

--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--	--

VASAVI COLLEGE OF ENGINEERING (Autonomous), HYDERABAD
B.E. (CBCS) III-Semester Main Examinations, December-2017
Bridge Course: Mechanics for Engineers
 (Common to Civil, EEE & Mech. Engg.)

Time: 3 hours

Max. Marks: 50

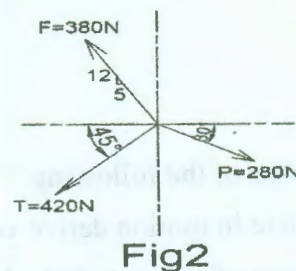
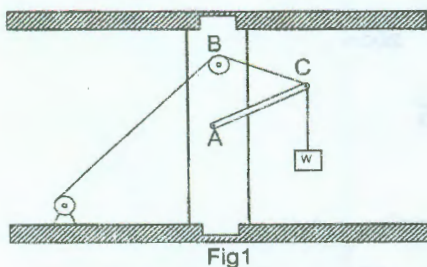
Note: Answer ALL questions in Part-A and any FIVE from Part-B

Part-A (15 Marks)

1. What is Engineering Mechanics? [1]
2. Define Friction. [1]
3. What is a position vector? [1]
4. For a rectilinear translation, positive x direction is taken along which direction? [1]
5. What is the simplest thought you get to quote a task, as an example of work done. [1]
6. What is principle of transmissibility? [2]
7. Draw the variation of frictional resistance with respect to applied force. [2]
8. What are the components of acceleration for a particle in curvilinear motion? What are their directions? [2]
9. What is the necessary condition to consider a body as particle in analyzing its motion? [2]
10. Why is using of work energy relations are easier way to analyze system of forces wherein there is a variation of internal forces? [2]

Part-B (5 × 7 = 35 Marks)

11. a) Abbreviate FBD with respect to engineering mechanics. Explain with a neat sketch how to construct FBD for a given system of forces as shown in Fig1 [3]
- b) Determine X and Y components of the system shown in Fig 2 [4]



12. a) State laws of friction [3]
- b) A 200N block is in contact with a plane inclined at 25° to the horizontal plane. A force P , parallel to acting up the plane, is applied to the body. If the coefficient of friction is 0.20 find the value of P to just prevent motion down the plane. [4]
13. a) What is Hodograph? Explain its construction. [3]
- b) A projectile is fired from the top of a cliff 100m high with a velocity of 400m/s directed at 40° find the range on a horizontal plane through the base of the cliff. [4]
14. a) For a curvilinear motion and if the coordinate system adopted in defining motion is Polar, In which directions acceleration components are derived. [1]

- b) A rod ABC rotating at 20rpm about a vertical axis through A, supports a 900N ball at its lower end as shown in Fig 3. It is fixed in the position by the rod BD. Neglecting the weights of rods AC and BD compute the force F in the rod BD. Is the force tensile or compressive? At what rpm will this force be zero? [6]

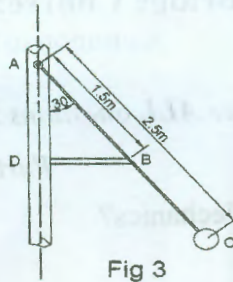


Fig 3

15. a) When equation of force is integrated directly with respect to time, the resultant equations are? [2]

- b) As shown in Fig 4, a 400N body moves along two inclines for which coefficient of friction is 0.20. If the body starts from the rest at A and slides 60m down the incline, how far will then move along other incline? What will be its velocity when it return to B? [5]

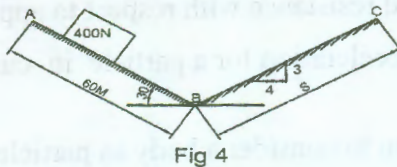


Fig 4

16. a) What is cone of friction explain with a neat sketch [2]
 b) Determine the magnitude and direction of resultant for the coplanar concurrent system shown in Fig. 5 [5]

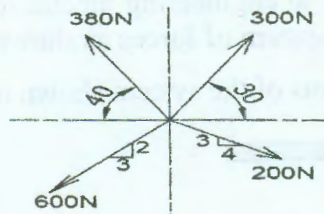


Fig 5

17. Answer any *two* of the following:

- a) For a particle in motion derive velocity and acceleration relations. [3.5]
 b) In the system of connected blocks shown in Fig 6 coefficient of kinetic friction under blocks A and C is 0.2. Compute the acceleration of each block and the tension in the connecting cable. Pulleys are assumed to be frictionless and of negligible weight. [3.5]

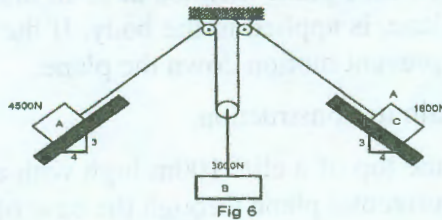


Fig 6

- c) Derive the following equation pertinent to work-energy [3.5]

$$\int_0^s \sum X (ds) = \frac{W}{g} (v^2 - v_0^2)$$

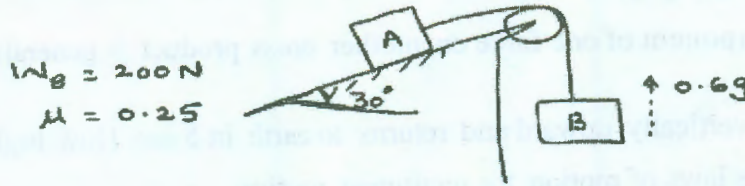
§§§§§

13. a) A ball is thrown vertically into the air at 15 m/s after 5 seconds another ball thrown vertically what should be its velocity if it reaches first ball 30m from the ground (Assume any data required suitably). [2]

b) A ball is thrown so that it strikes the incline ground 70m. If the ball reaches a maximum height of 17.5m above the point of release. Determine its initial velocity and inclination. [5]

14. a) Define the term 'Kinetics'. [2]

b) In the system of connected bodies shown, the pulleys are of negligible weight and frictionless. Determine the weight of A, the block B have an upward acceleration of $0.6g$. [5]



15. a) Write short note on work energy theorem. [2]

b) Show that work done by the rigid body is equal to change in kinetic energy of the system. [5]

16. a) Given the vectors $a=2i-3j-4k$, $b=4i+2j+k$ and $c=3i-j-2k$, evaluate $(a \times b) \times (a \times c)$. [3]

b) A 500 N block rests on inclined of 45° ground having coefficient of static friction as 0.25. Compute the value of horizontal force P necessary to just start the block upwards. [4]

17. Write short notes on any *two* of the following:

a) Projectile motion [3½]

b) Resultant force and inertial force with respect to dynamics. [3½]

c) Instantaneous centre in the plane motion. [3½]

§§§§§

