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First Semester B.E Degree Examination, January/February 2004**Common to all Branches except Architecture
(Old Scheme)****Elements of Civil Engineering**

Time: 3 hrs.]

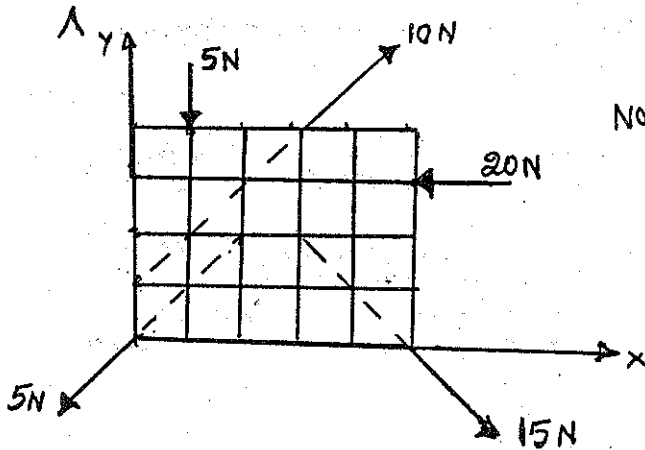
[Max.Marks : 100

- Note:** (1) Answer any **EIGHT** full questions from question No 1 to 12 and **SIX** questions from question No. 13 to 21.
(2) Question no 1-12 carry 5 marks each and questions 13-21 carry 10 marks each.
(3) Draw neat sketches wherever necessary.
(4) Missing data if any may be suitably assumed.

1. What are the ingredients of portland cement?
2. List the properties of good refractory bricks.
3. Explain any five defects in timber.
4. State the advantages of plastic.
5. State the uses of aluminium.
6. Distinguish between plywood and laminates.
7. State and explain transmissibility of force.
8. Explain scalars and vectors with examples.
9. Explain the terms angle of repose, angle of friction and cone of friction.
10. Explain cross product and dot product.
11. State and explain D'Alembert's principle.
12. State and derive the work energy equation.
13. (a) Explain the methods of seasoning of timber.
(b) What is curing of concrete? Explain any two methods of curing.
14. (a) What are the requirements of good building stone?
(b) Explain the different types of roofing tiles.
15. (a) Define water-cement ratio and explain its importance.
(b) What are the desirable properties of paints? List the uses of paints.

16. (a) Define i) a Force
 ii) Particle
 iii) Rigid body

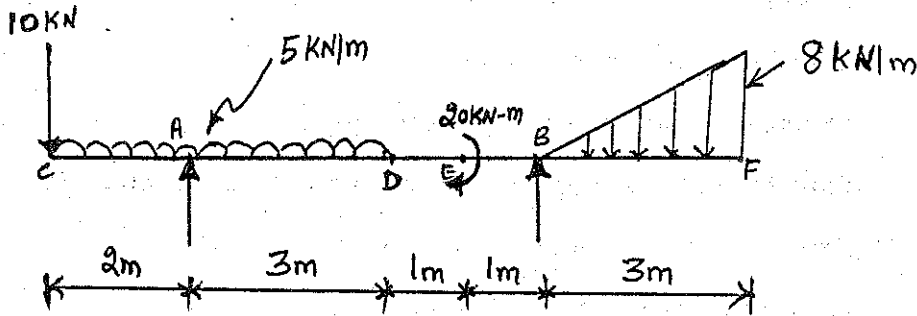
(b) Find the resultant of a set of coplanar forces shown in fig (1) using vector approach.



Note: Each square has a side of 8mm

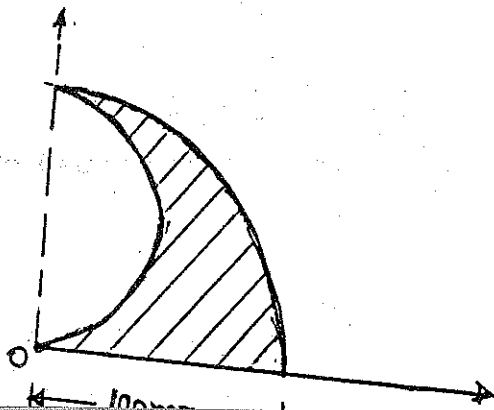
17. (a) Explain force polygon and funicular polygon.

(b) Find the support reactions for the beam shown in figure 2. (Use vector approach).

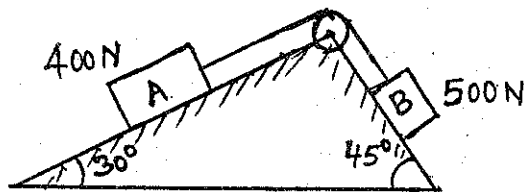


18 (a) State and prove parallel axis theorem.

(b) Locate the centroid of the shaded area shown in figure 3 with respect to point O.



19. (a) State the laws of dry friction.
- (b) A uniform ladder of length 8m rests against a vertical wall with which it makes an angle of 45° . The coefficient of friction between the ladder and the wall is 0.25 and that between the ladder and the ground is 0.30. If a man whose weight is one half of the ladder ascends the ladder, how high will he be when the ladder slips?
20. (a) Define work, power and energy.
- (b) In what distance will body A shown in figure 4 attain a velocity $2m/sec$ starting from rest? Take coefficient of friction between the blocks and the plane as 0.2. Assume the pulley is smooth.



21. A train weighing 4800 kN is moving up a slope 2 in 100 with an acceleration of $0.03m/sec^2$. Tractive resistance is 5N/kN. Determine the acceleration of the train if it moves with the same tractive force;
- (a) on a level track
- (b) down the plane inclined at 2 in 100.

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- Note:** (1) Answer any **EIGHT** questions from question No 1 to 12 and **SIX** questions from question No. 13 to 21
 (2) Questions 1 to 12 carry 5 marks each and questions 13 to 21 carry 10 marks each.
 (3) Answers must be specific and precise.
 (4) Draw neat sketches wherever necessary.
 (5) Assume missing data, if any, and state the same clearly.

1. Mention the properties of stones to be looked into before selecting them for any civil engineering work. (5 Marks)
2. List the properties of good refractory bricks. (5 Marks)
3. What are the qualities of a good fiber? List out. (5 Marks)
4. Write the neat sketches of any five types of roofing tiles and name them. (5 Marks)
5. State the advantages of plastics. (5 Marks)
6. Explain the significance of curing of concrete. (5 Marks)
7. Distinguish between dot product and cross product of vectors. (5 Marks)
8. Mention the conditions of static equilibrium for two dimensional
 (i) coplanar concurrent force system
 (ii) Coplanar non-concurrent force system. (5 Marks)
9. State and explain D'Alemberts principle of Dynamic Equilibrium. (5 Marks)
10. Explain Freebody diagram with atleast two examples. (5 Marks)
11. Replace the 80N force at 'A' by an equivalent force and couple moment at 'O', using vector approach. Refer fig.1. (5 Marks)

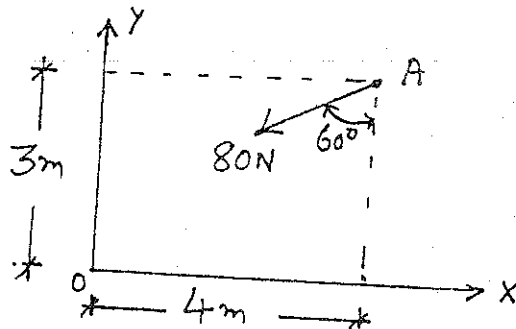


fig.1. (Q. No. 11)

(5 Marks)

Page No., 2

12. State and derive Work - Energy Equation. (5 Marks)
13. (a) What is meant by Grades of Concrete, mention the different Grades of Concrete as per IS:456-1978. (5 Marks)
- (b) Enumerate various types of cements and state their specific uses. (5 Marks)
14. (a) From the first principles, derive an expression for locating the centroid of a triangle. (5 Marks)
- (b) Distinguish between centroid and centre of gravity. (5 Marks)
15. (a) List the properties of good cement mortar. (5 Marks)
- (b) List the uses of RCC and PSC. (5 Marks)
16. (a) Make a list of desirable properties of paints. (5 Marks)
- (b) Mention the uses of Aluminium. (5 Marks)
17. (a) Explain the concept of Force Polygon and Funicular Polygon. (5 Marks)
- (b) Determine the magnitude and direction of force F such that the resultant force $F_R = 270N$ acts along y - direction as shown in fig.2. Use vector approach only. (5 Marks)

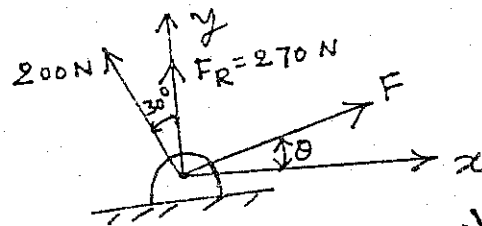


fig.2. (Q.No. 17(b))

(5 Marks)

(2 Marks)

18. (a) Explain the Concept of Force. (5 Marks)
- (b) ABCD is a square, whose sides are 2m long. Along the sides AB, BC, CD and DA forces acting are 1N, 2N, 8N and 5N respectively. Also, along diagonals AC and DB the forces acting are $5\sqrt{2}N$ and $2\sqrt{2}N$ respectively. Find the resultant of this force system. Use vector approach only. Refer fig.3. (8 Mark)

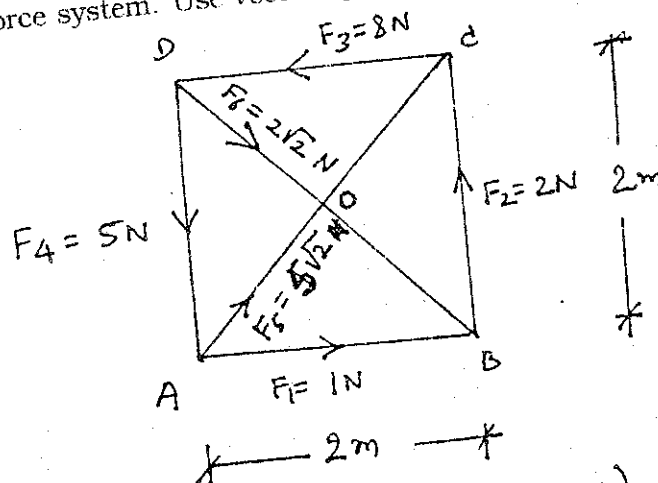


fig.3. (Q.No. 18(b))

Contd

19. (a) State and prove parallel axis theorem.

(4 Marks)

(b) Determine the moment of inertia of the shaded area about its horizontal centroidal axis. Take all dimension in 'mm'. Refer fig.4.

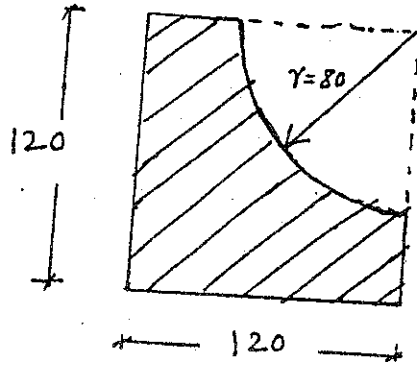


fig. 4. (Q.No. 19(b))

(6 Marks)

20. A body of weight 200N is acted upon by a force P of 40N shown in fig. 5. If the coefficient of friction between the inclined plane and the body is 0.3, determine whether the body moves up the plane or down the plane or remains stationary.

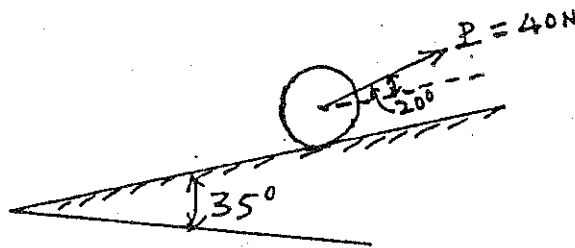
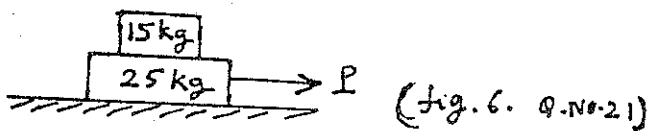


fig. 5 (Q.No. 20)

(10 Marks)

21. Determine the maximum force P that can be applied on block of 25kg mass as shown in fig.6., such that 15kg mass block does not slip. Also find the corresponding acceleration. The coefficient of friction between the two blocks and that between 25kg mass block and the plane is 0.35.



(fig. 6. Q.No. 21)

(10 Marks)

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- Note:**
1. Answer any FIVE full questions.
 2. Missing data, if any, suitably assumed.
 3. Answer must be specific and precise.
 4. Draw neat sketches wherever necessary.

1. (a) Discuss the infrastructural development activities in which civil engineers are involved. (8 Marks)
(b) Briefly explain about importance of construction management. (6 Marks)
(c) List the desirable properties of bricks. (6 Marks)
2. (a) Discuss the important properties of green (wet) and dry concrete. (8 Marks)
(b) As an alternative to stone and bricks, which are the materials developed as building blocks. List the properties of any one of them. (6 Marks)
(c) Briefly explain the principle on which piezo electric materials act as smart materials. Discuss about their uses in engineering. (6 Marks)
3. (a) Explain the basic concepts of surveying. (6 Marks)
(b) Write a short note on electronic distance measurement (EDM) instruments. (8 Marks)
(c) Explain the applications of remote sensing in
 - i) Resource exploration.
 - ii) Study of natural hazards.(6 Marks)
4. (a) Explain the characteristics of force to be specified to define a force completely. (4 Marks)
(b) State and explain the principle of transmissibility of forces. (4 Marks)
(c) Two identical rollers each weighing 200N are placed in a trough as shown in Fig.1. Assuming all contact surfaces are smooth, find the reactions developed at contact surfaces A, B, C and D. (12 Marks)
5. (a) Determine the magnitude and y-intercept of the resultant of force system acting on the lamina as shown in Fig.2. (8 Marks)
(b) Beam AB shown in Fig.3 has hinged support at A and roller support at B. Determine the reactions developed at the support when the forces shown in the figure are acting. (10 Marks)
6. (a) Prove that centroid of a triangle of height h is at a distance $h/3$ from its base. (8 Marks)
(b) Locate the centroid of area shown in Fig.4 with respect to the cartesian coordinate system shown. (12 Marks)

7. (a) State and prove parallel axis theorem of moment of inertia. (6 Marks)
- (b) Determine the moment of inertia of the unequal I-section shown in Fig.5 about its centroidal axis. (14 Marks)
8. (a) List the laws of dry friction. (6 Marks)
- (b) A ladder of length 4m weighing 200N is placed against a vertical wall as shown in Fig.6. The coefficient of friction between the wall and the ladder is 0.25 and that between the ladder and the floor is 0.3. Determine the minimum horizontal force to be applied at A to prevent slipping when a man weighing 600N wants to stand at a distance 3m from A shown in the figure. (14 Marks)

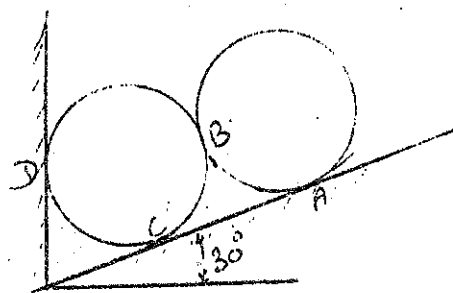


Fig. 1 (Q No. 4.c)

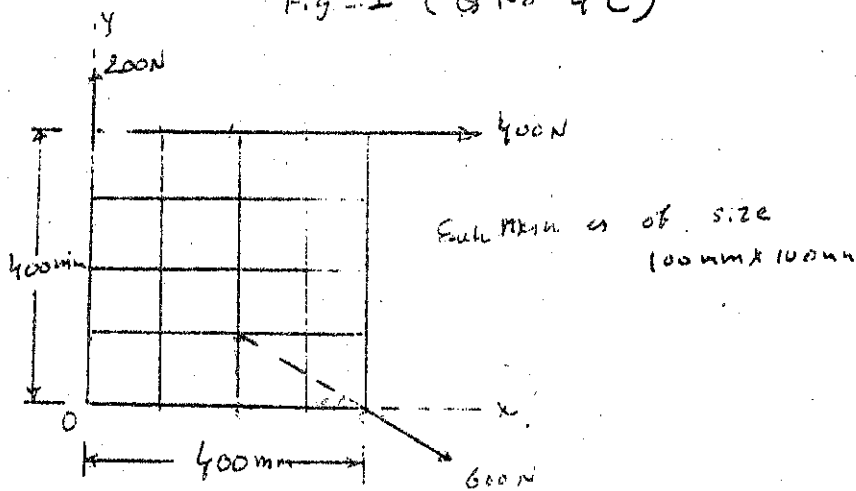


Fig 2 (Q No. 5-a)

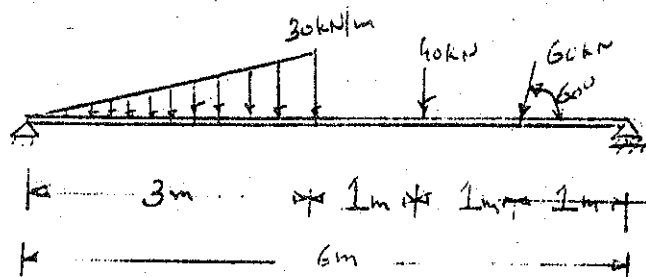


Fig. 3 (Q No. 5 b)

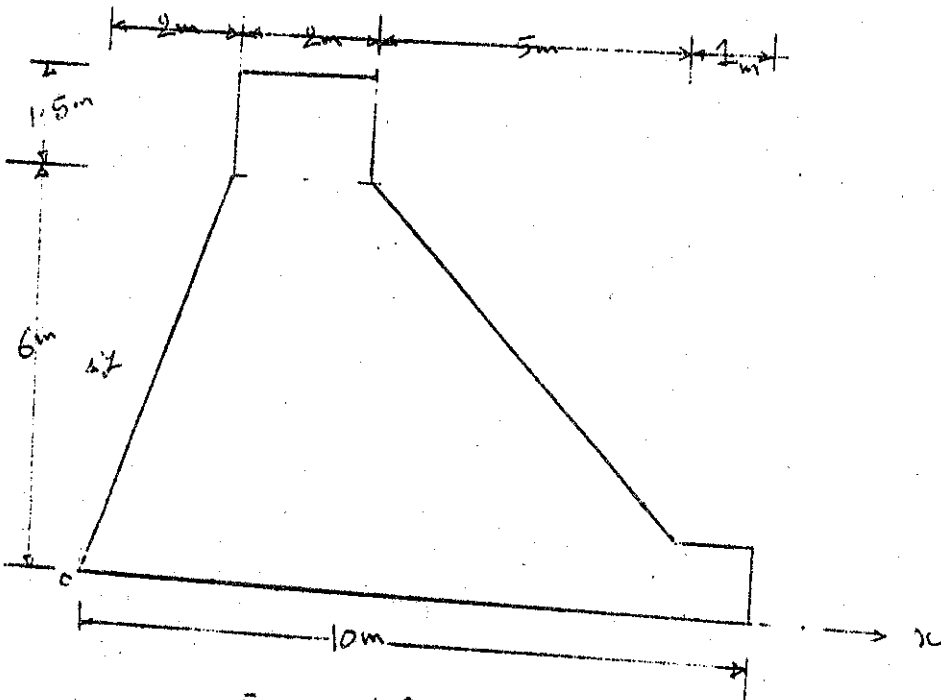
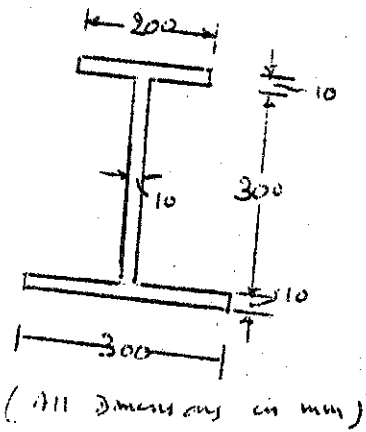


Fig. 4 (Q.No: 6-a)



(All dimensions are in mm)

Fig. 5 (Q.No: 7b)

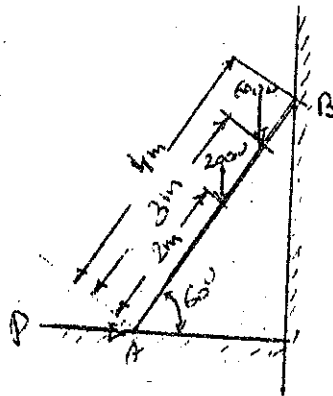


Fig. 6 (Q.No: 8-b)

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