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Model Question Paper-1 with effect from 2018-19
(CBCS Scheme)
First/Second Semester B.E.Degree Examination
Elements of Civil Engineering and Mechanics (Common to all Branches) **18CIV14/24**
Time: 3 hrs **Max. Marks: 100**
Note: Answer FIVE full questions, choosing one full question from each module

Module – 1 **Marks**

1a Define force and state its characteristics. 4m

b Explain briefly the scope of Civil Engineering in: 8m
a) Structural Engineering. b) Transportation Engineering.

c Write a note on the role of Civil Engineers in the infrastructure development of country. 8m

OR

2a Find the moment of force F = 600N about 'A' as shown in Fig.Q.2(a) 4m

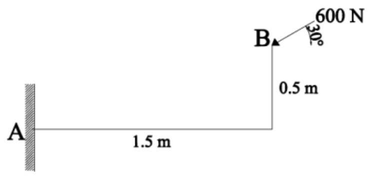


Fig. Q.2 (a)

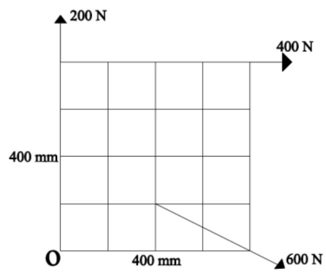
b To move a boat uniformly along the river at a given speed, a resultant force R=520N is required. Two men pulling with forces P and Q by means of ropes with angle $\theta_1$and θ_2 respectively. If 8m
a. $\theta_1 = 30^o$ and $\theta_2 = 40^o$ find P and Q,
b. $\theta_1 = 30^o$ and P=400 N find Q and θ_2

c State and prove Varignon's theorem of moments 8m

Module –2

3a State and prove Lami's theorem. 4m

b Determine the Magnitude and Y-Intercept of the resultant force system acting on the lamina as shown in Fig. Q.3(b). 8m



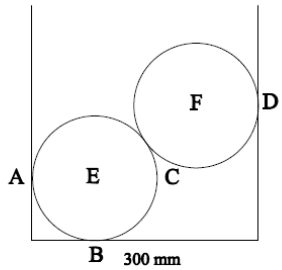


Fig. Q.3. (b). Fig. Q. 3. (c).

c Two Spheres each of radius 100mm and weight 5kN is in a rectangular box as shown in Fig. Q. 3 (c). Calculate the reactions at all the points of contact. 8m

OR

4a Distinguish between Static friction and kinetic friction. 4m

b A block Weighing 4000 N is resting on horizontal surface supports another block of 2000 N as shown in Fig. Q.4 (b), Find the horizontal force F just to move the block to the left. Take coefficient of friction for all contact surfaces as 0.2. 8m

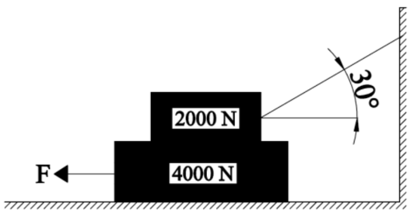


Fig. Q.4 (b)

c	A uniform ladder of length 15 m rests against a vertical wall making an angle 60° with the horizontal. Coefficient of friction between wall and the ladder is 0.30 and between ground and ladder is 0.25. A man weighing 500N ascends the ladder. How long will he able to go before the ladder slips? Find the weight that is necessary to be put at the bottom of the ladder so as to be just sufficient to permit the man to go to the top. Assume weight of the ladder to be 850 N.	8m

Module –3

5a	What is meant by equilibrium of a rigid body? State the conditions of static equilibrium for coplanar non-concurrent force system?	6m
b	Solve for the distance **X** such that the reaction RA an RB is equal for the beam shown in Fig. Q.5 (b).	14m

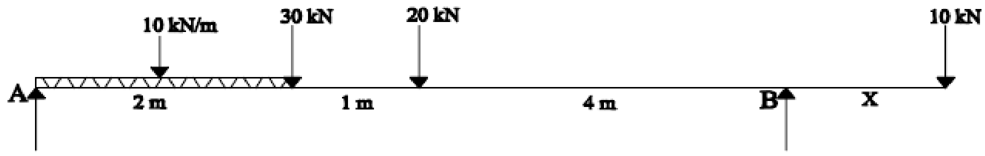


Fig. Q.5(b)

OR

6a	List the steps followed in the analysis of truss by method of Joints	6m
b	Find the support reactions and member forces for pin jointed plane truss shown in Fig. Q. 6 (b).	14m

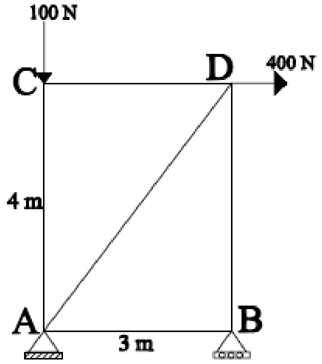


Fig. Q. 6 (b).

Module –4

7a	Derivation of expression for centroid of Triangle.	6m
b	Locate the Centroid of geometrical Fig.Q.7 (b). Shown with respect to horizontal axis.	14m

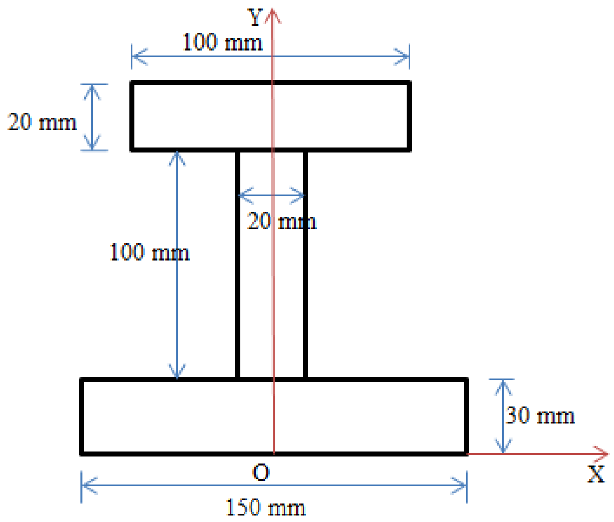


Fig.Q.7 (b).

OR

8a	State and prove Parallel axis theorem	6m
b	Obtain the Moment of Inertia and the radius of gyration of the shaded area shown in Fig. Q. 8. (b) With respect to X and Y axis.	14m

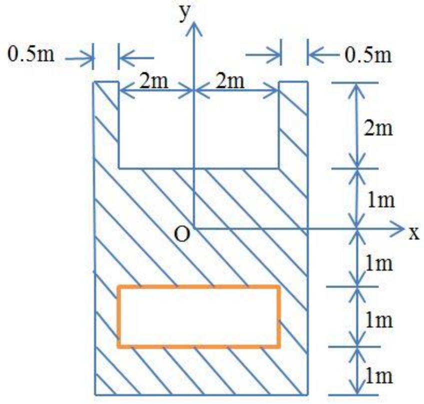


Fig. Q. 8. (b)

Module –5

9a	Define displacement, Velocity, Distance Travelled, Speed and Acceleration.	4 m
b	A vehicle is moving with variable acceleration and its motion is given by the equation s= 25t +4t^2-6t^3, where‘s’ is in m and‘t’ is in seconds. Determine (i) the velocity and acceleration at start (ii) the time, when the vehicle reaches its maximum velocity (iii) the max velocity of the vehicle.	8m
c	An aircraft moving horizontally at 120 kms/hr speed at an elevation of 1200m targets a point on the ground and releases a bomb which hits it. Determine the horizontal distance of the aircraft (position when it releases the bomb) from the target. Also calculate the velocity and direction with which bomb hits the target.	8m

OR

10a	State Newton’s Laws of Motion	4m
b	State D'Alembert's principle and mention its applications in Plane Motion.	8m
c	A particle is projected in air with a velocity of 120 m/sec at an angle of 30^0 with the horizontal. Determine (i) the horizontal range (ii) the max height by the particle (iii) the time of flight.	8m