KATHMANDU UNIVERSITY
End Semester Examination
March, 2025

Marks Scored:

Level : B.E.
Year : II

Course : CIEG 201
Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 11 MAR 2025

SECTION "A"

[20 Q. × 0.5 = 10 marks]

Choose and encircle the most appropriate option from each set of choices

1. Slow and progressive deformation due to sustained load is known
   a. Hardness b. Stiffness c. Creep d. Fatigue

2. The good clay for making bricks is
   a. Silted soil b. Black cotton soil c. Un weathered clay d. Weathered clay

3. _____uses solution of Sodium silicate and slaked lime to improve fire resistance of timber.
   a. Abel Process b. Ascue Treatment c. Creosotes d. Tarring

4. What is the purest form of iron?
   a. Cast Iron b. Wrought Iron c. Pig Iron d. Steel

5. Seasoning of timber is done to
   a. Reduce weight only
   b. Prevent shrinkage and warping
   c. Make it soft only
   d. Increase moisture content

6. Excess of lime in brick earth makes the brick
   a. Impermeable
   b. Melt and lose its shape
   c. To lose Cohesion
   d. To Shrink and warp on drying

7. _____ is prepared by dissolving asphalt in volatile solvent.
   a. Asphaltic cement
   b. Cut-back asphalt
   c. Mastic asphalt
   d. Asphaltic emulsion

8. The standard size of brick according to Indian Standard(IS) in mm is
   a. 230*115*57 b. 190*90*90 c. 240*115*55 d. 200*110*100

9. The aggregates of the following shape have minimum voids:
   a. Flaky aggregates
   b. Elongated aggregates
   c. Rounded aggregates
   d. Angular aggregates

10. Which of the following cement is suitable for use in massive concrete structures such as dams?
   a. ordinary Portland cement
   b. sulfate resisting cement
   c. rapid hardening cement
   d. low heat cement

11. The ratio of cement, sand and aggregate in nominal M15 concrete mix is
a. 1:2:4 b. 1:1.5:3 c. 1:1:2 d. 1:3:6

12. An aggregate having all the pores filled with water but having dry surfaces is called
a. Saturated surface dry aggregate b. Dry aggregate
c. Moist aggregate d. Surface dried aggregates

13. The bond produced by laying alternate headers and stretcher in each course in brick masonry is known as:
a. English bond b. Zigzag bond c. Flemish bond d. Rat trap bond

14. Strength of concrete increases with
a. Increase in water cement ratio b. Decrease in curing time
c. Increase in curing time d. Increase in fineness of cement

15. Workability of concrete by slump test is expressed in
a. mm b. mm^2 c. mm^3 d. mm/hr

16. Vicat's apparatus is used to perform
a. Soundness test b. fineness test c. Consistency test d. Compressive Strength test

17. For 100 sq. m concrete (1:2:4), 4cm thick floor, the quantity of cement required is:
a. $0.88m^3$ b. $0.90m^3$ c. $0.94m^3$ d. $1.00m^3$

18. Gypsum is added during the manufacture of cement
a. During burning in the kiln b. At the beginning of grinding the clinker
c. After grinding the clinker d. While mixing the raw materials

19. Which bogue compound in OPC is responsible for progressive strength by slow hardening and releasing less heat of hydration?
a. Dicalcium Silicate b. Tricalcium Silicate
c. Tricalcium Aluminate d. Tetracalcium alumina ferrite

20. The minimum particle size of fine aggregate in a concrete miz should not be less than:
a. 0.0075mm b. 0.75mm c. 0.075mm d. 0.45mm

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SECTION "B"

Attempt *ALL* questions. Assume suitable data if necessary.

1. Explain the importance of Construction material in the field of Engineering. Explain the stress strain diagram for a mild steel under tensile test. [1.5+2.5]

2. Differentiate between cast iron and wrought iron. What is the role of quenching in heat treatment process of metal? [1.5+1.5]

3. What are the characteristics of good timber? Explain how kiln seasoning helps in controlled seasoning of timber. What preservative measures can be applied in order to increase the durability of timber? [1+2+2]

4. List out the harmful ingredients in brick earth. Explain the manufacturing process of Brick. [1+3]

5. Which shape of aggregate is considered the best for making concrete and why? Explain the method of manufacturing of cement for ordinary Portland cement. [1+3]

6. What does the grade "M20" indicate in concrete? Explain Slump test to determine workability of concrete. [1+3]

7. Define Hydration of cement with chemical reactions. Explain the procedure for setting time test of cement in laboratory. [1.5+2.5]

8. Write short notes on (***ANY TWO***) [2×2.5]
   a. Microstructure of Carbon Steel
   b. Structure of Hydrated Cement Paste
   c. Forms of Bitumen

P.T.O

9. How is the durability issue considered in a mix design of concrete? Recommend and design a concrete mix for reinforced concrete structure using Ordinary Portland cement of grade 43 with 28 days' strength 51 N/mm2, if the structure is situated in very severe exposure condition where chemical admixtures are also recommended in the design. [1+6]

- Fine aggregate zone-II
- Degree of supervision = Good
- Design mix target slump = 150 mm
- Maximum nominal size of aggregates = 20 mm (Crushed Angular)
- Sp. gravity of Coarse aggregate = 2.72
- Sp. gravity of fine aggregate = 2.68
- Sp. gravity of cement = 2.93
- Sp. Gravity of admixture = 1.145
- Water absorption of Coarse aggregate and fine aggregate = 0.5% and 1% respectively.
- Missing data, if any can be assumed accordingly

Table 5 Minimum Cement Content, Maximum Water-Cement Ratio and Minimum Grade of Concrete for Different Exposures with Normal Weight Aggregates of 20 mm Nominal Maximum Size

(Clauses 6.1.2, 8.2.4.1 and 9.1.2)

Sl No.	Exposure	Plain Concrete			Reinforced Concrete		
		Minimum Cement Content kg/m³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete	Minimum Cement Content kg/m³	Maximum Free Water-Cement Ratio	Minimum Grade of Concrete
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)
i)	Mild	220	0.60	-	300	0.55	M 20
ii)	Moderate	240	0.60	M 15	300	0.50	M 25
iii)	Severe	250	0.50	M 20	320	0.45	M 30
iv)	Very severe	260	0.45	M 20	340	0.45	M 35
v)	Extreme	280	0.40	M 25	360	0.40	M 40

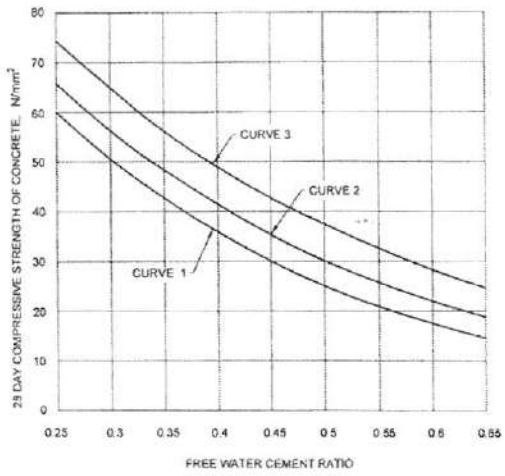

Table 4 Water Content per Cubic Metre of Concrete For Nominal Maximum Size of Aggregate

(Clause 5.3)

Sl No.	Nominal Maximum Size of Aggregate mm	Water Content[1] kg
(1)	(2)	(3)
i)	10	208
ii)	20	186
iii)	40	165

Table 5 Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate for Water-Cement/Water-Cementitious Materials Ratio of 0.50

(Clause 5.5)

Sl No.	Nominal Maximum Size of Aggregate mm	Volume of Coarse Aggregate per Unit Volume of Total Aggregate for Different Zones of Fine Aggregate			
		Zone IV	Zone III	Zone II	Zone I
(1)	(2)	(3)	(4)	(5)	(6)
i)	10	0.54	0.52	0.50	0.48
ii)	20	0.66	0.64	0.62	0.60
iii)	40	0.73	0.72	0.71	0.69