VRK/KS/14/6557

Faculty of Engineering & Technology
Second Semester B.E. (C.B.S.) Examination
ENGINEERING MECHANICS
Paper—4

Time—Two Hours] [Maximum Marks—40

INSTRUCTIONS TO CANDIDATES

(1) All questions carry marks as indicated.

(2) Answer **ALL** questions.

1. (a) State and explain Varignon's Theorem. 3

(b) Find :

(i) Component of Force P along Force Q and

(ii) Moment of P about Origin.

Force $\vec{P} = 3i - 2j + 4k$

Force $\vec{Q} = 7i - 4j - 8k$. 7

OR

2. (a) State Static Equilibrium Conditions of 3-D Non concurrent Force System. 3

(b) Find Resultant and its location of the Force System, shown in Fig. -1. The grid is 1 Unit each along X and Y axes.

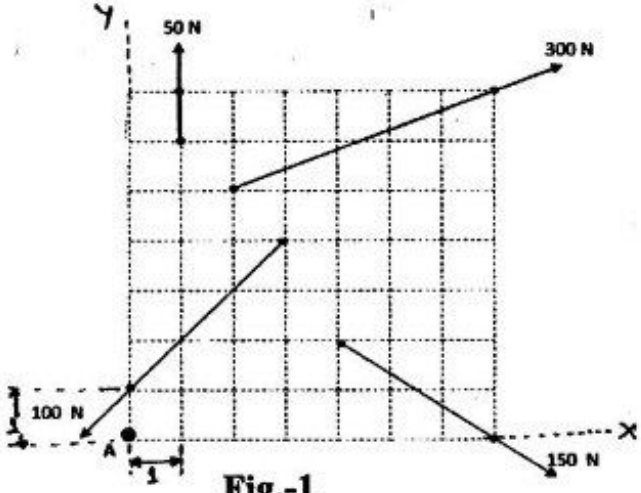

Fig.-1 7

3. (a) Define Free Body Diagram. 3

(b) A uniform wheel weighing 200 kN and of 600 mm diameter rests against 150 mm thick rigid block as shown in Fig. 2. Find minimum P required to Pull the wheel over the block.

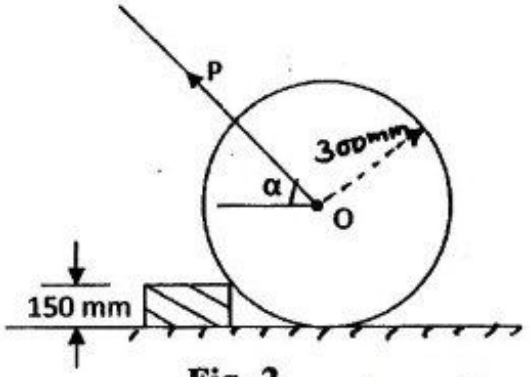

Fig.-2 7

OR

4. (a) A rope is looped over two fixed wheels each diameter 2m, as shown in Fig. 3. If $\mu = 0.25$. Determine the maximum and minimum values of P that will prevent motion of W.

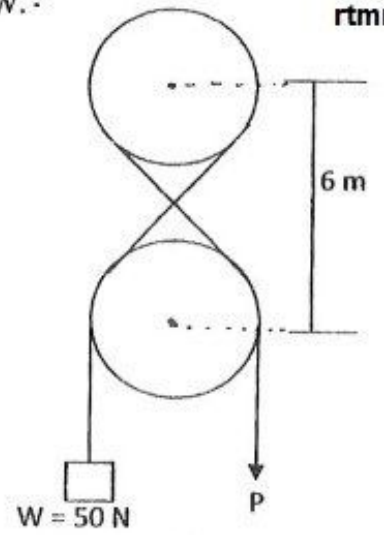

Fig.-3 5

(b) Find the force in the Truss members shown in Fig. 4.

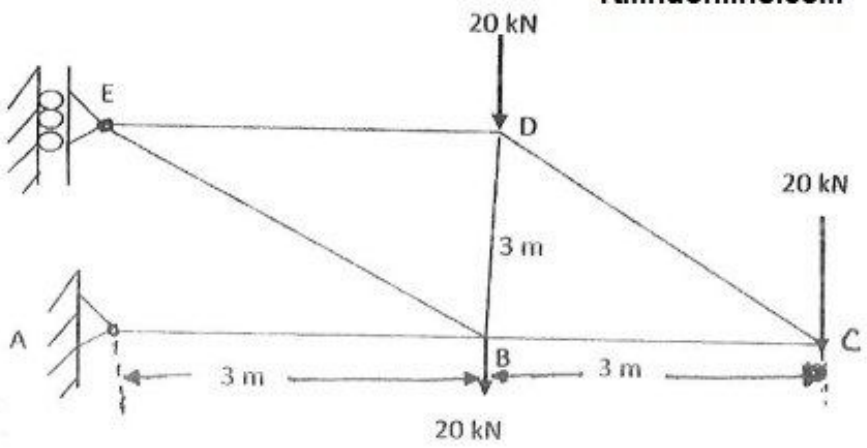

Fig.-4 5

5. (a) State and explain the principle of virtual work. 3

(b) Determine Centroid wrt X and Y axes of the Figure-5. Given below :

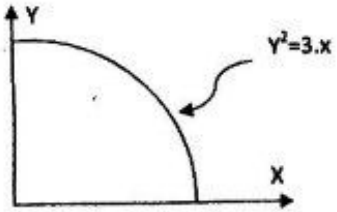

Fig.-5 7

OR

6. (a) Determine MI wrt X and Y axes of the Figure-6. Given below :

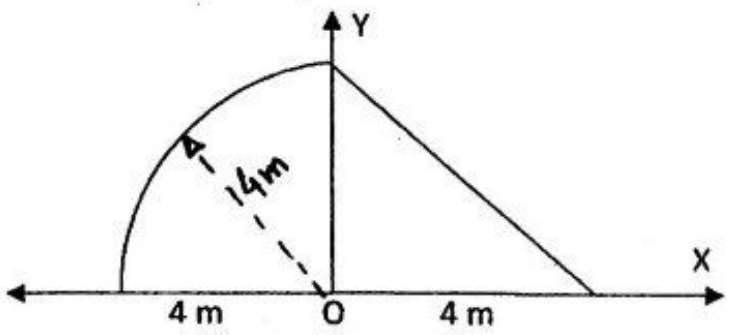

Fig.-6 4

(b) The System consisting of two equal bars and a Block C, is held in equilibrium by force P. The weight of each bar is 100 N. Using Virtual Work method find

the value of P to maintain the system in equilibrium. Refer Fig. 7

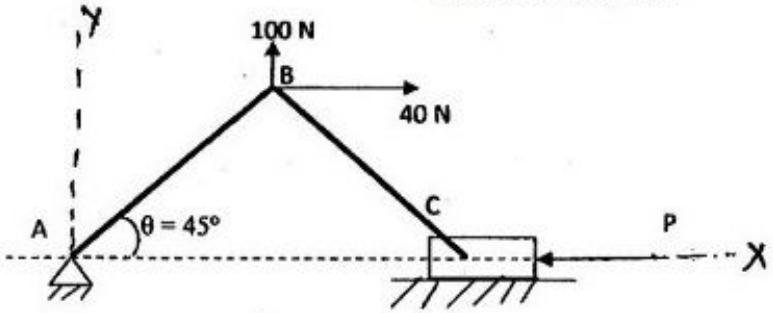

Fig.-7 6

7. (a) Determine the acceleration of the bodies, Coefficient of Kinetic friction is 0.20 and Coefficient of static friction is 0.25, at all the contact surfaces. Body A weight 200 and B weighs 300 N.

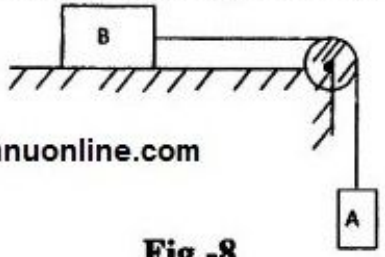

Fig.-8 5

(b) As shown in Fig. 9. The initial velocity of Block A is 2.4 m/sec. Find velocity after 5 sec. Coefficient of friction is 0.3 .

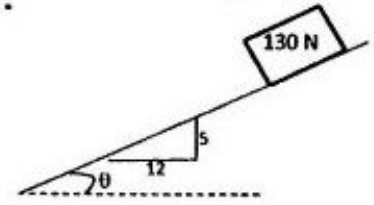

Fig.-9 5

OR

8. (a) Define coefficient of restitution. 2

(b) The 50 N Block A has velocity 3 m/s when it strikes 100 N ball B. If coefficient of restitution is 0.8, find the position of block A, Maximum and Minimum tension in the string, Fig.-10. The coefficient of friction between the block and the surface is 0.2.

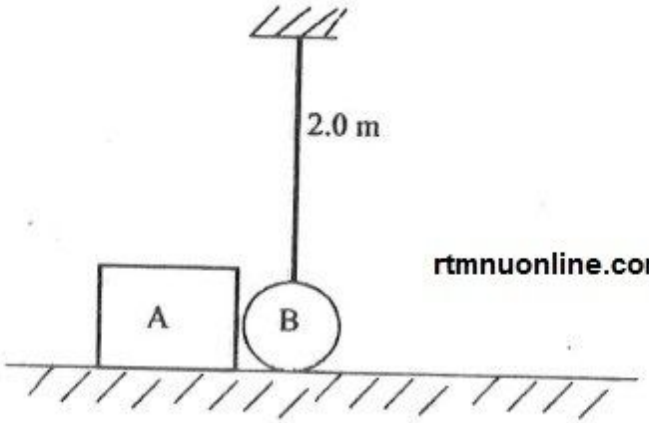

Fig.-10 8