2013

CIVIL ENGINEERING (Paper - II)

Time allowed : 3 Hours }   **{ Maximum Marks : 200**

Note :

(i)   *Solve any one question from each section.*

(ii)   *Do not reproduce any question. Write only the question number against the answer.*

(iii)   *Number of optional questions up to the prescribed number in the order in which questions have been solved, will only be assessed, excess answers of the question/s will not be assessed.*

(iv)   *Figures to the right indicate the marks for the questions.*

(v)   *Assume suitable data if necessary and state it clearly.*

(vi)   *Use of Non-programmable calculators is permitted.*

(vii)   *Use of I.S. Codes and Steel Tables is not permitted.*

(viii) *Candidates should not write roll number, any name (including their own), signature, address or any indication of their identity anywhere inside the answer books otherwise they will be penalised.*

(ix)   *Candidates are expected to answer all the subquestions of a question together. If subquestion of a question is attempted elsewhere (after leaving a few pages or after attempting another question) the later subquestion shall be overlooked.*

SECTION - A

1.   (a)   Explain use of tape to measure distance AB on sloping ground, as indirect method.   **10**
In chaining an area containing a pond two points C and D were selected on either side of chain station A such that A, C, D lie on a line. The point B which is on the other side of pond is on the chain line AB. If distances AC, AD, BC and BD are 35 m, 45 m, 100 m and 95 m respectively, determine the length of chain line AB and the angles which the inclined line CD makes with the chain line AB.

     (b)   Why declination at a place does not remain constant ?   **10**
The true bearing of T as observed from station A was 358° and magnetic bearing of the same was 8°. FB of lines AB, AC and AD was found to be 290°, 340° and 30° respectively. Find the true forebearing of lines AB, AC and AD.

P.T.O.

(c) Explain any five tests that you will perform to assess a plane table in perfect **10** adjustment for accurate work. What adjustment will you recommend if the plane table is not in adjustment ?

(d) Prove that, the area of the traverse is equal to the algebraic sum of the products of **10** the total latitude of each point and algebraic sum of the departures of the lines meeting at that point.

2. (a) A dumpy level was set up midway between two pegs 80 m apart. The readings **10** on the staff at the two pegs were 3.2 and 3.015 m respectively. The instrument was then moved by 20 m ahead of the second peg in line with two pegs. The respective staff readings were 2.825 and 2.69 m. Calculate the staff readings on the two pegs to provide horizontal line of sight.

(b) To determine the gradient between two points A and B, a tacheometer was set **10** up at another station C and following data was observed keeping staff vertical.

Staff at	Vertical angle	Stadia readings
A	$+4° 20'$	1.3, 1.61, 1.92
B	$+10' 40''$	1.1, 1.41, 1.72

If the horizontal angle ACB is 35° 20' determine average gradient between A and B

$K = 100 ; \quad C = 0$

(c) A horizontal curve is to be set. Devise a suitable solution under following **10** situations :

(i) The point of intersection is not accessible

(ii) Both tangent point and point of tangency are not accessible.

(d) Explain the relation between height of the station above a datum and the distance   **10**
of the station from the point of tangency in case of geodetic surveying.

The elevations of two triangulation stations A and B 100 km apart are 180 m and
450 m respectively. The intervening obstruction situated at C 75 km from A has
an elevation of 259 m. Ascertain if A and B are intervisible. If not then by how
much should B be raised so that the line of sight must nowhere be less than 3 m
above the surface of the ground, assuming A as the ground station.

SECTION - B

3.   (a)   Explain the following vibrators used for compaction of concrete   **10**

(i)   Internal vibrators

(ii)   External or form vibrators

(iii)   Surface vibrators

(iv)   Table vibrators

(b)   Discuss the structural shapes of common rolled steel sections used for construction   **10**
with examples [Figure for each shape is expected].

(c)   State the reasons for artificial seasoning of timber.   **10**

Explain any four methods of artificial seasoning from the following methods :

(i)   Water seasoning

(ii)   Seasoning by boiling or steaming

(iii)   Kiln or hot air seasoning

(iv)   Chemical or Salt seasoning

(v)   Electrical seasoning

(vi)   Smoke drying

(vii)   Charring or scorching

(d)   State the essential and other ingredients of a paint or oilpaint. Discuss the essential   **10**
ingredients.

P.T.O.

4. (a) (i) Give the distances of building line and control lines for ribbon development   5
                along approaches specified by National Building Code for National
                Highway, State Highway, Major district Road, Other district Road and village
                road.

          (ii) Enlist the different principles of planning. Explain "Aspect" principle for   5
                different units of a residential building.

    (b) Explain with a sketch   10

          (i)   Grease Trap

          (ii) Intercepting trap

    (c) Discuss the general principles and factors in Acoustical design of a Cinema Hall.   10

    (d) Explain the general measures of fire safety that have been recommended in   10
         buildings

          (i)   Alarm system

          (ii) Fire Extinguishing Arrangements

          (iii) Escape Route (means of escape)

SECTION - C

5. (a) Explain with neat sketches different types of Ashlar masonry.   10

    (b) Explain in brief the factors that affect the selection of flooring material.   10

    (c) Briefly describe, with neat sketches, the various types of pointing.   10

    (d) What are the different causes of dampness in a building ? Enlist different methods   10
         of prevention of dampness in a building.

6. (a) State purpose of rate analysis and explain in brief factors affecting rate analysis.   10

    (b) Explain briefly the situations when lowest tender is rejected.   10

    (c) What is meant by a 'Contract'? What are the essentials of valid contract ?   10

    (d) Explain constant percentage method to calculate depreciation. Find out book   10
         value of a construction equipment after 5 years costing Rs. 80,000/-. Assume life
         as 8 years and the salvage value Rs. 8000/-. Use constant percentage method.

SECTION - D

7.   (a)   Define voids ratio, porosity, degree of saturation with respect to soil mass.   **10**

Derive the equation $es_r = \omega G$

(b)   Enlist the assumptions made by Boussinesq in his theory for the problem of stress   **10**
distribution in soils due to a concentrated load.

And with a neat sketch explain stress isobar and its significance.

(c)   Explain the following terms in connection with shear tests on soil sample   **10**

(i)   Undrained test

(ii)   Consolidated undrained test

(iii) Drained test

A cylinder of soil fails under an axial vertical stress of 160 kN/m², when it is
laterally unconfined. The failure plane makes an angle of 50° with the horizontal.
Calculate the value of cohesion and the angle of internal friction of the soil.

(d)   Define optimum moisture content. What is the effect of increase in compactive   **10**
effort on optimum moisture content for a given soil. Explain it with a neat sketch.

A cohesive soil yields a maximum dry density of 18 kN/m³ at an OMC of 18%
during a standard proctor test. If the value of G is 2.7, what is the degree of
saturation ?

8.   (a)   State any five assumptions made in Terzaghi's theory of consolidation.   **10**

An undisturbed sample of clay 24 mm thick consolidated 50% in 22 minutes
when tested in laboratory with double drainage. The clay layer from which the
sample was obtained, is 5 m thick in the field. How much time will it take to
consolidate 50% with double drainage ?

(b)   Distinguish between active earth pressure and passive earth pressure.   **10**

A 5 m high retaining wall has a granular backfill with a level top. The retaining
wall face makes an angle of 85° with the base. Soil parameters r, ϕ and δ are
16 kN/m³, 35° and 10° respectively. Using Columb's method obtain active thrust
on the wall.

(c) State the characteristics of bearing capacity failures namely general, local and punching shear failure, with neat sketches. **10**

(d) Define critical depth of a slope.

A long natural slope of cohesionless soil is inclined at 13° to the horizontal. If $\phi = 30°$ determine the factor of safety of the slope. **10**

SECTION - E

9. (a) A construction equipment was purchased in Rs.12000/- (Rs. Twelve thousand). Assuming its salvage value at the end of 6 years to be Rs.3000/-, determine amount of depreciation for each year by **10**

(i) Straight line method

(ii) Constant percentage method.

[show the answer in the following format]

Format

Age in years	Book value at the end of year	Depreciation	Total depreciation
0			
1			
2			
3			
4			

(b) Discuss the advantages of following hammers used as a pile driving equipment **10**

(i) Drop hammer

(ii) Single acting steam hammer

(iii) Double acting steam hammer

(iv) Diesel hammer

(v) Hydraulic Hammer

(c)   While submitting a proposal for construction of a building, service plan is also to   10
be submitted to the local authorities.
Which points are to be submitted in this service plan ? Explain each point.

(d)   A project consists of following activities.   **10**

Activity	Preceded by	Duration (days)
A	Nil	4
B	A	8
C	A	6
D	C	8
E	C	4
F	E	12
G	E	8
H	A	2
J	H	8
K	F	6
L	G, K	4
M	D, J, L	4
N	B	4
O	M, N	4

(i)   Draw the network.

(ii)   Find out critical path and project duration.

(iii) Calculate Free Float and Independent Float for non critical activities.

10. (a) Explain the safety measures to be adopted on worksite for demolition of a building. **10**

(b) A PERT project consists of following activities with their duration. **10**

Activity	Optimistic time	Pessimistic time	Most likely time
	in days (to)	in days (tp)	in days (tm)
1-2	6	18	9
1-3	5	17	8
2-4	4	22	7
3-4	4	16	7
2-5	4	10	7
3-5	2	8	5
4-5	4	22	10

Find out the probability of completion of project in 37 days

[For $Z = 1$, probability 84.13%

For $Z = 2$, probability 97.72%]

(c) Describe the stages of inspection and quality control for **10**

(i) Earthwork

(ii) Masonry

(iii) Reinforcement in RCC

(d) Who is the father of scientific management ? State and explain salient features of **10** scientific management.

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