GIET UNIVERSITY, GUNUPUR – 765022

B. Tech (Second Semester – Regular) Examinations, September – 2021

BESBS1031 – Elements of Mechanical Engineering

(C.S.E)

Time: 2 hrs   Maximum: 50 Marks

Answer ALL Questions
The figures in the right hand margin indicate marks.

PART – A: (Multiple Choice Questions)   **(1 x 10 = 10 Marks)**

Q.1. Answer *ALL* questions   [CO#]   [PO#]

a. The forces, whose lines of action are parallel to each other and act in the same directions,   CO1   PO1
are known as _____.
   (i)   Coplanar concurrent forces   (ii) Coplanar non-concurrent forces
   (ii)   Like parallel forces   (iii)   Unlike parallel forces

b. Which of the following is not a vector quantity ____.   CO1   PO1
   (i)   weight   (ii)   velocity
   (iii)   acceleration   (iv)   force

c. A ____ is a single force which can replace two or more forces and produce the same   CO1   PO1
effect on the body as the forces.
   (i) tensile force   (ii) compressive force
   (iii) Resultant force   (iv) none of these

d. A number of forces acting at a point will be in equilibrium if   CO1   PO1
   (i) their total sum is zero   (ii) two resolved parts in two directions at
                                               right angles are equal
   (iii) sum of resolved parts in any two   (iv) all of them are inclined equally
   perpendicular directions are both zero

e. If a perfect truss has J points, then the number of members are _____ .   CO2   PO1
   (i) 2J   (ii) 2J – 3
   (iv)   2J – 4   (v)   none of these

f. Which axial force is determined while analysing a truss?   CO2   PO1
   (i) compressive force   (ii) tensile force
   (iii) both i and ii.   (iv) none of the above

g. Static friction is always _____ dynamic friction.   CO2   PO1
   (i) equal to   (ii) less than
   (iii) greater than   (iv) none of these

h. General gas equation is........   CO3   PO1
   (i) $PV = nRT$ (ii) $PV = mRT$
   (iii) $PV^n = C$ (iv) $C_p - C_v = R/J$

i. What is value of Cp/CV for air CO3   PO1
   (i)   1   (ii)   1.2
   (iii)   1.4   (iv)   2

j. Which of the following branch is not a parts of robotics?   CO4   PO1
   (i) Computer Engineering   (ii) Mechanical Engineering
   (iii) Electrical Engineering   (iv) Chemical Engineering

PART – B: (Short Answer Questions)   **(2 x 5 = 10 Marks)**

   a.   What is the free body diagram? Explain it with a suitable example.   CO1   PO1

   b.   Establish the relationship between angle of friction and angle of repose   CO2   PO1

   c.   Differentiate between plane truss and space truss.   CO2   PO1

   d.   The temperature of a system is increased by 27^0 C. what are the corresponding values in   CO3   PO2
        ^{0}F and K scale.

   e.   Define 'Degree of Freedom".   CO4   PO1

**PART – C: (Long Answer Questions)**   **(6 x 5 = 30 Marks)**

Answer *ANY FIVE* questions   Marks   [CO#]   [PO#]

   3.   Find the magnitude of two forces such that if they act at right angle their resultant   (6)   CO1   PO2
        is $\sqrt{10}$ KN, While they act at an angle of 60°, their resultant is $\sqrt{13}$ KN.

   4.   An Electric light fixture weighing 15N hangs from a point C, by two strings AC   (6)   CO1   PO2
        and BC. AC is inclined at 60^0 to the horizontal and BC at 45^0 to the vertical as
        shown in figure , Determine the forces in the strings AC and BC
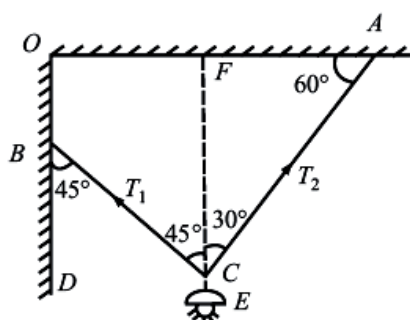
   5.   Find the centroid of a 100 mm × 150 mm × 30 mm T-section.   (6)   CO1   PO2
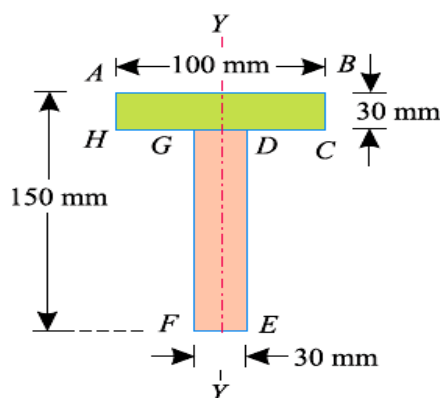
   6.   Determine the reaction and the forces in each member of a simple triangle truss   (6)   CO2   PO2
        supporting two loads as shown in figure
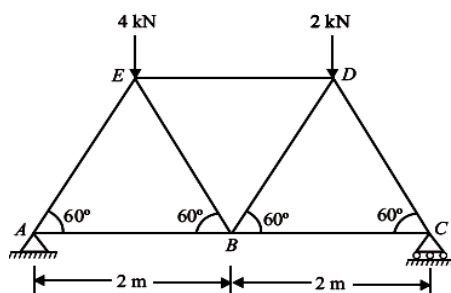
7. Convert the following reading of pressure to Kpa assuming that the Barometers reading in 760 mm of Hg   (6)   CO3   PO2

    a) 40 cm of HG vacuum

    b) 1.2 met of H_2O gauge

8. A mass of gas is compressed in a quasi-static process from 80 kPa, 0.1 m^3 to 0.4MPa, 0.03 m^3. Assuming that the pressure and volume are related by PV^n = constant, find the work done by the gas system.   (6)   CO3   PO2

9. How robots are classified? Explain briefly with suitable figures   (6)   CO4   PO1

10. What are the benefits of FMS and explain the need of FMS in modern manufacturing environment?   (6)   CO4   PO1

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