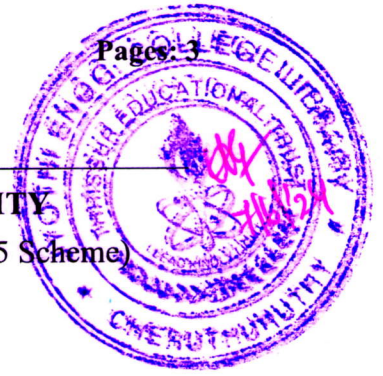


Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S1 (S,FE) S2 (S,FE) Examination May 2024 (2015 Scheme)

**Course Code: BE 100****Course Name: ENGINEERING MECHANICS**

Max. Marks: 100

Duration: 3 Hours

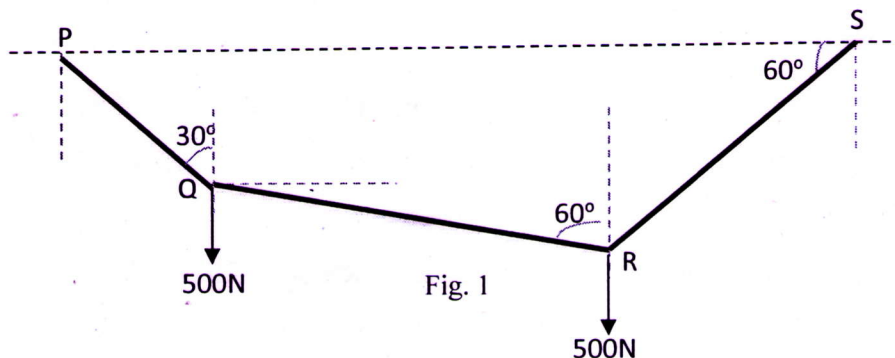
PART A*Answer all questions, each carries 5 marks*

Marks

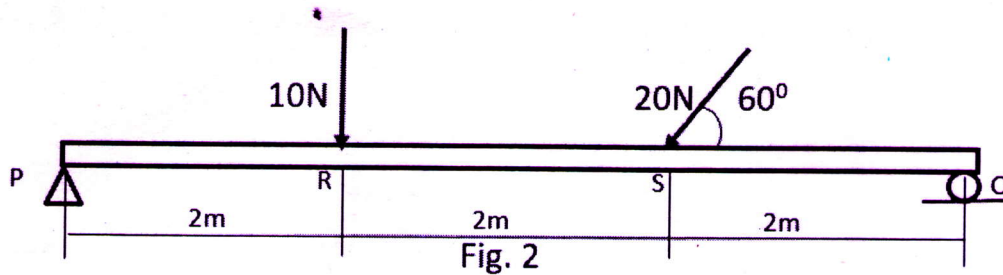
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|---|---|-----|
| 1 | State and explain the Principle of transmissibility of forces in mechanics | (5) |
| 2 | With two examples, explain the concept of free body diagram | (5) |
| 3 | State and explain perpendicular axis theorem | (5) |
| 4 | List any five laws of dry friction | (5) |
| 5 | With sketches, explain the concept of instantaneous centre method of rotation | (5) |
| 6 | State and explain D'Alembert's principle | (5) |
| 7 | List and explain different types of mechanical vibration | (5) |
| 8 | Derive the expression for the acceleration of particle executing SHM | (5) |

PART B*Answer any 2 questions from each SET, each question carries 10 marks.***SET I**

- 9 Find the magnitude of the two forces P and Q, such that if they act at right angles, their resultant is $\sqrt{10}$ N. But if they act at 60° , their resultant is $\sqrt{13}$ N. (10)
- 10 A string PQRS is attached to two fixed points P and S has 2 equal weights of 500N attached to it at Q and R. The weights rest with the portions PQ and RS, inclined at angles of 30° and 60° respectively to the vertical as shown in Fig. 1. Find the tension in the portions PQ, QR and RS of the string, if the inclination of the portion QR with the vertical is 120° . (10)



- 11 A beam 6m long is loaded as shown in Fig. 2. Calculate the reactions at P and Q (10)



SET II

- 12 Find the moment of inertia about the centroidal axis X-X axis of the I section as shown in Fig. 3 . All dimensions in mm. (10)

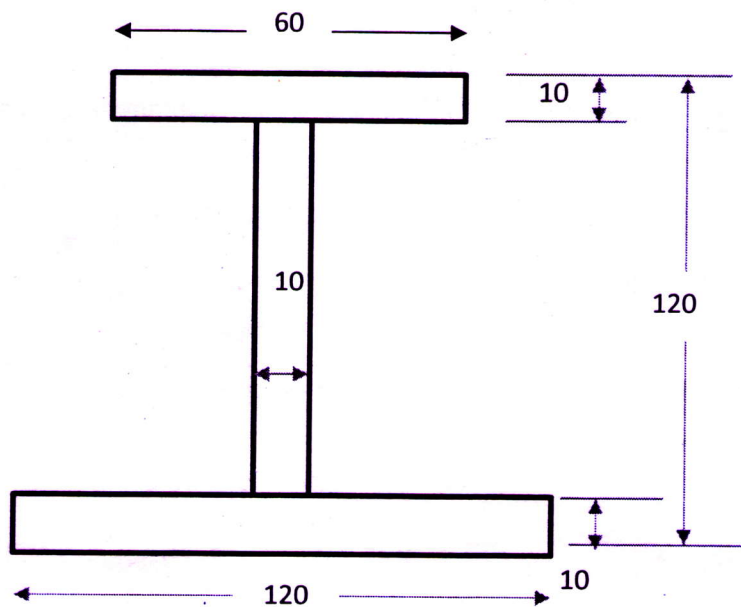


Fig. 3

- 13 a) State and explain Pappus-Guldinus theorem 1 (3)
 b) A ladder 5m long and weighing 300N, rests on a horizontal plane and leans against a smooth vertical wall at an angle of 70° with the horizontal. The ladder is about to slide when a man weighing 750N stands at 1.5 m length from bottom of the ladder. Calculate the coefficient of friction between ladder and floor. (7)
- 14 a) Prove that angle of repose is equal to angle of friction (5)
 b) A beam EF of span 10 m is carrying a point load of 20 N at its centre G. Determine the reactions at the supports, by using principle of virtual work. (5)

SET III

- 15 Three links are hinged together to form a triangle as shown in Fig.4. At a certain instant, the point R is moving towards the mid-point of ST with a velocity of 5 m/s and S is moving at a perpendicular direction of RT. Find the velocity of T. (10)

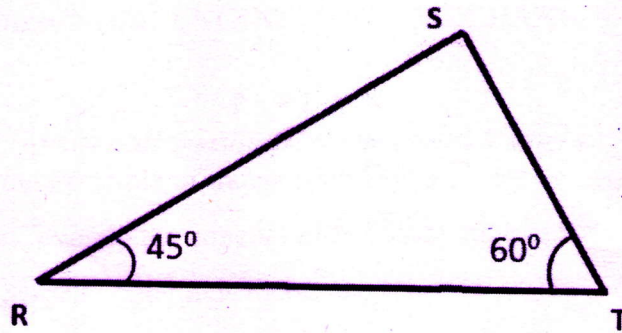


Fig. 4

- 16 An elevator has an upward acceleration of 1 m/s^2 . What pressure will be transmitted to the floor of the elevator by a man weighting 600 N sliding in the elevator? What pressure will be transmitted if the elevator has a downward acceleration of 2 m/s^2 ? (10)
- 17 A body moving with SHM, has an amplitude of 1m and period of oscillation is 2 sec. Find the velocity and acceleration of the body at $t = 0.4\text{ sec}$, when time is measured from (i) the mean position and (ii) the extreme position. (10)
