KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

Marks Scored:

Level : B.E./B.Tech.
Year : II
Course : CIEG 201
Semester : I & II
Exam Roll No. :
Time: 30 mins.
F. M. : 10
Registration No.:
Date : 21 JUL 2023

SECTION "A"
[20Q. × 0.5 = 10 marks]

Encircle the most appropriate answer from each set of choices.

1. Which of the following is an example of brittle material?
   a. Steel b. Aluminum c. Glass d. Copper

2. Which of the following ore consist highest percentage of iron?
   a. Magnetite b. Hematite c. Limonite d. Iron Pyrite

3. The Principal raw material for all ferrous metal is _____.
   a. Cast Iron b. Wrought Iron c. Steel d. Pig Iron

4. Which of the following is defect in timber due to defective seasoning?
   a. Burls b. Wane c. Checks d. Shakes

5. Which of the following statement is **TRUE**?
   a. Wood have same stress-strain relations for different directions.
   b. Wood have different stress-strain relations for different directions.
   c. Compressive strength perpendicular to fibres of wood is more than that parallel to fibres.
   d. Tensile strength perpendicular to fibres of wood is more than that parallel to fibres.

6. The size of standard brick available in Nepal is _____.
   a. 230 ×110 × 75 b. 230 × 130 × 55 c. 230 × 110 × 55 d. 250 × 110 × 55

7. The dry weight of brick is 2.5 kg and it's weight after immersion in water for 24 hours is 2.85 kg, then the water absorption for brick is _____.
   a. 12.3% b. 6.5% c. 9% d. 14%

8. Which of the following compound imparts color to the glass?
   a. Lead Oxide b. Silica c. Lime d. Potash

9. What is the nominal mix ratio for M20 concrete?
   a. 1:2:4 b. 1:1:2 c. 1:1.5:3 d. 1:0.5:1

10. The number of bags of cement (50 kg) required per cubic meter of M25 concrete is ____.
    a. 15 b. 13 c. 11 d. 8

11. The range of particle size for fine aggregate is _____.
    a. 0.02 mm-4.75 mm b. 0.06 mm-4.75 mm
    c. 0.02 mm-8.75 mm d. 0.06 mm-8.75 mm

12. Which of the following relation gives the coefficient of curvature for aggregates?

a. $\frac{D_{10}{}^2}{D_{60}D_{30}}$ b. $\frac{D_{30}{}^2}{D_{60}D_{10}}$ c. $\frac{D_{60}{}^2}{D_{30}D_{10}}$ d. $\frac{D_{30}{}^2}{D_{60}{}^2}$

13. The rate of heat evolution of four compounds will be in following descending order:

a. C_3S, C_3A, C_4AF, C_2S b. C_2S, C_3A, C_3S, C_4AF

c. C_2S, C_3S, C_4AF, C_3A d. C_3A, C_3S, C_4AF, C_2S

14. Which of the following statement is **INCORRECT**?

a. Portland cement is an example of natural cement.
b. Cement is adhesive as well as cohesive material.
c. Portland cement is of hydraulic type.
d. For civil engineering works generally calcareous cements are used.

15. What is the percent of water by weight of cement required for hydration of cement?

a. 23% b. 38% c. 15% d. 48%

16. Which of the following statement is **TRUE**?

a. As water cement ratio increases, the strength of concrete also increases.
b. As the temperature increases gain in strength decreases.
c. Use of larger size aggregate results lower strength of the concrete.
d. As gel-space ratio decreases, the strength of concrete increases.

17. As per IS 456:2000, the flexural strength of concrete is equal to _____.

a. $0.85(f_{ck})^{0.5}$ b. $0.8(f_{ck})^{0.5}$ c. $0.75(f_{ck})^{0.5}$ d. $0.7(f_{ck})^{0.5}$

18. A concrete cube (150 × 150 × 150 mm) fails at ultimate load of 900 kN while testing at lab. The compressive strength of concrete is _____.

a. 40,000 kN/mm^2 b. 40,000 kN/m^2

c. 4,000 kN/m^2 d. 4,000 kN/mm^2

19. Tensile strength of concrete is measured by _____.

a. Direct tension test in the universal testing machine.
b. Applying compressive load along the diameter of the cylinder.
c. Applying third point loading on a prism.
d. Applying tensile load along the diameter of the cylinder.

20. The length of time for which a concrete mixture will remain plastic is usually more dependent on _____.

a. The setting time of cement than on the amount of mixing water and atmospheric temperature.
b. The atmospheric temperature than on the amount of mixing water and the setting time of cement.
c. The setting time of cement and the amount of mixing water than on atmospheric temperature.
d. The amount of mixing water used and the atmospheric temperature than on the setting time of cement.

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SECTION "B"

Attempt *ALL* questions.

1. Differentiate between Ferrous and Non-Ferrous metals.Why steel is most popular construction material among other metals? Describe the types of steel and it's use. [1.5+1.5+2=5]

2. Briefly describe various commercial forms of wood. What are the methods of seasoning of timber? What are the defects that occur if seasoning is not done properly? [2+2+1=5]

3. Briefly describe the harmful ingredients of brick earth. Explain briefly various methods of testing brick. [2.5+2.5=5]

4. Briefly write about alkali-aggregate reaction. What is grading of aggregates and how is it carried out? Discuss about types of grading and characteristic of grading curve. [1.5+2+2.5=6]

5. Why is it required to determine the initial and final setting time of cement? Briefly describe about hydration of cement. What are the roles of admixture in concrete? [1.5+2+1.5=5]

6. Why concrete need to have sufficient workability? How do you measure the workability of concrete? Explain various methods of curing concrete. [1+2+2=5]

7. Explain various factors that influence the strength of concrete. How do you carry out the compressive strength test of concrete? [2+2=4]

8. Design a concrete mix having a characteristic compressive strength at 28 days of 25 N/mm^2 by IS method using maximum size of the angular aggregate as 20 mm. The structure is exposed to moderate environment and degree of workability desired is compacting factor of 0.85. Take Specific gravity of cement, coarse aggregate and fine aggregate as 3.15, 2.72 and 2.66 respectively. Water absorption in coarse aggregate is 0.5% and free surface moisture of fine aggregate is 2%. Sand conforms to zone III of IS 383:1970. Minimum cement content and maximum water-cement ratio from durability consideration is 300 kg/m^3 and 0.55 respectively. Assume standard deviation of 4.0 and amount of entrapped air as 2%. Assume any other missing data suitably. [5]

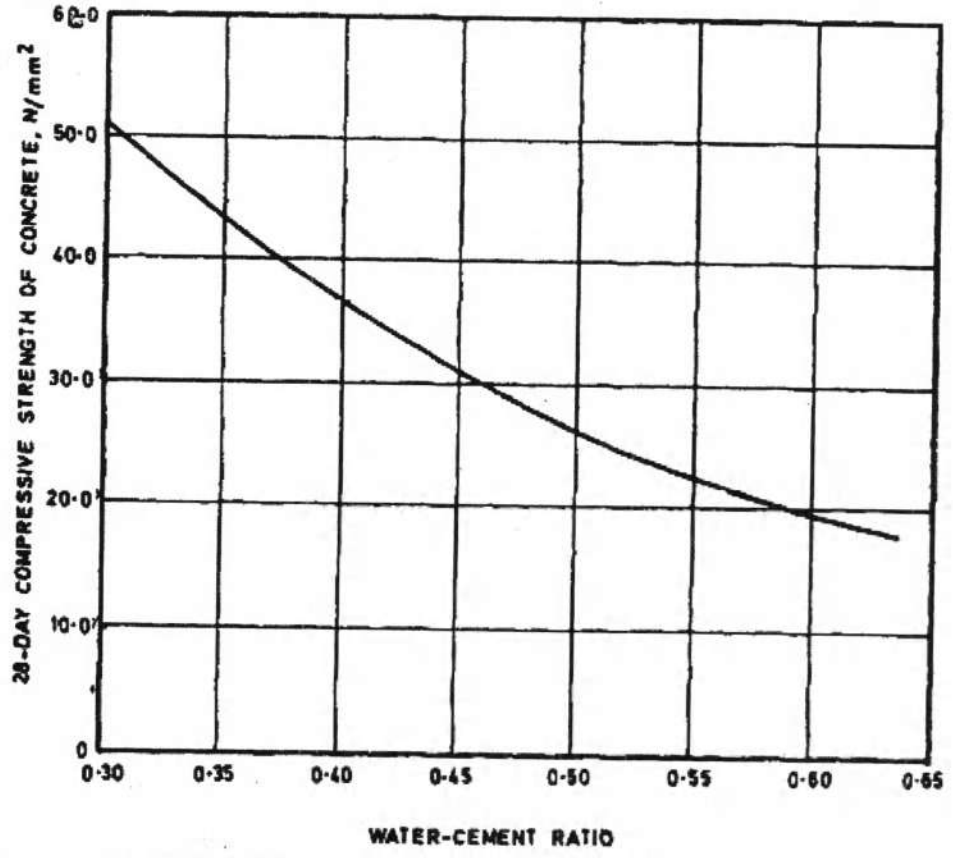

TABLE APPROXIMATE SAND AND WATER CONTENTS PER CUBIC METRE OF CONCRETE FOR GRADES UPTO M 35

Nominal Maximum Size of Aggregate mm	Water Content*, per Cubic Metre of Concrete kg	Sand as Percent of Total Aggregate by Absolute Volume
10	208	40
20	186	35
40	165	30

*Water content corresponding to saturated surface dry aggregate.

TABLE ADJUSTMENT OF VALUES IN WATER CONTENT AND SAND PERCENTAGE FOR OTHER CONDITIONS

Change in Condition Stipulated for Tables 4 and 5	Adjustment Required in	
	Water Content	Percent, Sand in Total Aggregate
(1)	(2)	(3)
For sand conforming to grading Zone I, Zone III or Zone IV of Table 4 of IS : 383-1970*	0	+ 1·5 percent for Zone I − 1·5 percent for Zone III − 3·0 percent for Zone IV
Increase or decrease in the value of compacting factor by 0·1	± 3 percent	0
Each 0·05 increase or decrease in free water-cement ratio	0	± 1 percent
For rounded aggregate	− 15 kg/m³	− 7 percent