

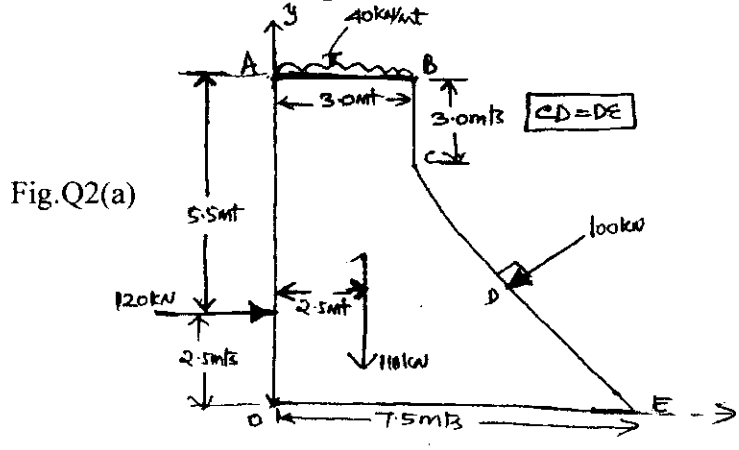
First Semester B.Arch. Degree Examination, January 2013
Structures - I

Time: 3 hrs.

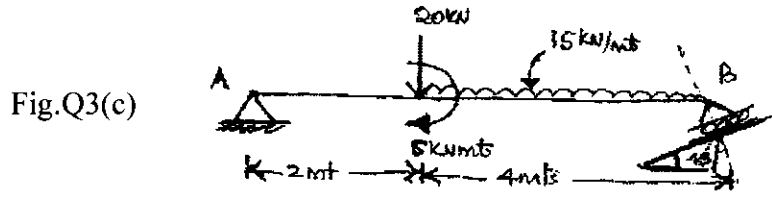
Max. Marks:100

Note: 1. Answer any FIVE full questions.
2. Do not scale the Drawing, Follow written dimension.
3. Missing data may be suitably assumed.

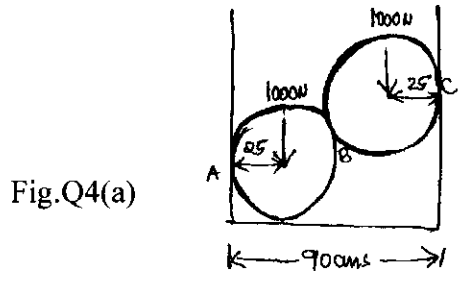
- 1 a. What is the principle of transmissibility of a force? (03 Marks)
 b. Distinguish between : i) Resolution & Composition ii) Resultant & Equilibrant
 iii) Law of Triangle of forces and law of polygon of forces. (08 Marks)
 c. The sum of 2 concurrent forces P & Q is 270 N and their resultant is 180N. The angle between forces P and resultant 'R' is 90° . Find magnitude of each force and angle between them. (09 Marks)
- 2 a. The cross section of dam is shown in fig.Q2(a). Determine the magnitude, direction and x intercept of resultant force from the given sketch. (13 Marks)



- b. State and prove Lami's theorem. (07 Marks)
- 3 a. Differentiate between statically determinate and statically indeterminate structures (Beams). (03 Marks)
 b. With neat sketches, explain various types of supports. (07 Marks)
 c. Determine the reaction @ the supports for the beam shown in fig.Q3(c). (10 Marks)

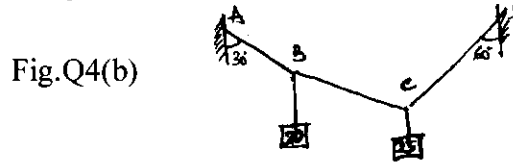


- 4 a. Two spheres each of weight 1000N and of radius 25cms, rest in horizontal channel of width 90cms as shown in fig.Q4(a). Find the contact reactions @ A, B and C. (09 Marks)



Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

- b. A wire is fixed at 2 points A and D as shown in fig.Q4(b). Two weights 20kN and 25kN are supported at B and C respectively. When equilibrium is reached it is found that inclination of AB is 30° and that of CD is 60° to the vertical. Determine the tension in segments AB, BC and CD of the rope and also inclination of BC to vertical. (11 Marks)

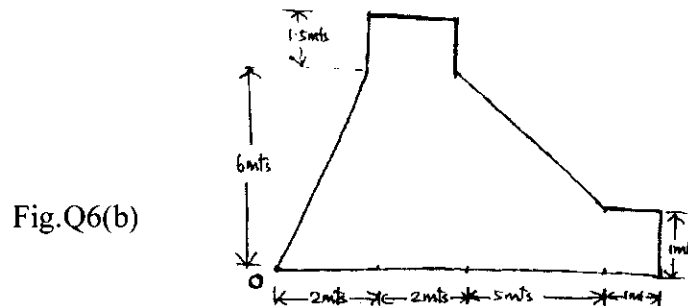


- 5 a. What should be the value of the angle ' θ ' in fig.Q5(a), so that the motion of the 90N block impends down the plane? μ for all surfaces is $\frac{1}{3}$. (10 Marks)

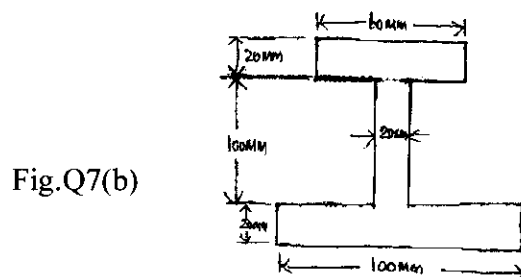


- b. A ladder 5mts long and 250N weight is placed against a vertical wall in a position where its inclination to the vertical is 30° . A man weighing 800N climbs the ladder. At what position, will he induce slipping? M for all contact surfaces is 0.2. (10 Marks)

- 6 a. From the 1st principles, locate the centroid of Quadrant of a circle. (10 Marks)
 b. Locate the centroid of cross section shown, with respect to point 'O' from fig.Q6(b). (10 Marks)



- 7 a. From the 1st principles, determine the second moment of area of the Δ^{le} about its base and about its centroidal axis. (08 Marks)
 b. Find the moment of inertia about the horizontal centroidal axis for I section shown in fig.Q7(b). (12 Marks)



- 8 a. Explain Perfect, Deficient and Redundant Trusses, with example. (05 Marks)
 b. Write short notes on any Three of the following :
 i) State and Prove Varignon's theorem.
 ii) Free body diagram - Explain with atleast two illustrations.
 iii) State and Prove Pavalal axis theorem.
 iv) Laws of Friction. (15 Marks)