| BAR-014 |

BACHELOR OF ARCHITECTURE

00171

Term-End Examination

December, 2010

BAR-014 : THEORY OF STRUCTURES – II

Time : 3 hours   *Maximum Marks : 70*

Note :   (i)   *Question No. 1 is compulsory.*

(ii)   *Answer **any four** questions from the remaining questions.*

(iii)   *Use of calculator is **permitted**.*

1.   Choose the most appropriate answer from the options given for questions (a) to (g).   **7x2=14**

   (a)   For large span, suitable system is :

       (i)   R.C.C. beam.

       (ii)   Steel girder.

       (iii)   Steel truss.

       (iv)   Arch.

   (b)   Hooke's law is valid upto :

       (i)   Limit of proportionality.

       (ii)   Elastic limit.

       (iii)   Yield point.

       (iv)   Ultimate point.

(c) Centre of gravity of composite section is located using :

(i) Moment principal.

(ii) Principle of superposition.

(iii) Principle of transmissibility of forces.

(iv) Parallelogram law of forces.

(d) If all the dimensions of a prismatic bar are doubled, then the maximum stress produced in it under its own weight will :

(i) decrease

(ii) remain unchanged

(iii) increase to two times

(iv) increase to four times

(e) If the resultant of two forces has the same magnitude as either of the force, then the angle between the two forces is :

(i) 30°

(ii) 45°

(iii) 60°

(iv) 120°

(f) The centroid of a semicircular lamina of radius 'r' from the diameter is :

(i) $\dfrac{3r}{2\pi}$

(ii) $\dfrac{4r}{3\pi}$

(iii) $\dfrac{2r}{3\pi}$

(iv) $\dfrac{3r}{4\pi}$

(g) Moment of inertia of a rectangular plane area of width 'b' and depth 'd' about its base is :

(i) $\dfrac{bd^3}{12}$

(ii) $\dfrac{db^3}{12}$

(iii) $\dfrac{bd^3}{3}$

(iv) $\dfrac{bd^3}{36}$

2. Determine the position of the centroid of the plane   14
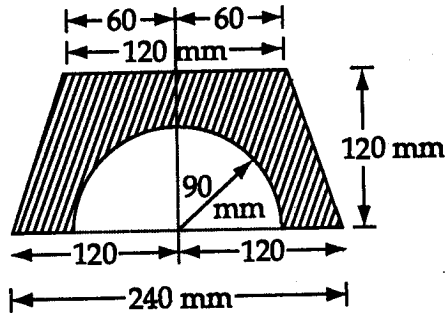   figure shown in Figure 1.

Figure 1

3. Find the moment of inertia of the shaded area   14
   shown in Figure 2, about the base BC and also
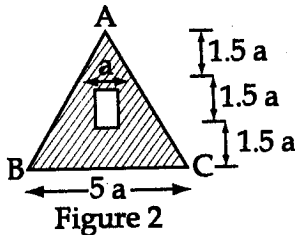   about the centroidal axis parallel to the base.

Figure 2

4. (a) Discuss how bearing wall systems transfer   7
       gravity loads. In what way it differs from
       that for rigid frames ?

   (b) What are the advantages of an arch in   7
       comparison to a beam ? Discuss their load
       bearing mechanisms.

5. Describe the following material properties with suitable examples. **4x3½=14**

 (a) Toughness.

 (b) Malleability.

 (c) Plasticity.

 (d) Ductility.

6. (a) A steel bar of variable section is subjected   7
     to forces as shown in Figure 3. Taking
     $E = 205$ kN/m², determine the total
     elongation of the bar.

45 kN 30 mm dia   20 35 30 mm kN kN   30 mm dia   55 kN

|←1 m→|←1.2 m→|←1 m→|

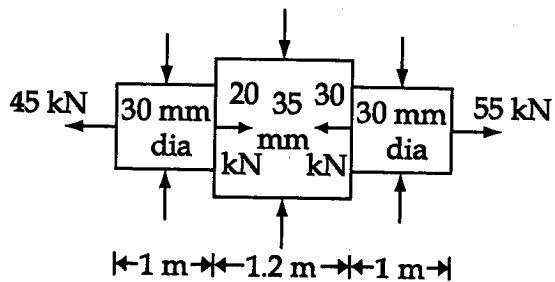Figure 3

(b)   Find the resultant for the concurrent   7
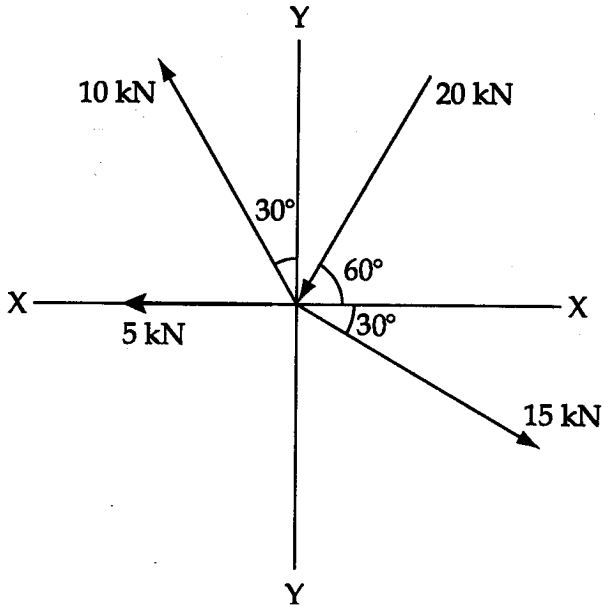coplaner force system shown in Figure 4.

Figure 4

7.   Write short note on *any two* of the following : 2x7=14

(i)   Simple geometrical forms and their structural behaviour.

(ii)   Parallel axis theorem and Polar moment of inertia.

(iii)   Method of projections and method of moments.