CBCS SCHEME

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21CIV14

First Semester B.E./B.Tech. Degree Examination, Feb./Mar. 2022
Elements of Civil Engineering and Mechanics

Time: 3 hrs.   Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Briefly explain the scopes of Branches :
      i)   Construction technology   ii) Water resources and Irrigation Engineering. **(10 Marks)**
   b. What are the roles of a Civil Engineer in Infrastructural development of a Country?
                                                                                      (05 Marks)
   c. What are the requirements of a good stone?   **(05 Marks)**

OR

2 a. How does GIS work? What are the different ways of using GIS in Business and everyday life?   **(10 Marks)**
   b. What are the requirements of a good Brick?   **(05 Marks)**
   c. What are advantages and disadvantages of wood?   **(05 Marks)**

Module-2

3 a. State and prove Varignon's theorem.   **(06 Marks)**
   b. Two forces acting on a body are 500N and 1000N as shown in Fig. Q3(b). Determine the third force F such that the resultant of all the three forces are 1000N directed at 45° to the X - axis.   **(06 Marks)**

Fig. Q3(b)
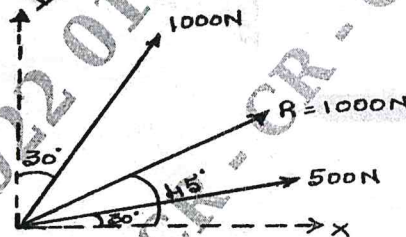
   c. A system of cables in equilibrium condition under two vertical loads of 300N and 500N as shown in Fig. Q3(c). Determine the forces developed in the different segments.   **(08 Marks)**
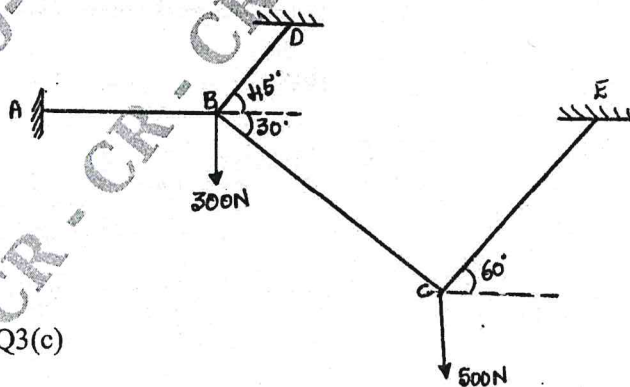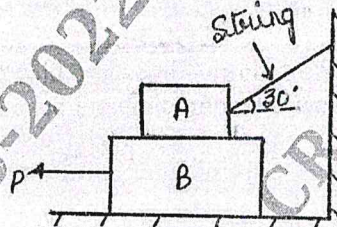

Fig. Q3(c)

OR

4 a. Briefly explain :
   i) Angle of friction   ii) Coefficient of friction   iii) Angle of repose.   **(06 Marks)**

   b. Find the force P first required to slide block B as shown in Fig. Q4(b). Find also the tension in the string. Take weight of block A = 500N , Weight of Block B = 1000N , $\mu = 0.2$ (for all contact surface).   **(06 Marks)**

Fig. Q4(b)

   c. Find the value of P so that the body will not impend down the plane as shown in Fig. Q4(c). Also find the value of P for the body to impend up the plane. Take $\mu = 0.3$.   **(08 Marks)**
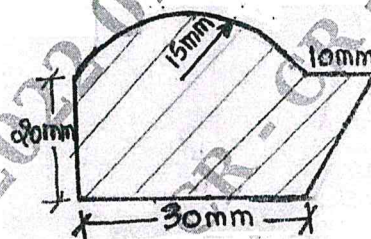
Fig. Q4(c)
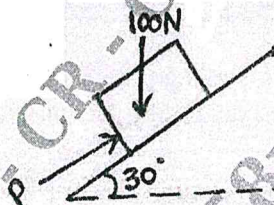
Module-3

5 a. Derive the expression for Centroid of a semi – circle from First principle.   **(08 Marks)**

   b. Determine the centroid of a shaded area of composite section as shown in Fig. Q5(b).   **(12 Marks)**
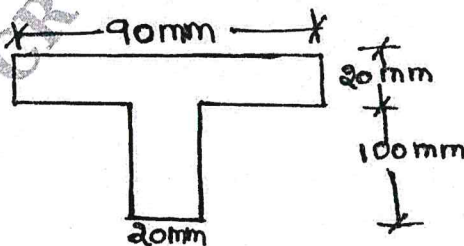
Fig. Q5(b)

OR

6 a. State and prove perpendicular axes theorem.   **(08 Marks)**

   b. Find the second moment of area as shown in Fig. Q6(b) about horizontal , vertical centroidal axis.   **(12 Marks)**
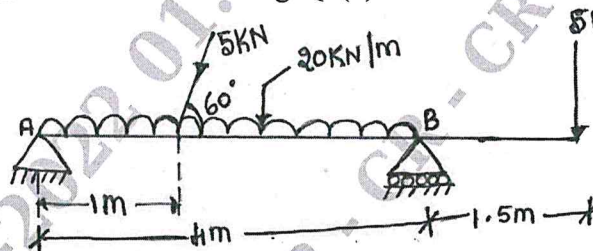
Fig. Q6(b)

Module-4

7 a. Explain different types of supports and loads with neat sketch. **(10 Marks)**

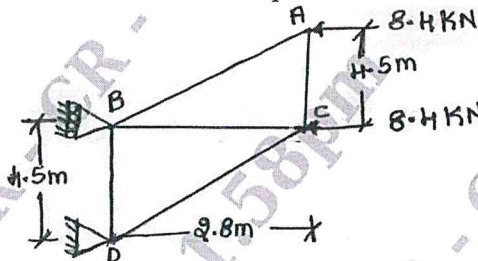b. Find the support reaction for the beam as shown in Fig. Q7(b). **(10 Marks)**

Fig. Q7(b)

OR

8 a. List the different types of Trusses. What are the assumptions made in the analysis of Trusses? **(10 Marks)**

b. Determine the force in each member of truss as shown in Fig. Q8(b) using method of joints. Also state whether each member is in tension or compression. **(10 Marks)**

Fig. Q8(b)

Module-5

9 a. What is Super Elevation? State the importance of Super Elevation. **(04 Marks)**

b. A Burglar's car starts with an acceleration of $2m/sec^2$. A police van came after 10 sec and continued to chase the Burglar's car with an uniform velocity of 40m/sec. Find the time taken by the police van to overtake the Burglar's car. **(08 Marks)**

c. A stone 'A' is dropped from top of a tower 50m height. At the same time another stone 'B' is thrown up from the foot of the tower with the velocity of 25m/sec. At what distance from the top and after how much time the two stones will cross each other. **(08 Marks)**

OR

10 a. State and explain D'Alembert's principle. **(04 Marks)**

b. The equation for the angle of rotation 'θ' is given by $\theta = 2t^3 - 5t^2 + 8t + 6$, where 't' is the time taken in seconds. Find i) The angular velocity ii) Angular acceleration of the body when t = 0 and t = 5 secs. **(08 Marks)**

c. A projectile is fired at certain angle with the horizontal has a horizontal range of 3.5km. If the maximum height reached is 500m, what is the angle of elevation of the Cannon? What was the Muzzle velocity of the projectile? **(08 Marks)**

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