KATHMANDU UNIVERSITY
End Semester Examination
February/March, 2019

Marks Scored:

Level : B. E./B. Tech.
Year : II
Course : CIEG 201
Semester : I

Exam Roll No. :
Time: 30 mins.
F. M. : 10

Registration No.:
Date : 12 MAR 2019

SECTION "A"
[20 Q × 0.5 = 10 marks]

Encircle the most appropriate answer.

1. Gel/Space ratio = x = volume of gel / Space available = 0.657 C / 0.319 C + Wo. Here Wo, stands for
   a. Weight of cement in kg
   b. Weight of cement in g
   c. Volume of gel
   d. Volume of mixing water in ml

2. The timber having maximum resistance against white ants is obtained from
   a. Char b. Shisha c. Sal d. Teak

3. The compressive strength of 100 mm cube as compared to 150 mm cube is always
   a. Less b. More c. Equal d. Less or Equal

4. Which of the following statements is correct?
   a. Excess of alumina in the clay makes the brick brittle and weak.
   b. Excess of alumina in the clay makes the brick crack and warp on drying
   c. Excess of alumina in the clay leaves high power deposit on the brick.
   d. Excess of alumina in the clay improves impermeability and durability of the brick.

5. For the manufacture of Portland cement the proportions of raw material used are
   a. Lime 63%; silica 22%; other ingredients 15%
   b. Silica 22%; lime 63%; other ingredients 15%
   c. Silica 40%; lime 40%; other ingredients 40%
   d. Silica 70%; lime 20%; other ingredients 20%

6. Quick setting cement is produced by adding
   a. Less amount of gypsum in very fine powdered form
   b. More amount of gypsum in very fine powdered form
   c. Aluminum sulphate in very fine powdered form
   d. Pozzolana in very fine powdered form

7. Pick up the correct statement from the following.
   a. Adding 5% to 6% moisture content by weight, increases the volume of dry sand from 18% to 38%
   b. The bulking of fine sand is more than that of coarse sand
   c. If the percentage content of moisture exceeds 10%, increase in bulk of sand starts decreasing
   d. All options are correct

8. Pick up the correct statement from the following.
   a. Gypsum in cement decreases the setting time
   b. The first compound of cement which reacts with water is C2S
   c. Bulking of sand is less when its particles are fine
   d. All options are correct

9. The datum temperature for maturity by Plowman, is
   a. 23°C b. 0°C c. – 5.6° C d. –11.7° C

10. If the compaction factor (W_p / W_f) is 0.95, the workability of concrete is
    a. Extremely low b. Very low c. High d. Low

11. Under constant load, the Creep strain in concrete is
    a. Time dependent b. Temperature dependent
    c. Moisture dependent d. None of these

12. If 1500 g of water is required to have 1875 g cement paste of normal consistency, the percentage of water is
    a. 20% b. 25% c. 30% d. 35%

13. Slate and marble stone belong to
    a. Igneous rocks b. Metamorphic rocks
    c. Sedimentary rocks d. Foliated rocks

14. Strength of concrete is directly proportional to
    a. Cement-water ratio b. Sand-cement ratio
    c. Water-aggregate ratio d. All option are correct

15. You are asked to construct a massive dam, the type of cement you will use is
    a. Ordinary Portland cement. b. Rapid hardening cement
    c. Low heat cement d. Blast furnace slag cement

16. If 20 kg of coarse aggregate is sieved through 80 mm, 40 mm, 20 mm, 10 mm, 4.75 mm, 2.36 mm, 1.18 mm, 600 micron, 300 micron, and 150 micron standard sieves and the weights retained are 0 kg, 2 kg, 8 kg, 6 kg, 4 kg respectively, the fineness modulus of the aggregate lies in the range of
    a. 6.85 - 7.10 b. 7.85 -7.95 c. 7.50 - 7.75 d. 7.20 - 7.45

17. Operation that takes place in pug mill is
    a. Weathering b. Blending c. Tempering d. burning

18. Which one of the following aggregates gives maximum strength in concrete?
    a. Rounded aggregate b. Elongated aggregate
    c. Flaky aggregate d. Cubical aggregate

19. High early strength cement is used for
    a. Hot weather concreting. b. Mass concreting.
    c. Cold-weather concreting d. Warm-humid weather concreting.

20. Reinforcement corrosion can be reduced by
    a. Increasing water-cement ratio b. Reducing permeability of concrete
    c. Increasing maximum size of aggregate. d. Reducing the coarse aggregate content.

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F. M. : 40

SECTION "B"

Attempt ***ALL*** Questions. Schematic diagrams must be shown wherever necessary. Any data you feel missing may be suitably assumed and stated clearly. (A **semi-log graph** is provided with this question paper which should be attached with the answer sheet at the time of submission of answer sheet.)

1. Explain the importance of construction materials? Which shape of aggregate is considered the best for making concrete and why? Discuss about the impact of curing, temperature, grading of aggregate, and water cement ratio in cement concrete. [1.5+1.5+3]

2. Explain the limitations of Water cement ratio law? How does the volumetric change in concrete occur due to the impact of aggregate, water cement ratio, member size and Medium Ambient conditions on shrinkage of concrete? [1+1+3]

3. Explain the various forms of Bitumen. The following data were obtained by performing the sieve analysis of 10 kg for coarse aggregates and 1 kg for fine aggregates. Carryout the fineness modulus of coarse and fine aggregate as per IS standard and trace out a particle size distribution curve in **semi-log graph provided.** Also calculate the coefficient of uniformity and coefficient of curvature for the coarse and fine aggregate. [2+4]

Sieve size (mm)	80	40	20	10	4.75	2.36	1.18	0.6	0.3	0.15	Pan
(Coarse Aggregate) Weight retained (kg)	0.0	0.0	3.5	3.0	2.8	0.70	0.0	0.0	0.0	0.0	0.0
(Fine aggregate) Weight retained (kg)	0.0	0.0	0.0	0.0	0.0	0.10	0.25	0.35	0.15	0.10	0.05

4. With the help of neat dimensional set-up experiment, describe "slump test' and its application in real fields and its limitation. Explain the manufacturing process of bricks with neat sketch. [4+3]

5. A concrete having full maturity strength of 325kg / cm^2 is used in cold zone at 5°C temperature. Using Plawman's equation estimate its strength after 15 days. Use coefficient A=2l and B=61. With the help of neat schematic curve, describe the creep phenomena and its recovery. Also discuss the factor affecting the creep of concrete. [2+3]

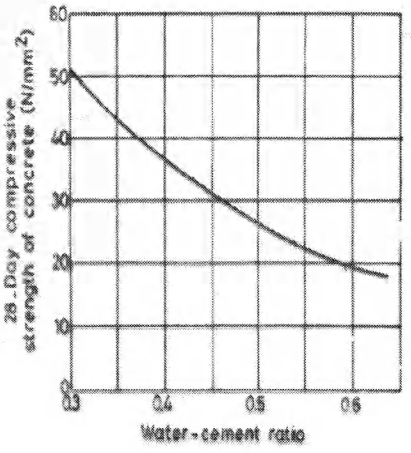
6. Describe the maturity concept of concrete and its significance. Using I.S Method design a concrete mix for reinforced concrete structure using Ordinary Portland cement of grade 43 with 28 days strength 51 N/mm^2 and the Characteristic compressive strength of the concrete required in field at 28 days is 35 MPa, if the superplasticiser is used as a chemical admixture. [2+4]

Fine aggregate zone-III, standard deviation = 5
Design mix target slump = 175 mm
Maximum nominal size of aggregates = 20 mm (Crushed Angular)
Sp. gravity of Coarse aggregate = 2.82
Exposure Condition = Moderate
Maximum free water cement ratio = 0.5
Degree of supervision = Good
Sp. gravity of fine aggregate = 2.65
Sp. gravity of cement = 2.93
Sp. gravity of admixture = 1.21
Entrapped air = 2%
Water content = 186 liters (per cubic meter of concrete for 20 mm size of aggregate)

7. Write short notes on: ***(ANY TWO)*** [2 × 2.5 = 5]
   a) C-S-H gel
   b) Phases system of concrete
   c) Micro-structure of Carbon steel

Table 3 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate
(Clauses 4.4, A-7 and B-7)

Sl No.	Nominal Maximum Size of Aggregate	Volume of Coarse Aggregate[1] per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
	mm	Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.50	0.48	0.46	0.44
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.75	0.73	0.71	0.69



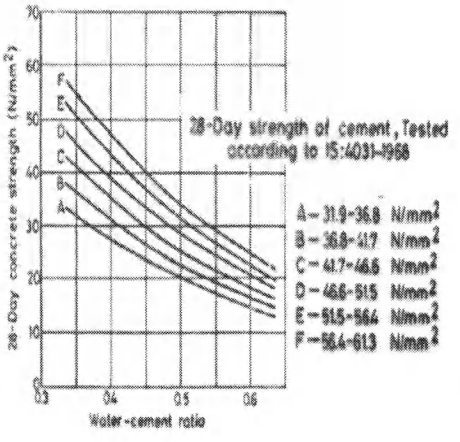


Table 12 MAR 2019
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Attach graph with your answer book