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H.P.A.S. (Main)—2013

CIVIL ENGINEERING

Paper II

Time : 3 Hours

Maximum Marks : 150

Note :— (a) Question 1 is compulsory. Attempt any four questions out of the remaining questions. In all, five questions are to be attempted.

(b) Assume suitable data, if missing.

1. (a) Describe briefly graphical method of solving three points problem encountered in a Plane Table Survey. 10

(b) Mention essential requirements for a transition curve. Also, derive an expression (equation) for an ideal transition curve. 10

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- (c) Briefly describe the procedure used for determination of tacheometric constants by Fixed Hair method. 10
2. (a) Briefly describe the procedure applied for graphical adjustment of closing error in a traversing survey. 10
- (b) Describe the methods of indirect contouring in brief. 10
- (c) Briefly describe various temporary adjustments for a theodolite. 10
3. (a) Describe briefly the classification of roads, based on location and function, according to the Nagpur Road Plan. 10
- (b) Briefly describe different types of turnouts in a permanent way. 10

- (c) Explain briefly the total reaction time of a driver and also describe various factors on which it (the reaction time) depends. 10
4. (a) Water of viscosity 0.001 N.s/m^2 leaks through a horizontal crack (40 mm wide and 2.5 mm deep) in a wall of thickness 100 mm. Determine the rate of leakage (flow), if the pressure difference between the two ends of the crack is 0.0003 N/mm^2 . 10
- (b) Describe various methods used for controlling the water hammer. 10
- (c) A siphon of diameter 200 mm connects two reservoirs with difference in elevation = 20 m. Length of siphon is 500 m and the summit is 3.0 m above the water level in upper reservoir.

Length of pipe from upper reservoir to summit is 100 m. Assuming the co-efficient of friction to be 0.005, find the discharge through the siphon and pressure at the summit. Neglect minor losses. 10

5. (a) Derive an expression for critical depth in case of an open channel flow. 10

(b) Giving neat and labelled sketches, describe each of the following briefly : 4×5=20

(i) Hydraulic jump

(ii) Specific energy curve

(iii) Equivalent pipe

(iv) Velocity distribution in case of turbulent flow in a pipe.

6. (a) Briefly describe the regime theory for an unlined open channel in alluvium. 10
- (b) Describe in brief different parameters used to design a rigid dam. 10
- (c) Describe the principles of sediment transport in brief. 10
7. (a) Describe briefly the graphical method used for determination of storage capacity of a reservoir. 10
- (b) Briefly describe various irrigation methods and their relative efficiencies. 10
- (c) Describe in brief different methods applied for control of water logging. 10

8. Describe each of the following briefly :

6×5=30

- (a) Bacteriological analysis of water
- (b) Primary sedimentation tank
- (c) Manhole
- (d) Pressure filter
- (e) Activated sludge process
- (f) Septic tank.