Seat No. : _____

NL-120

November-2013

F.Y. B.Arch., (Sem.-I) (New)

AR-104 : Structures-1

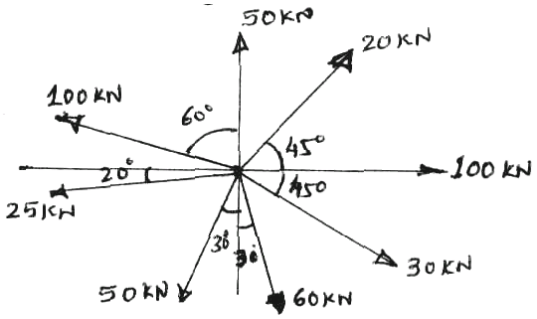
Time : 3 Hours] **[Max. Marks : 50**

1. (a) Define : (Any **Five**) **5**
   - (a) Concurrent forces
   - (b) Non Coplanar forces
   - (c) Force
   - (d) Equilibrium
   - (e) Parallel forces
   - (f) Moment

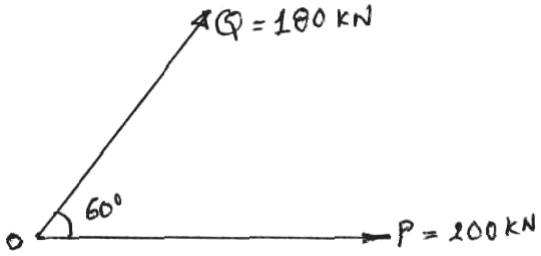
   (b) State and prove Law of Parallelogram of forces. **5**

2. (a) State Lami's Theorem. **1**

   (b) Find out magnitude and direction of the Resultant force for given Force system as shown in figure. **5**



   (c) Find out Resultant for given force system with its direction using Law of Parallelogram. **4**



   Also, determine magnitude and direction for following cases :

   (i) If P = Q = 175 kN (ii) if $\theta = 90°$

3. (a) Enlist and explain various types of loads that acts on a structure. **3**

   (b) Explain couple and enlist characteristics of couple. **3**

(c) Choose correct answer from given options. **4**

(i) Under the action of a Couple, the body will have a motion of _____

(a) Translation (b) Rotation (c) Plane motion

(ii) When some portion of the body is isolated with the forces acting on it, to study its equilibrium, it is called _____ diagram.

(a) Force (b) Space (c) Free body (d) Polar

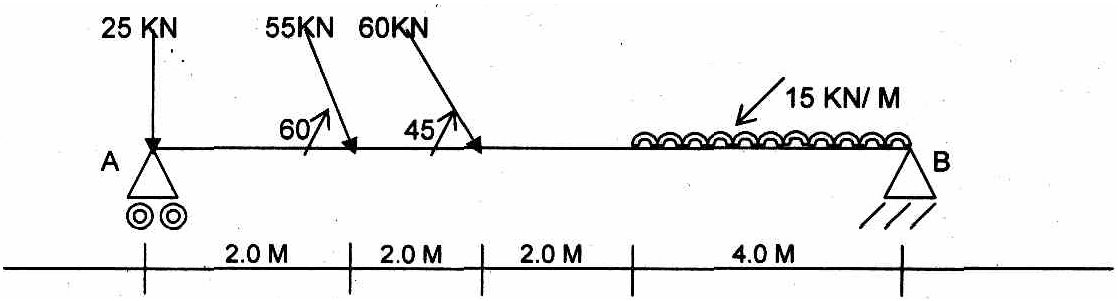
(iii) Forces acting along the same line are called _____

(a) Collinear (b) Parallel (c) Skew

(iv) A Roller support can develop _____ reaction component.

(a) Zero (b) One (c) Two (d) Three

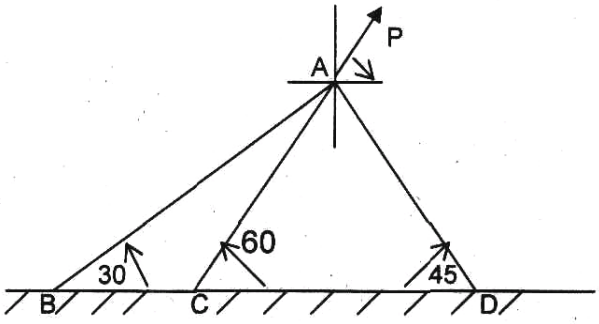
4. (a) Determine support reactions for a beam shown in figure. **6**



(b) Enlist types of supports and their reactions. **3**

(c) State and explain Law of polygon of forces. **1**

5. (a) Three ropes are tied together at 'A'. If maximum permissible Tension in rope AB = 200 kN, AC = 300 kN, AD = 150 kN. Find Maximum force 'P' that can be applied and in what direction for System in equilibrium. **5**



(b) Find forces in string PQ, QR and RS for the system shown in figure, **5**