Question Paper 2014

Civil Engineering
(Paper II)

(Civil and Structural)

1. (*a*) What are the constituents of good brick-earth? What constituents render brick-earth unsuitable for manufacturing bricks ? (10)

(*b*) Describe any two tests to be performed in case of burnt clay bricks. (10)

(*c*) State the conditions under which you will recommend the following cements. Give also the reasons.

　(*i*) Rapid hardening cement

　(*ii*) High alumina cement (10)

(*d*) Briefly explain (10)

　(*i*) Assessed value

　(*ii*) Sinking fund

(*e*) Determine the number of bags of cement required for a standard brick masonary for a wall of thickness 30 cm for a height of 10 m and length 200 m in 1 : 4 mortar. (20)

2. (*a*) The readings given in the Table below were recorded in a levelling operation from points 1 to 10. Reduce the levels by the height of instrument method and apply appropriate checks. The point 10 is a bench mark having elevation of 66.374 m. Determine the loop closure. (30)

Station	Chainage (m)	B.S.	I.S.	F.S.	Remarks
1	0	0.597			B.M. = 68.233 m
2	20	2.587		3.132	C.P
3	40		1.565		
4	60		1.911		
5	80		0.376		
6	100	2.244		1.522	C.P
7	120		3.771		
8	140	1.334		1.985	C.P
9	160		0.601		
10	180			2.002	

(*b*) A soil sample in its natural state has, when fully saturated, a water content of 32.5%. Determine the void ratio, dry and total unit weight. Calculate the total weight of water required to saturate a soil mass of volume 10 m³. Assume $G_S = 2.69$. (15)

(*c*) Describe the method of laying Water Bound Macadam (WBM) road. (15)

3. (a) Find the discharge through a rectangular orifice 2.0 m wide and 1.5 m deep fitted to a water tank. The water level in the tank is 3.0 m above the top edge of the orifice. Take c_d = 0.62. (30)

(b) Enumerate the assumptions made in Lacey's theory of canal designs. (15)

(c) Write short note on types of impurities in water in the light of domestic supply. (15)

4. (a) Draw the shear force and bending moment diagram and label the values of the largest positive and negative shearing forces and bending moments for the beams with overhang as shown in Figure 1. (30)
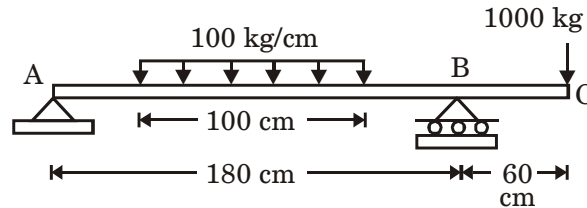
Fig. 1

(b) Describe the various defects in concrete along with precautions that should be exercised to prevent them. (30)

5. (a) Describe briefly creep and shrinkage. (20)

(b) A rectangular, singly reinforced beam 300 mm wide and 500 mm effective depth is used as a simply supported beam over an effective span of 6 m. The reinforcement consists of 4 bars of 20 mm diameter If the beam carries a load of 12 kN/m (inclusive of self weight), determine the stress developed in concrete and steel. Take m = 19. (40)

6. (a) Classify welded joints according to type of joints. (20)

(b) A single rivet lap joint is used to connect 12 mm thick plates by providing 20 mm diameter rivets at 50 mm pitch. Determine the strength of the joint and joint efficiency. Take working stress in shear in rivets = 80 N/mm^2, working stress in bearing in rivets = 250 N/mm^2 and working stress in axial tension in plates = 156 N/mm^2. (40)