USN | | | | | | | | | | |

CIV13/23

# First / Second Semester B.E. Degree Examination, Dec. 07 / Jan. 08
## Elements of Civil Engineering

Time: 3 hrs. Max. Marks:100

**Note :** *1. Answer any FIVE full questions.*
*2. Assume any missing data suitably.*
*3. Draw neat sketches wherever necessary.*
*4. Answers should be precise, brief and to the point.*

1 a. How economy of a country is related to infrastructure development? Explain with examples. **(10 Marks)**
b. Explain role of civil engineer with respect to analysis and design. **(05 Marks)**
c. Briefly explain how cost overrun and time overrun can be checked in construction. **(05 Marks)**

2 a. List uses of timber in construction. **(05 Marks)**
b. Explain different types of mortar with related uses and advantages. **(10 Marks)**
c. List advantages of having smart materials in construction. **(05 Marks)**

3 a. What is geographic information system? Explain with examples from civil engineering spatial analysis uses. **(10 Marks)**
b. List principles of surveying. Explain importance of each of these principles. **(10 Marks)**

4 a. Explain the following with sketches and an examples in each case:
i) Coplanar concurrent forces
ii) Non-coplanar concurrent forces
iii) Non-coplanar non-concurrent forces. **(09 Marks)**
b. Determine the magnitude and direction of a single force which keeps the system of forces shown in Fig.Q4(b) in equilibrium. **(11 Marks)**

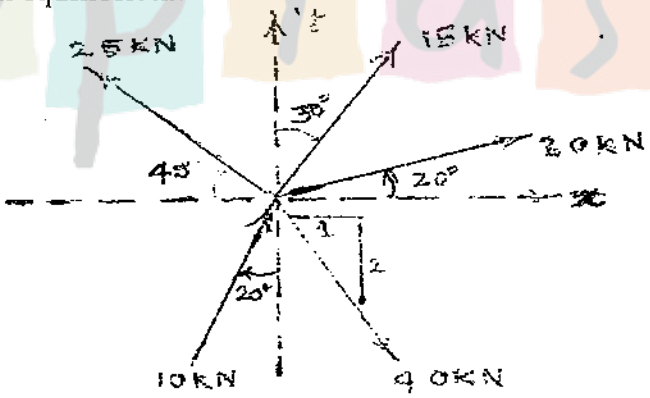

Fig.Q4(b)

5 a. State the conditions of equilibrium of coplanar non-concurrent forces. **(03 Marks)**
b. With the aid of a neat sketch explain 'Free body diagrams'. **(05 Marks)**
c. Two identical cylinders of diameter 200 mm and weight 500 N each are placed as shown in Fig.Q5(c). Determine the reactions at points A, B and C. **(12 Marks)**

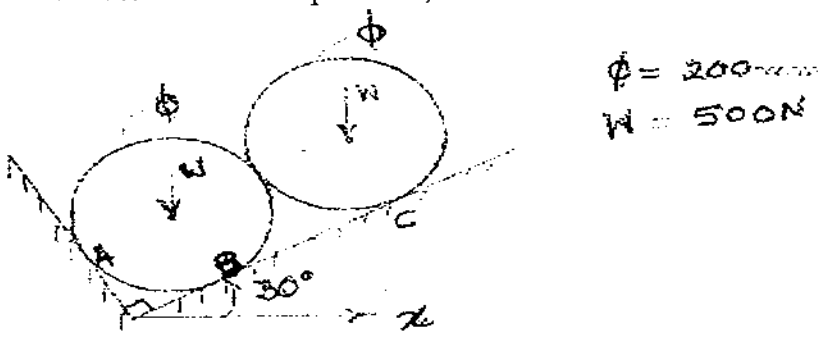

Fig.Q5(c)

6 a. A beam ABC is of length 12 m such that AB = 8 m and BC = 4 m, simply supported at A and B. The beam supports concentrated loads of magnitude 20 kN at 3 m from point 'A', 40 kN at point 'C', clockwise moment of 20 kNm at 5 m from 'A', and a udl of 20 kN/m over the entire span AB. Determine the reactions at supports A and B. **(08 Marks)**

b. Determine the coordinates of centroid of the composite reaction shown in Fig.Q6(b) with respect to the point 'P' shown in Fig.Q6(b). **(10 Marks)**

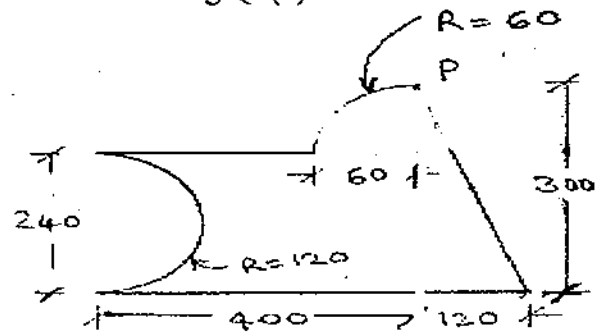


Fig.Q6(b)

All dimensions are in mm

c. Differentiate between center of gravity and centroid. **(02 Marks)**

7 a. State and prove perpendicular axis theorem. **(05 Marks)**

b. Determine the minimum radius of gyration of the section among x-x and y-y centroidal axes of the composite section shown in Fig.Q7(b). **(15 Marks)**

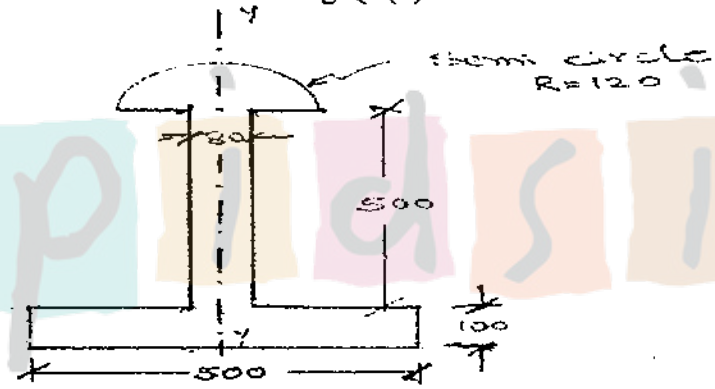


Fig.Q7(b)

All dimensions are in mm

8 a. A ladder of length 'l' rests on a wall which makes an angle of $45^0$ with the wall. Coefficient of friction between ladder and floor is 0.6, and coefficient of friction between ladder and wall is 0.4. Show that a man whose weight is the same as that of ladder may ascend a distance of 0.855 L before the ladder begins to slip. **(10 Marks)**

b. The force 'P' is applied to the 50 kg block when it is at rest. Determine magnitude and direction of the friction force exerted by the surface on the block if i) P = 0, ii) P = 200 N and iii) P = 250 N iv) What value of 'P' is required to initiate motion up the incline? The static and kinetic coefficients of friction between the block and the incline are $\mu_s = 0.25$ and $\mu_k = 0.2$ respectively. (Refer Fig.Q8(b)). **(10 Marks)**

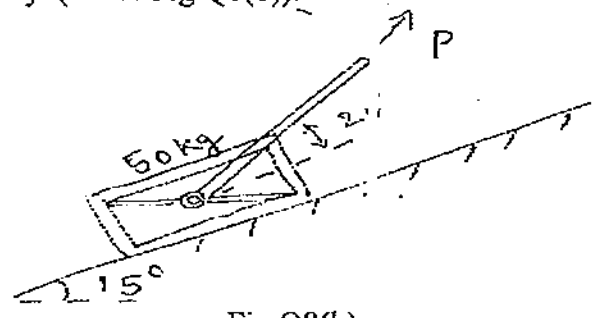


Fig.Q8(b)

*****