Registration No :

Total Number of Pages : 02

B.Arch
AS223

2ⁿᵈ Semester Back Examination 2018-19
MECHANICS - II
BRANCH : B.Arch
Time : 3 Hours
Max Marks : 70
**Q.CODE : F352**
Answer Question No.1 which is compulsory and any FIVE from the rest.
The figures in the right hand margin indicate marks.

Q1   Answer the following questions :   **(2 x 10)**
  a)   State Hooke's law.
  b)   Define virtual work.
  c)   Write difference between stable and unstable equilibrium.
  d)   Sate Parallel axis theorem.
  e)   Define Principal axes and principal moment of inertia.
  f)   State curvilinear motion with example.
  g)   What is the path of a trajectory of a projectile?
  h)   Write the relation between moment of a force and angular momentum.
  i)   Define Poisson's ratio.
  j)   What do you mean by compound pendulum.

Q2 a) Using the method of virtual work, determine the force in top member of the following truss consisting of equilateral triangles.   **(5)**
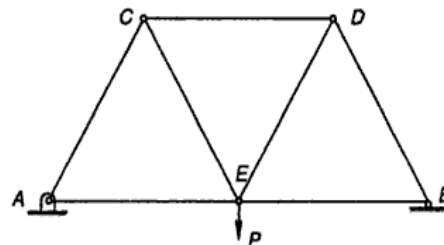
  b) State and explain the principle of virtual work with examples.   **(5)**

Q3 a) A thin circular ring of mass 100 kg and radius 2 m resting on a smooth surface is subjected to a sudden application of a force of 300 N at a point on the periphery. Calculate the angular acceleration of the ring and the mass center.   **(5)**

  b) A projectile is fired with an initial velocity of 150 m/s and angle of projection 45° to horizontal from the roof of the building. The height of the roof is 150 m from ground level. Determine the range of the projectile.   **(5)**

Q4 a) A 2 kg ball is suspended by inextensible string from a ceiling to comprise a pendulum of length 3 m. The ball is released from a position where the string makes an angle 45° with vertical. Determine the velocity of the ball when the string makes an angle 30° with the vertical and when it is at bottom position.   **(5)**

  b) Determine the moment of inertia of a triangular section having base 100 mm and height 40mm about its centroidal axis and about the base.   **(5)**

Q5 **a)** Determine the force required to punch a 15mm hole in a mild steel plate of 5 mm thick. The ultimate shear stress of the plate is 500 N/mm^2. **(5)**

b) State and prove the principle conservation of energy. **(5)**

Q6 Determine the moment of inertia of the I-section about the centroidal axis parallel to flange: **(10)**
Top flange = 10cm✗ 1 cm ; Bottom flange = 20cm✗ 1 cm;
web= 10cm✗ 1 cm

Q7 A rectangular element in a strained material is subjected to tensile stresses of 120 N/mm^2 and 60 N/mm^2 on mutually planes together with shear stress of 70 N/mm^2. Determine the principal stresses, principal planes and maximum shear stress in the block. **(10)**

Q8 **Write short answer on any TWO :** **(5 x 2)**
a) Equilibrium of Ideal Systems
b) Mohr's stress Circle
c) Moment of Momentum