PAPER ID-310900

Roll No: | | | | | | | | | | | | | |

B TECH
(SEM-III) THEORY EXAMINATION 2020-21
ENGINEERING MECHANICS

Time: 3 Hours ***Total Marks: 100***

Note: 1. Attempt all Sections. If require any missing data; then choose suitably.

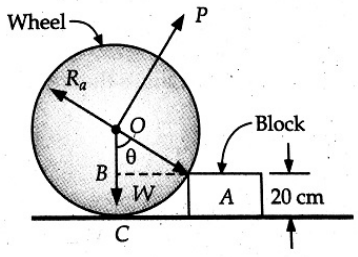
SECTION A

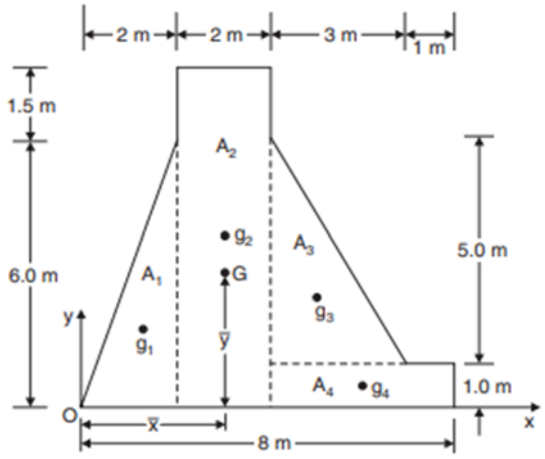
1. Attempt *all* questions in brief. 2 x 10 = 20

Q no.	Question	Marks	CO
a.	What is force? Give the necessary and sufficient conditions for equilibrium of 'non-concurrent' force system.	2	
b.	State Lami's Theorem.	2	
c.	Define angle of repose.	2	
d.	Differentiate between truss and frame.	2	
e.	Define radius of gyration.	2	
f.	What do you understand by area moment of inertia and mass moment of inertia?	2	
g.	Define Poisson's ratio.	2	
h.	Write the formula for total change in length of a three bars of different lengths and different diameters when subjected to an axial load P.	2	
i.	What do you mean by pure bending?	2	
j.	Write D' Alembert's principle.	2	

SECTION B

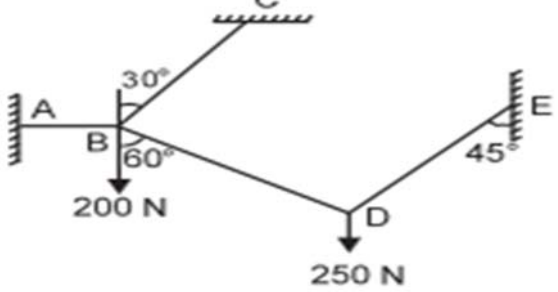
2. Attempt any *three* of the following: 3 x 10 = 30

Q no.	Question	Marks	CO
a.	A uniform wheel of 50 cm diameter and 1 KN weight rests against a rigid rectangular block of thickness 20 cm. Considering all surfaces smooth; determine the least pull to be applied through the centre of wheel to just turn it over the corner of the block and reaction of the block. 	10	
b.	A belt is running over a pulley of diameter 120 cm at 200 rpm. The angle of contact is 165° and coefficient of friction between the belt and the pulley is 0.3. If the maximum tension in the belt is 3000 N, find the power transmitted by the belt.	10	
c.	Locate the centroid of the area shown in fig.	10	

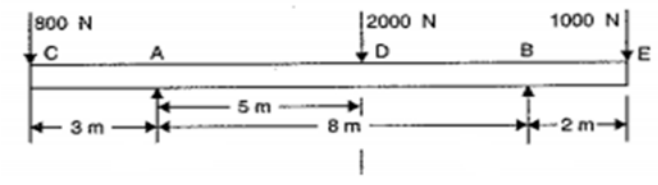
			
d.	A particle moves along a straight line with an acceleration described by the equation a = - $8s^{-2}$ where a is in m/s^2 and s in m. When t= 1 s, s = 4 m and v= 2 m/s. Determine the acceleration when t = 2s.	10	
e.	List the assumptions made in simple bending theory. Derive the simple bending equation.	10	

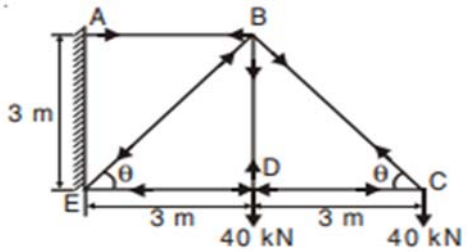
SECTION C

3. Attempt any *one* part of the following:

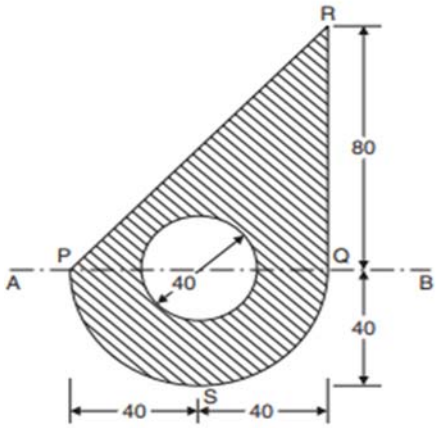
Q no.	Question	Marks	CO
a.	A system of connected flexible cables shown in Fig. 2.39(a) is supporting two vertical forces 200 N and 250 N at points B and D. Determine the forces in various segments of the cable. 	10	
b.	A uniform ladder of weight 30 N and length 13 m is placed against a smooth vertical wall with its lower end 10 m from the wall. In this position the ladder is just to slip. Determine the coefficient of friction between the ladder and the floor and frictional force acting on the ladder at the point of contact between the ladder and floor.	10	

4. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	Draw the S.F. and B.M. diagrams for the beam which is loaded as shown in figure below. Determine the point of contraflexure with in the span AB. 	10	

b.	Find the forces in all the members of the truss shown in Fig. Tabulate the results. 	10	

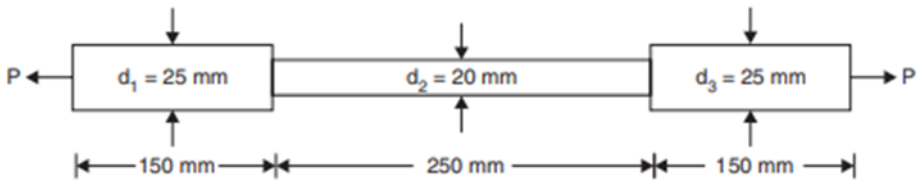
5. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a	Find moment of inertia of the shaded area shown in the Fig about the axis AB 	10	
b	State and prove parallel axis theorem.	10	

6. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	State and prove work energy principle.	10	
b.	A passenger sitting in a train moving at 54 km/hr is hit by a stone thrown at right angles to it with a velocity of 18 km/hr. calculate the velocity and direction with which the stone appears to hit the passenger.	10	

7. Attempt any *one* part of the following:

Q no.	Question	Marks	CO
a.	The bar shown in Fig. 8.16 is tested in universal testing machine. It is observed that at a load of 40 kN the total extension of the bar is 0.280 mm. Determine the Young's modulus of the material. 	10	
b.	In a hollow circular shaft of outer and inner diameters of 20 cm and 10 cm respectively, the shear stress is not to exceed 40 N/mm^2. Find the maximum torque which the shaft can safely transmit.	10	