

Model Question Paper-I/II with effect from 2021 (CBCS Scheme)

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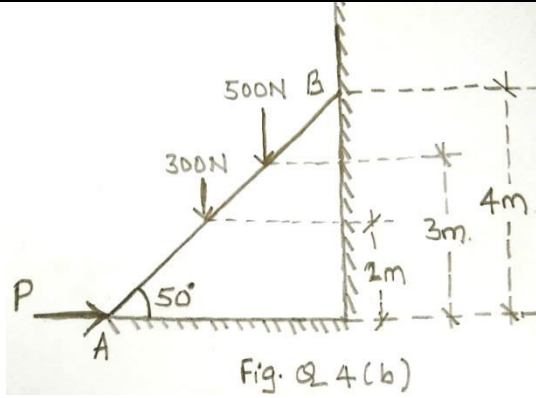
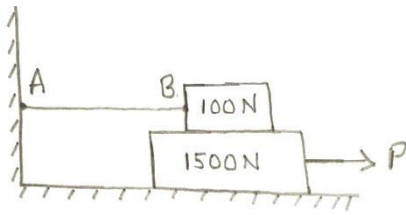
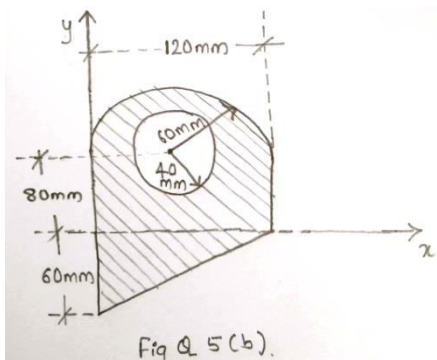
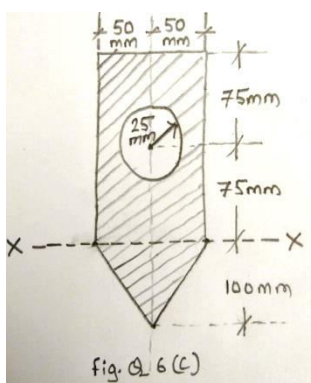
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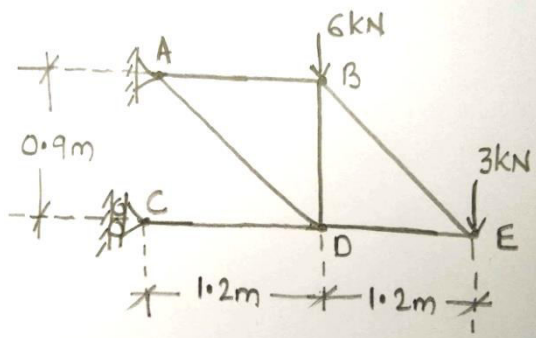
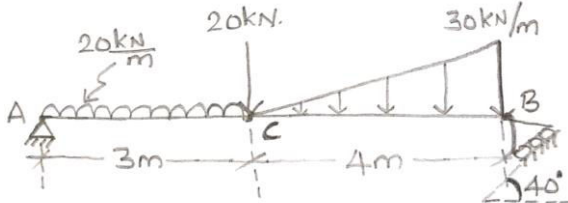
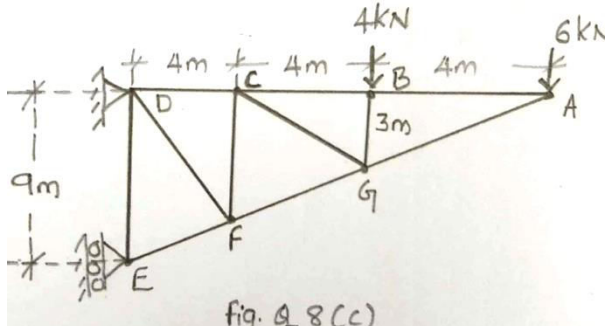
First Semester _BE_____ Degree Examination
Subject Title Elements of civil Engineering and Mechanics

TIME: 03 Hours**Max. Marks: 100**

- Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
 02. Any missing data may suitable be assumed.
 03.

Module -1			Marks
Q.01	a	Explain briefly the scope of civil engineering in i) Irrigation engineering ii) Structural engineering	8
	b	Explain briefly application of any two smart materials in Civil engineering	6
	c	What are the requirements of good cement?	6
OR			
Q.02	a	Explain briefly the scope of civil engineering in i) Transportation engineering ii) Water resource engineering	8
	b	Explain briefly i) RCC ii) PSC	6
	c	What are the advantages of stone construction over brick construction?	6
Module-2			
Q. 03	a	Explain Couple and its characteristics.	6
	b	The sum of two concurrent forces P and Q is 500N and their resultant is 400N. If the resultant is perpendicular to P, find P, Q and angle between P and Q.	6
	c	Determine the resultant of the force system acting on the plate as shown in fig. Q 3(c), with respect to AB and AD.	8
OR			
Q.04	a	State and Prove Varignon's principle of moments.	6
	b	A ladder weighing 300N is to be kept in position as shown in fig. Q4 (b). Determine the horizontal force P to be applied to keep ladder in position, assume all contact surfaces as smooth.	6

		 <p style="text-align: center;">Fig. Q 4 (b)</p>	
	c	<p>Determine the smallest force P required to just move the bottom block if i) top block is restrained by cable AB ii) Cable AB is removed, refer fig. Q4 (c). Take $\mu_s = 0.30$ and $\mu_k = 0.25$.</p>  <p style="text-align: center;">Fig Q 4 (c)</p>	8
Module-3			
Q. 05	a	Derive an expression for moment of inertia of a triangle from first principle about its vertical centroidal axis.	10
	b	Locate the centroid of the shaded area as shown in fig. Q 5(b)	10
		 <p style="text-align: center;">Fig Q 5 (b).</p>	
OR			
Q. 06	a	State and prove perpendicular axes theorem	6
	b	Find the centroid of the area enclosed by a semi circle of radius 'r' from first principle.	6
	c	<p>Determine the moment of inertia about X-X axis for the shaded area as shown in fig. Q 6 (c)</p>  <p style="text-align: center;">fig. Q 6 (c)</p>	8

Module-4			
Q. 07	a	Explain different types of loads with neat sketches.	8
	b	Analyse the truss as shown in fig Q 7(b), by methods of joints.  Fig. Q 7(b)	12
OR			
Q. 08	a	Write a note on classification of trusses.	4
	b	Find the support reactions for the beam as shown in fig Q 8 (b).  Fig. Q 8(b).	8
	c	A roof truss is loaded as shown in fig Q 8 (c), determine the forces in members BC, GF and CG.  fig. Q 8(c)	8
Module-5			
Q. 09	a	Define i) Time of flight ii) Horizontal range iii) Maximum Height iv) Trajectory	4
	b	A projectile is fired with a velocity of 60 m/s on horizontal plane. Find its time of flight in the following cases i) Its range is four times the maximum height ii) Its maximum height is four times the horizontal range iii) Its maximum height and horizontal range are equal.	8
	c	A stone is released from top of a tower ' h ' meter in height, it covers a vertical distance of ' h/5 ' meter during its last second of descend. Find the height of the tower.	8
OR			

Q. 10	a	State and explain D' Alembert's principle.	6
	b	The motion of a particle is defined by $x = (t+1)^2$ and $y = 4(t+1)^{-2}$ where x and y are in meters and t in seconds. Show that path of particle is part of rectangular hyperbola. Find velocity and acceleration at $t = 0$.	6
	c	Two cars moving in the direction are 150m apart. Car A being ahead of car B, at this instant velocity of car A is 3 m/s and constant acceleration of 1.2 m/s^2 . While the velocity of car B is 30 m/s and its uniform retardation is 0.6 m/s^2 . How many times do the cars cross each other? Find when and where they cross with respect to given position of car A.	8

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome				
Question		Bloom's Taxonomy Level attached	Course Outcome	Program Outcome
Q.1	(a)	L1	1	1
	(b)	L1	1	1
	(c)	L1	1	1
Q.2	(a)	L1	1	1
	(b)	L1	1	1
	(c)	L1	1	1
Q.3	(a)	L2	2	3
	(b)	L2	2	3
	(c)	L2	2	3
Q.4	(a)	L2	3	3
	(b)	L2	3	2
	(c)	L2	3	2
Q.5	(a)	L2	4	3
	(b)	L2	4	3
	(c)	L2	4	3
Q.6	(a)	L3	4	2
	(b)	L3	4	2
	(c)	L3	4	3
Q.7	(a)	L2	3	3
	(b)	L3	3	2
	(c)	L2	3	3
Q.8	(a)	L3	3	4
	(b)	L2	3	3
	(c)	L3	3	3
Q.9	(a)	L2	5	3
	(b)	L3	5	2
	(c)	L3	5	3
Q.10	(a)	L2	5	3
	(b)	L3	5	3
	(c)	L3	5	3
Bloom's Taxonomy Levels	Lower order thinking skills			
	Remembering(knowledge): L_1	Understanding Comprehension): L_2	Applying (Application): L_3	
	Higher order thinking skills			
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6	



Model Question Paper-I with effect from 2021 (CBCS Scheme)

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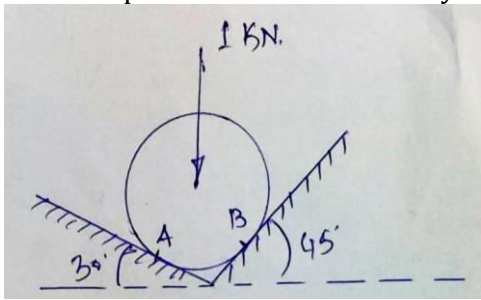
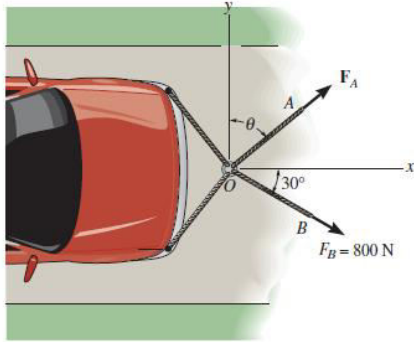
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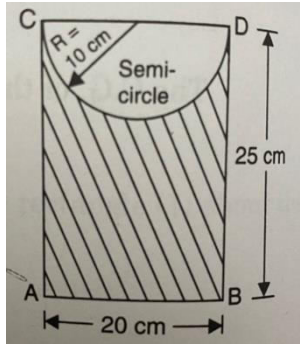
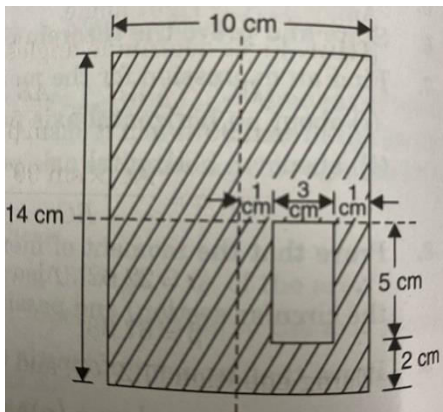
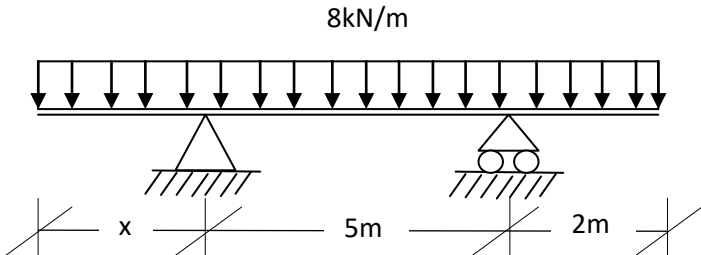
First Semester B.E. Degree Examination Elements of Civil Engineering and Mechanics

TIME: 03 Hours

Max. Marks: 100

Note: 01. Answer any **FIVE** full questions, choosing at least **ONE** question from each **MODULE**.
02. Missing data, if any, may be suitably assumed.

Module -1			Marks
Q.01	a	List out different braches of Civil Engineering. And Explain, any three of them.	12
	b	Elaborate how Civil Engineers have a role in the development of any country.	08
OR			
Q.02	a	What are the different building materials used in construction industry? Explain in detail the materials used in RCC.	12
	b	What are Smart materials? Explain.	08
Module-2			
Q. 03	a	Elaborate the concept of idealization.	08
	b	Find the reactions at the points of contact for the system shown in Fig.Q3b.	12
 <p style="text-align: center;">FIG. Q3B</p>			
OR			
Q.04	a	Determine the magnitude and direction of F_A so that the resultant force is directed along the positive x axis and has a magnitude of 1250N. Refer fig. Q4a.	10
 <p style="text-align: center;">Fig. Q4a</p>			

	b	A particle of mass 5 Kg rests on a 30° inclined plane with the horizontal. A force F_a of magnitude 30 N acts on the particle in the direction parallel and up the inclined plane. a) Draw a Free Body Diagram including the particle, the inclined plane and all forces acting on the particle with their labels. b) Find the force of friction acting on the particle. c) Find the normal force exerted by the inclined on the particle.	10
Module-3			
Q. 05	a	Prove that, centroid of an equilateral triangle lies at a distance of one third of the height (of triangle) from the base of the triangle.	08
	b	Find the Moment of Inertia about AB of the shaded area for the Fig.Q5b shown below.  Fig. Q5b	12
OR			
Q. 06	a	State and Prove Parallel axis theorem.	05
	b	Find the Centre of gravity for the shaded area shown in Fig.Q6b.  Fig.Q6b	15
Module-4			
Q. 07	a	What are the different types of beams? Also write the difference between a determinate beam and an indeterminate beam.	04
	b	Find x such that reactions at both supports are equal for the beam shown in Fig.Q7b. 	16

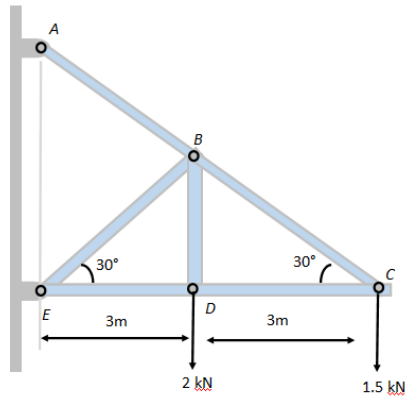
OR			
Q. 08	a	What are the prerequisites for applying method of joints in analysis of trusses?	04
	b	Find the magnitude of forces in each and every member of the truss shown in Fig.Q8b. Also verify the force in the member BE using method of sections.  Fig. Q8b	16
Module-5			
Q. 09	a	Define the following: Displacement, Distance travelled, Velocity and Acceleration. Also mention their SI units.	08
	b	A Car travels along a straight road. Its distance is given by the equation: $S = 2.4t^2 - 0.12t^3$. Where "t" is time in seconds. I. Compute the average velocity of the car for the time interval at t=0 and t=15 Sec. II. Calculate the instantaneous velocity of the car at t=5 Sec III. Calculate the instantaneous acceleration of the car at t=5 Sec.	12
OR			
Q. 10	a	State D'Alemberts Principle and write its importance in Structural Dynamics.	10
	b	A body falling freely under the action of gravity passes two points 20m apart vertically in 0.4 seconds. From what height above the higher point the body starts to fall. Take $g = 9.8\text{m/sec}^2$	10

Table showing the Bloom's Taxonomy Level, Course Outcome and Program Outcome				
Question		Bloom's Taxonomy Level attached	Course Outcome	Program Outcome
Q.1	(a)	L1, L2	CO1	PO1,PO2
	(b)	L1, L2	CO1	PO1,PO2
Q.2	(a)	L3	CO1	PO1, PO2, PO3
	(b)	L3	CO1	PO1, PO2, PO3
Q.3	(a)	L1	CO2	PO1,PO2
	(b)	L3	CO2	PO1, PO2, PO3
Q.4	(a)	L3	CO2	PO1, PO2, PO3
	(b)	L3	CO2	PO1, PO2, PO3
Q.5	(a)	L3	CO3	PO1, PO2, PO3
	(b)	L3	CO3	PO1, PO2, PO3
Q.6	(a)	L2	CO3	PO1,PO2
	(b)	L3	CO3	PO1, PO2, PO3

Q.7	(a)	L1	C04	P01,P02
	(b)	L3	C04	P01, P02, P03
Q.8	(a)	L2	C04	P01,P02
	(b)	L3	C04	P01, P02, P03
Q.9	(a)	L1	C05	P01,P02
	(b)	L3	C05	P01, P02, P03
Q.10	(a)	L2	C05	P01,P02
	(b)	L3	C05	P01, P02, P03
Lower order thinking skills				
Bloom's Taxonom y Levels	Remembering(knowledge): L_1		Understanding Comprehension): L_2	Applying (Application): L_3
	Higher order thinking skills			
	Analyzing (Analysis): L_4	Valuating (Evaluation): L_5	Creating (Synthesis): L_6	

