TRIBHUVAN UNIVERSITY
INSTITUTE OF ENGINEERING
Examination Control Division

2078 Kartik

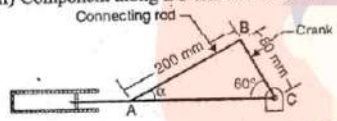
Exam.	Back		
Level	BE	Full Marks	80
Programme	BEL, BEX, BEI, BCT, BAM, BIE, BAG, BAR, BAS	Pass Marks	32
Year / Part	I / I	Time	3 hrs.

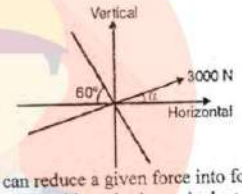
Subject: - Applied Mechanics *(CE 401)*

- ✓ Candidates are required to give their answers in their own words as far as practicable.
- ✓ *Attempt **All** questions.*
- ✓ *The figures in the margin indicate **Full Marks**.*
- ✓ *Assume suitable data if necessary.*

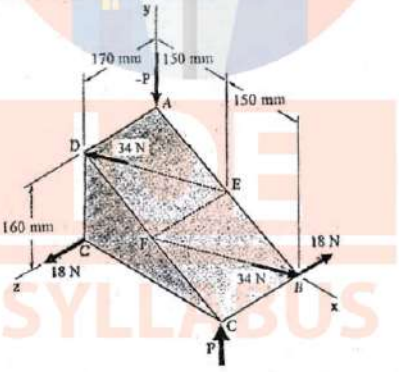
1. What do you mean by Mechanics? Explain the principle of mechanics. [3]

2. Figure below shows a particular position of 200mm connecting rod AB and 80mm long crank BC. At this position, the connecting rod of the engine experience a force of 3000N on the crank pin at B. Find its [3+3]
   (i) Horizontal and vertical component.
   (ii) Component along BC and normal to it.

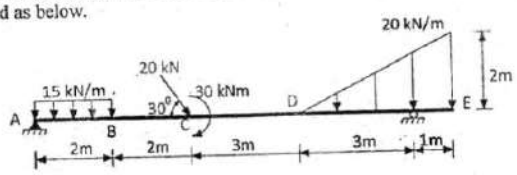




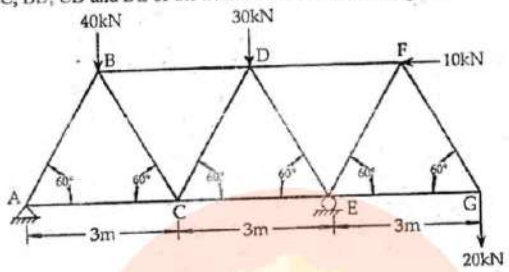
3. Prove that couple is a free vector. Explain how we can reduce a given force into force and couple at a point. If P=20N, replace the three couples with a single equivalent couple, specifying its magnitude and the direction of its axis. [3+3+8]



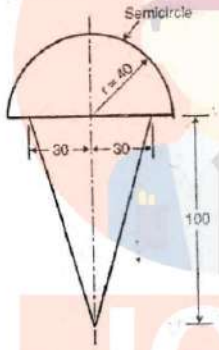
4. Deduce the relationship between load, shear force and bending moment of the beam section loaded uniformly with intensity of load w. Draw AFD, SFD and BMD for the beam loaded as below. [4+9]



5. Explain the use of truss in engineering approach. Determine the force developed in the members BC, BD, CD and DE of the truss loaded as shown in figure. [2+6]

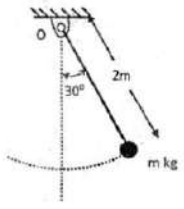


6. Define centroid and radius of gyration with examples. Find the moment of inertia of the given section about centroidal axes. [4+8]



All dimension are in mm

7. Define friction, static and kinetic friction. Also explain about impending motion. [4]
8. Determine motion of particle when acceleration is given function of position. A ball is thrown vertically upload from 20m level in an elevator shift with velocity of 20m/s. After 1 sec, an open platform elevator passes the 5m level, moving upward with constant velocity 2m/s. Calculate when & where ball hits the elevator. [4+6]
9. The bob of 3m pendulum describes an arc of circle in a vertical plane. If the tension in the cord is 2 times the weight of bob of the position shown, find the velocity and acceleration of the bob in that position. Define impulse momentum principle and dynamic equilibrium. [6+2+2]



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