

Seat No.	
----------	--

W - 965

Subject: Applied Mechanics

Code : 59185/59941

F.E. SEM. -- I and II (New Syllabus : Introduced from July 2013)

Day and Date : Friday 30 - 05 - 2014

Time : 10.00 a.m. to 01.00 p.m.

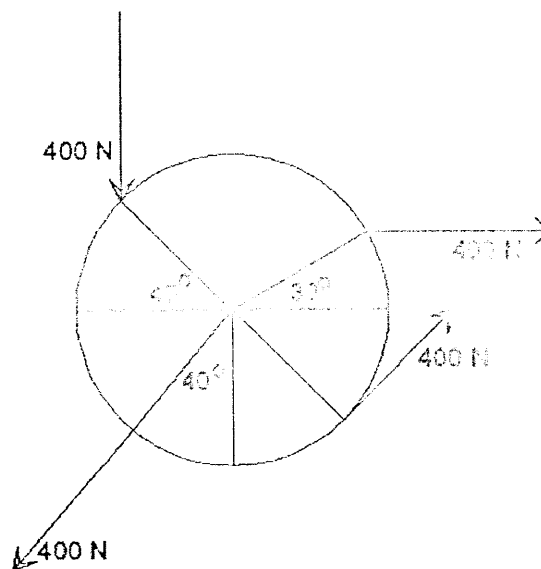
Total Marks : 100

Note : 1. All questions are compulsory

2. Figures to the right indicate maximum marks for the question
3. Neat sketches should be drawn wherever necessary
4. Use of non-programmable calculator is allowed
5. Any missing data may be assumed suitably and clearly highlighted in the answer-sheets.

SECTION - I

- Q. 1 a. Enlist the different types of 2-D Force Systems with a single line characteristic of the system, that can be studied in the study of Forces. 04
- b. Four Forces, each of 400 N magnitude act on a wheel along the directions as shown in the figure. Find the resultant force in magnitude, direction and position. Take radius of the wheel as 1 metre. 12

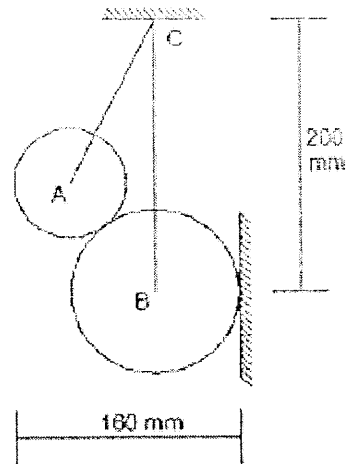


Q 2. a. Discuss the various Beam supports in short.

08

b. Two cylinders A and B of diameters 8 cm and 12 cm respectively are held in equilibrium by separate strings as shown in the figure. If their weights are 20 N and 40 N respectively, determine the tension in the strings and reactions at all point contacts.

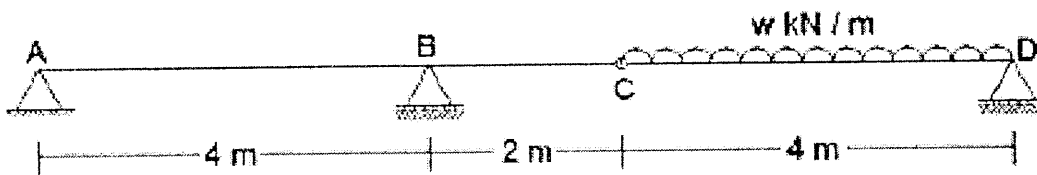
10



OR

Two beams ABC and CD are pinned together at C as shown in Fig. Beam CD carries an uniformly distributed load of w kN/m which produces reaction at B as 60 kN. Determine w and find reaction at A and D.

10

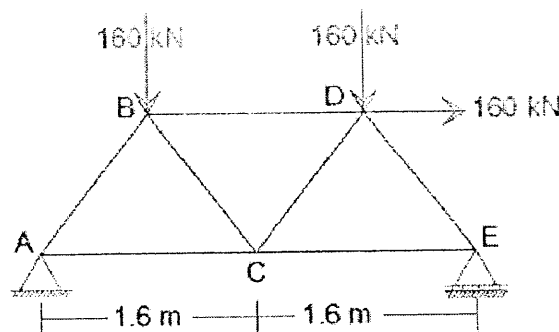


Q. 3. a. Explain the terms : Perfect Truss, Stable Truss and Unstable Truss

06

b. Analyse the truss and tabulate all the member forces in the truss loaded and configured as shown in the figure below. All members of the truss have the same length of 1.6 m

10



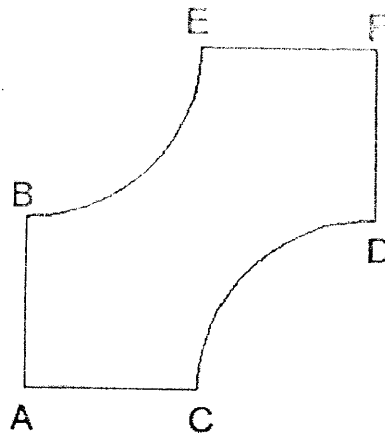
SECTION II

Q. 4. a. Write a short note on Moment of Inertia

06

b. Find the radius of gyration for the plane lamina shown besides about the Centroidal Vertical axis. The edges AC, DF, FE and BA, each of length 80 mm are a part of a square 160 mm x 160 mm. The arcs CD and BE are quarter-circular arcs of a part of a circle of radius 80 mm.

10

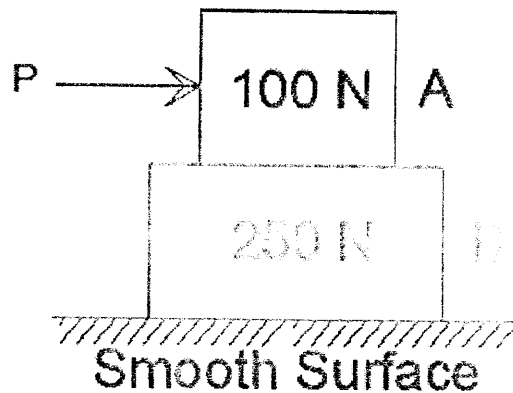


Q. 5. a. Explain the Law of conservation of mechanical energy

08

b. Two Blocks A and B of weight 100 N and 250 N respectively are placed on a smooth horizontal surface as shown in the figure. Find the maximum force P that will prevent slip between block A and B. Find the acceleration of the system in that case. Adopt coefficient of friction available between the blocks as 0.4 in static stage.

10



OR

b. A locomotive starts from rest and pulls a train, weighing 18 MN down a 1 % grade. The train resistance is 3 N per KN. If the draw bar pull is constant and equal to 44.5 KN find the speed of the train after it has moved 1500 m. Find the final power developed by the engine. What is the acceleration of the locomotive and for what duration has it been in motion to cover this distance? 10

Q. 6. a. Compare direct and oblique central impact of bodies. 05

b. A 20 gm bullet is fired horizontally with a velocity of 600 m/sec into a 4.5 kg soft block which is stationary and placed on a horizontal surface. Adopting the coefficient of kinetic friction between block and surface as 0.4, determine how far the block will move and the percentage loss of kinetic. 10
