

**CENTRAL PUBLIC WORKS DEPARTMENT**  
**DEPARTMENTAL EXAMINATION FOR AEE (CIVIL)**

**OCTOBER – 2020**

**Civil Engineering Paper-II**

**(With Books)**

**Time: 3 hours**

**Maximum Marks: 100**

**Attempt all questions**

1. Define following terms related to surveying and their practical applicability:  
(i) Plain surveying (ii) Geodetic surveying (iii) Chain and Compass survey (iv) Theodolite survey  
(v) Levelling Survey (vi) Photogrammetric survey (vii) EDM (Total Station) Survey (viii) LiDAR Survey  
(8x1.25)
2. (i) Draw a typical cross section of hilly road with side hill cut and box cut showing various elements.  
(ii) Find out the radius of an existing curve of highway with following data: Length of any chord = 50m, mid offset from existing centreline = 3m.  
(2x5)
3. Define following terms related to bearing capacity of soil and state which value of these terms are used for foundation design of structures:  
(i) Ultimate bearing capacity (ii) Net bearing capacity (iii) Net safe bearing capacity (iv) Gross safe bearing capacity (v) Net safe settlement pressure (vi) Net allowable bearing pressure  
(1.5X5+2.5)
4. Workout the redistribution of base pressure when negative pressure is indicated due to effect of axial load and bending moment on a footing. Data: (i) Column load = 1000 KN (ii) Moment on column = 900 KN-M (iii) Footing size = 3.4 mX3.4m (iv) Depth of footing = 1.5m (v) Thickness of footing at edge = 250mm (vi) Thickness footing at face of pedestal = 650mm (vii) Density of soil = 19.2 KN/m<sup>3</sup> (viii) Density of concrete = 25 KN/ m<sup>3</sup>.  
(10)
5. Elaborate the type of foundations provided in the civil engineering structures and their applicability situations. Are raft and pile foundations designed for lateral forces? What type of foundations are adopted for expansive soils?  
(4+3+3)

6. Calculate the overturning stability of linear 3m high compound wall with and without footing having 0.25m thick brick wall with intermediate brick pillars of size 0.5mX0.5m @ 3m c/c laid over 1 m wide and 0.25m thick CC footing. Adopt maximum wind pressure of  $1.5\text{KN/m}^2$ , density of concrete  $24\text{ KN/ m}^3$  and density of brick masonry  $20\text{ KN/ m}^3$ .

(10)

7. What is nominal and design mix concrete? Write down the steps involved in method of particular design mix based on IS:10262.

OR

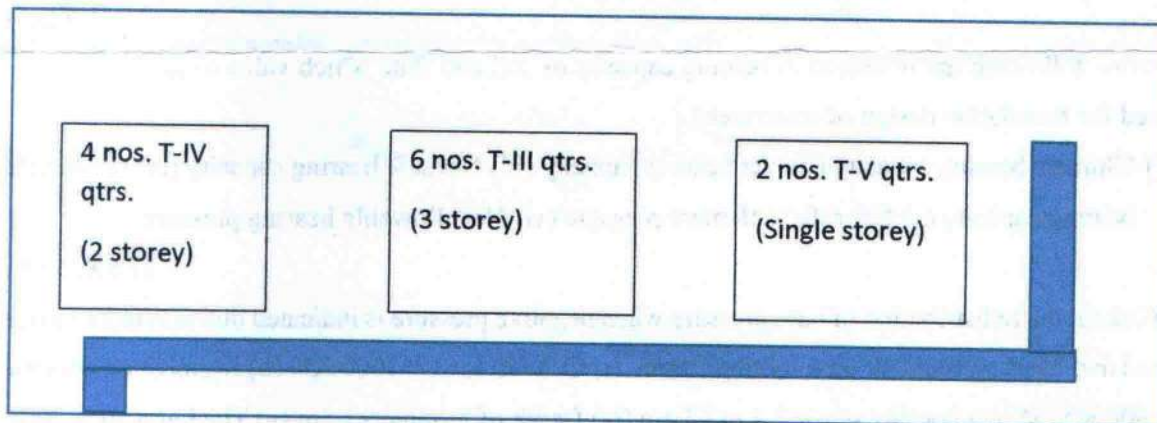
What is job mix formula in bitumen based courses in flexible pavement? Write down the steps involved in finalizing the job mix formula.

(3+7)

8. Define aerobic and anaerobic sewerage treatment processes? Draw a flow chart for any one sewerage treatment plant based on aerobic technique.

(3+7)

9. Design water supply scheme with distribution grid lines for a colony having size of 50mX100m with residential blocks as per following: Assume location of UG Sump in the plot and value of any other data needed.



(10)

10. (i) What is Prestressed Concrete and its advantages over normal concrete with applicability?

- (ii) A pretensioned concrete beam of rectangular section 150mm wide by 300mm deep is prestressed by 4 wires of 5 mm dia stressed to  $1200\text{ N/mm}^2$ . The wires are located at 50mm from soffit. Find the stress developed at soffit of the beam by considering nominal concrete section.

(5+5)