2019

CIVIL ENGINEERING-II

Time Allowed—3 Hours *Full Marks—200*

If the questions attempted are in excess of the prescribed number, only the questions attempted first up to the prescribed number shall be valued and the remaining ones ignored.

Answer may be given either in ***English*** *or in* ***Bengali*** *but all answers must be in one and the same language*

Group-A

Answer **any four** *questions.*

1. (a) A steel tape was exactly 30m long at 18°C when supported throughout its length under a pull of 8 kg. A line was measured with the tape under a pull of 12kg and found to be 801m. The mean temperature during the measurement was 26°C. Assuming the tape to be supported at every 30m, compute the true length of the line, given that the cross-sectional area of the tape = 0.04 cm^2, the weight of 1 cubic centimetre is 0.0077 kg, the coefficient of expansion for steel = 0.0000117 per °C and the modulus of elasticity for steel = 2.1×10^6 kg/cm^2. 15

(b) An observer standing on the deck of a ship just sees a lighthouse. The top of the lighthouse is 35m above the sea level, and the hight of the observer's eyes is 6m above the sea level. Find the distance of the observer from the lighthouse. 5

(c) The following notes refer to the reciprocal levels taken with one level:

Instrument at	Staff reading on A	Staff reading on B	Remarks
A	1.156	2.597	Distance between A and B = 1200m
B	0.987	2.418	R. L. of A = 625.555

Find (i) the true reduced level of B, and (ii) the error in the collimation adjustment of the instrument.

6+9=15

2. (a) What is hydrologic cycle? What are the stages of hydrologic cycle? Explain. 10

(b) Define the terms: Isohyet, Unit storm, Inter-flow, Runoff and Unit Hydrograph 10

(c) The peak of a flood hydrograph due to a six hour storm is 470 m^3/sec. The average depth of rainfall is 8 cm. Assume an infiltration loss of 0.25 cm/hour and a constant base flow of 15m^3/sec. Estimate the peak discharge of a 6 hour unit hydrograph for this catchmesnt. 10

(d) Explain the effects of water-logging on land. 5

3. (a) Calculate the diameter required for a single-stage trickling filter which is to yield as effluent BOD_5 of 20 mg/l, when treating settled domestic sewage with BOD_5 of 120 mg/l. The waste water flow is 2200 m^3/day and the recirculation is constant at 4000 m^3/day. The filter depth is 1.5m. 15

(b) Design a septic tank for a hostel having 50 students with probable peak discharge of 63 litres/minute. Assume suitable data. 10

(c) Enumerate the processes that are employed to purify water before supplying to the consumers. 10

4. (a) (i) Give a list of any five principal building stones. 5

(ii) What are the characteristics of good building stones? 10

(b) Explain briefly the following terms:

Activity, Event, Total float, Free float, Independent float, Earliest start time, Earliest finish time, Critical activities, Optimistic time, and Slack. 20

5. (a) Classify roads according to location, purpose and connectivity and also according to mode of construction. 10

(b) With a neat sketch describe the different layers of road and explain briefly how a road is constructed. 10

(c) Calculate the length of transition curve needed on a two lane highway having a longitudinal circular curve of radius = 300m. Design speed = 80kmph, length of wheel base of largest vehicle = 6m. 15

6. (a) For the distribution main of a city water supply a 30 cm main is required. As pipes above 25 cm are not available, it is decided to lay two parallel mains of same diameter. Determine the diameters of the parallel mains. 20

(b) What treatments are done to remove undesirable and objectionable taste and odour before water is supplied to public use? 15

Group-B

Answer **any two** *questions.*

7. (a) Enumerate the methods of irrigation. 10

(b) Define 'Duty' and 'Delta'. Derive the relationship between duty and delta for a given base period. 10

(c) The gross command area for a distributory is 10,000 hectares, 75% of which can be irrigated. The intensity of irrigation for Rabi season is 60% and that for Kharif season is 30%. If the average duty at the head of distributory is 2500 hectares per cumec for Rabi season and 1000 hectares per cumec for Kharif season, determine the discharge required at the head of the distributory from average demand consideration. 10

8. (a) The bearing of one side of a plot in the shape of a regular pentagon is 80°. Find the bearings of the remaining sides taken in a clockwise order the same way round. 15

(b) The coordinates of two points C and D are as follows:

Point	Coordinates	
	N	E
C	982.5	825.2
D	1198.6	576.4

Find the length and bearing of the line CD. 15

9. (a) (i) What do you understand by the term 'workability' and how is it measured?

(ii) Define water-cement ratio and indicate its effect on strength of the concrete.

(iii) Can concrete be always made stronger by mixing more cement without any regard to water, compaction, or curing? 5×3=15

(b) (i) What are the advantages of a CPM chart over Gantt Bar Charts?

(ii) Discuss the difference between CPM and PERT networks. 8+7=15

10. (a) (i) What is meant by composting? What are the steps of composting?

(ii) What will make compost break down faster? 7+8=15

(b) Describe the procedure for carrying out the plaster in cement mortar (1:4) in two coats on the external surfaces of a residential building. 15