvert z\rvert=2$ using Cauchy's integral formula.	14M	CO5	L5
		OR			
10.		Prove that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)\lvert Real\ f(z)\rvert^2=2\lvert f'(z)\rvert^2$ where $w=f(z)$ is analytic.	14M	CO5	L5

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Hall Ticket Number :										

R-19

Code: 19A236T

II B.Tech. I Semester Supplementary Examinations June 2024

Basic Electrical and Electronics Engineering

(Mechanical Engineering)

Max. Marks: 70 Time: 3 Hours

Answer *any five full questions* by choosing one question from each unit (5x14 = 70 Marks)

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			Marks	CO	BL
		UNIT–I			
1.	a)	Briefly Explain the need of Star-Delta Transformations in the Electrical Circuits.	7M	CO1	L2
	b)	Derive the Expression for Capacitance when C1, C2, and C3 are connected in parallel.	7M	CO1	L6
		OR			
2.		List out the V-I relation and Power equations for the following electrical elements i) Resistance ii) Inductance iii) Capacitance	14M	CO1	L1
		UNIT–II			
3.		With the help of basic principles derive the Emf equation of DC Generator	14M	CO2	L6
		OR			
4.		Explain Swinburne's test for the determination of efficiency of a dc machine	14M	CO2	L2
		UNIT–III			
5.		Explain the principle of operation of a single-phase transformer and derive its EMF equation.	14M	CO3	L2
		OR			
6.		Explain the principle of operation and constructional features of a three-phase induction motor. Mention its applications.	14M	CO3	L2
		UNIT–IV			
7.		Briefly Explain the operation of Bridge Rectifier with necessary diagrams and derive the following terms i) Dc Output voltage ii) Peak Inverse Voltage iii) Ripple Factor	14M	CO4	L2
		OR			
8.	a)	Distinguish between Half wave rectifier and full wave rectifier	7M	CO4	L5
	b)	Explain the input and output characteristic of a transistor in common base configurations	7M	CO4	L2
		UNIT–V			
9.	a)	List out the various applications of CRO in Laboratories.	4M	CO5	L1
	b)	Draw a basic block diagram of a CRO and explain the features of CRO in details.	10M	CO5	L2
		OR			
10.	a)	Explain the concept of induction heating and also discuss about various industrial applications of induction heating	7M	CO5	L2
	b)	Explain the operation of CRO with a neat sketch.	7M	CO5	L2

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