2021

CIVIL ENGINEERING

PAPER-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 answer must be in one and the same language.*

All notations/symbols have their usual meanings, unless otherwise specified.

Group-A

Answer *any four* questions. 32×4=128

1. (a) What are the major advantages of nondestructive method of testing for concrete? Name three(3) main important nondestructive tests on concrete. Describe the properties of concrete that can be estimated from such tests.

   (b) Explain the term 'Activity' in project network analysis for civil engineering projects. What are the reasons for using dummy activity?

   (c) A construction company has an opportunity to submit bid document for construction of a building. From specifications, PERT network along with 3 time estimates (in week) were found out and are shown in Fig. 1 below. Determine the critical path and its standard deviation. (4+3+5)+(2+2)+(12+4)=32

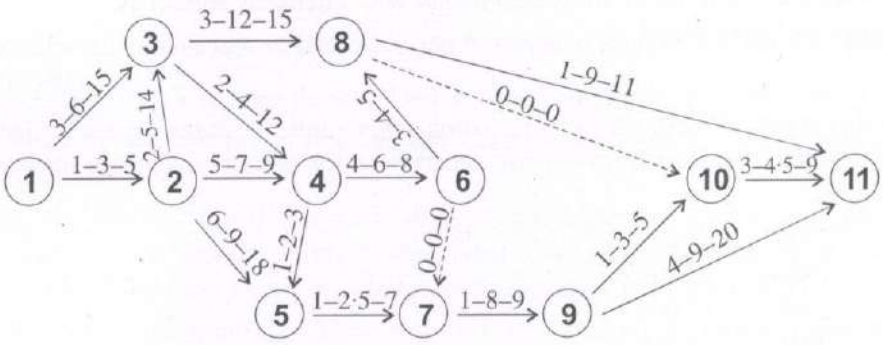

Fig-1. PERT NETWORK

2. (a) What are the differences between horizontal equivalent and contour interval? State the characteristics feature of contours plot.

   (b) Define the magnetic and true bearings of a line. Explain the term 'declination' and describe different types of variations in declination.

(c) While traversing in the field with compass, following bearings were observed:

Line	F·B	B·B
AB	45°45′	226°10′
BC	96°55′	277°5′
CD	29°45′	209°10′
DE	324°48′	144°45′

Determine the corrected bearings and check the correction also. (4+6)+(4+2+4)+12=32

3. (a) Give a neat sketch showing cross-sectional elements of a typical road in embankment, indicating Border line, Control line, Building line, Road land, Formation width, Road margin, Shoulder and carriageway. What are the purposes for providing Separator? State some of the forms of separator in which they are provided.

(b) Explain the terms:

(i) Prime Coat

(ii) Tack Coat

(iii) Surface Dressing (12+3+5)+(4×3)=32

4. (a) What is meant by aquifer? Explain various types of aquifer. An aquifer is 80 ha. in area. The water table is lowered by 10 m over whole area. If the porosity of the aquifer is 30% and the specific retention is 5%, calculate the amount of water which will be drained from the aquifer. Define 'storage coefficient'.

(b) Explain the objects for river training work. Name various types of such works. Explain the advantages and disadvantages of embankment in river training works.

(3+5+6+2)+(4+4+8)=32

5. (a) State the principle for deciding the capacity of a sedimentation tank for continuous flow. What are the overflow ratio for plain rectangular tank for different cases?

(b) What are the reasons for using coagulants during chemical sedimentation process? Name some of the commonly used coagulants with chemical equations.

(c) What are the differences between super chlorination and breakpoint chlorination?

(16+4)+(4+3)+5=32

6. (a) Name standard methods for forecasting population for water supply project. Population of a town, obtained from census department for consecutive three decades are shown below:

Year	Population
1990	12,000
2000	17,000
2010	23,500
2020	31,000

Estimate the population of the time for 2030 and 2040.

(b) Describe the desirable qualities of stones for building construction purposes.

(c) Specify the characteristics of a good mortar lime and cement.

(d) Explain the types of cement to be used for mass concrete and under water construction.

(4+12)+5+5+(3+3)=32

Group-B

Answer *any two* questions. 36×2=72

7. (a) State the differences between salvage value and scrap value.
   (b) Explain the importance and frequency of updating in completion of a project.
   (c) 30 kg of coarse aggregates were taken for sieve analysis. weight retained on 80 mm, 40 mm, 20 mm, 10 mm and 4·75 mm sieves, are 0, 1, 11, 10 and 8 kg respectively. Find the fineness modulus of the aggregate sample.
   (d) Write short notes on: 8+(5+3)+10+(5×2)=36
      (i) Rapid Hardening Cement
      (ii) Quick Setting Cement

8. (a) Name different methods for removal of temporary and permanent hardness of water.
   (b) What is meant by Refuse? What are different methods of disposal of refuse? Explain the method of waste disposal by composting.
   (c) Explain the following:
      (i) Wholesome water
      (ii) Palatable water
      (iii) Coliform Index 8+(2+4+16)+(2×3)=36

9. (a) State the basic principle of planning of roads.
   (b) What is meant by camber? Explain different types of camber.
   (c) Explain the functions of a transition curve. Name different types of such curves with sketches.
   (d) Describe cement concrete slab method of construction of concrete pavement, indicating placement of different joints in such pavement. What is CBR?
   (e) Define 'Group Index' and state use of group index in design of flexible pavement.
   4+(4+2)+(4+4)+(5+4+3)+(2+4)=36

10. (a) What is Lacy's ragime theory? Under what condition it is applicable?
   (b) What are the benefits of lined canal? Give one example of lining method of canal with neat sketch.
   (c) A city releases 5 mlD domestic sewage. Calculate the size of a circular type primary sedimentation tank for setting of suspended solids. Assume overflow rate as 16 m^3/m^2/day. Depth of the tank is 3·5 m. Check hydraulic retention time (HRT) and weir flowrate.
   (d) What is 'PAN' pollution? How is it formed? What are its effects? Describe the purpose and functions of cyclone separator with a neat sketch.
   (e) What is rotary signals? Describe with a neat sketch for a four (4) way skewed intersection.
   (3+2)+(3+3)+8+(2+2+2+5)+6=36
