

KATHMANDU UNIVERSITY
End Semester Examination
March, 2024

SOE.

Marks Scored:

Level : B.E.

Course : CIEG 201

Year : II

Semester : I

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date

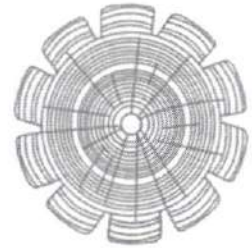
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SECTION "A"

[20Q. × 0.5 = 10 marks]

Choose the most appropriate answer. Symbols have their usual meanings.

- Identify the type of defect in timber shown in the figure.
a. Shakes
b. Rindgalls
c. Twisted fibres
d. Knots
- Sapwood consists of
a. Innermost annular rings around the pith
b. Portion of timber between heartwood and cambium layer
c. Thin layers below the bark
d. Thin fibre which extends from the pith outwards and holds the annular rings together
- Which of the following pairs gives a correct combination of the useful and harmful constituents respectively of a good brick earth?
a. Lime stone and alumina
b. Alumina and iron
c. Alkalies and magnesium
d. Silica and alkalies
- Which of the following stone is best suited for construction of piers and abutments of a railway bridge?
a. Granite
b. Sand stone
c. Lime stone
d. Quartzite
- Cast iron contains carbon approximately
a. 0.05% to 1.75%
b. 0.25 % to 1.15%
c. 1.5% to 5.5%
d. 0.01% to 0.15%
- Which of the following is the main reason to provide frog in the bricks?
a. Print manufacturer's name
b. Form keyed joint between brick and mortar
c. Improve thermal insulation
d. Reduce the weight of brick
- Consider the given statements with respect to unburnt or sun dried bricks.
A. Unburnt or sun dried bricks can be used only in the construction of temporary and cheap structures.
B. Unburnt or sun dried bricks should NOT be used at the places exposed to heavy rains.
Identify the correct statement/s.
a. Both the statements are true
b. Both the statements are false
c. Statement (a) is false and statement (b) is true
d. Statement (a) is true and statement (b) is false



8. Which of the following statements is **not** correct?
- By kiln seasoning moisture content can be reduced to the desired extent.
 - Kiln seasoning is quicker than natural seasoning.
 - Kiln seasoning is superior to natural seasoning.
 - Kiln seasoning needs less stacking place than natural seasoning.
9. In which of the following applications is tar more commonly used than bitumen?
- Road construction
 - Waterproofing
 - Timber preservation
 - Roofing
10. Rapid hardening cement attains early strength due to
- Larger proportion of lime grounded finer than normal cement
 - Lesser proportion of lime grounded coarser than normal cement
 - Lesser proportion of lime grounded finer than normal cement
 - Excess percentage of gypsum
11. Compared to mild steel, cast iron has
- High compressive strength
 - High tensile strength
 - Low compressive strength
 - Low tensile strength
- The correct answer is
- (i) and (ii)
 - (ii) and (iii)
 - (iii) and (iv)
 - (i) and (iv)
12. Proper amount of entrained air in concrete results in
- Better workability
 - Better resistance to freezing and thawing
 - Lesser workability
 - Less resistance to freezing and thawing
- The correct answer is
- (i) and (ii)
 - (i) and (iv)
 - (ii) and (iii)
 - (iii) and (iv)
13. Increase in fineness of cement
- Reduces the rate of strength development and leads to higher shrinkage
 - Increases the rate of strength development and decreases the rate of deterioration
 - Decreases the rate of strength development and increases the bleeding of cement
 - Increases the rate of strength development and results in higher shrinkage
14. What is the requirement of water (expressed as % of cement w/w) for the completion of chemical reactions in the process of hydration of OPC?
- 10 to 15%
 - 16 to 19%
 - 20 to 25%
 - 26 to 30%
15. For high degree of workability, the slump value should vary between
- 0 to 25 mm
 - 25 to 50 mm
 - 50 to 80 mm
 - 80 to 100 mm

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16. Workability of concrete is directly proportional to:
- water cement ratio
 - grading of aggregate
 - strength of aggregate
 - aggregate cement ratio
- a. (iii), (iv) b. (ii), (iv) c. (ii), (iii) d. (i), (ii)
17. For one cubic meter of concrete (1 : 2 : 4), the number of cement bags required is
- a. 4.5 b. 6.3 c. 5.0 d. 5.3
18. In concrete, while hand mixing is adopted, excess cement to be added is
- a. 4% b. 14% c. 10% d. 20%
19. The maturity index of concrete, if it is cured at a constant temperature of 20°C for 5 days is, (Assume datum temperature is -10°C).
- a. 145°C.days b. 150°C.days c. 155°C.days d. 160°C.days
20. Segregation in the concrete occurs when:
- Cement gets separated from mixture due to excess water
 - Cement fails to give adequate binding quality
 - Water is driven out of concrete at a faster rate
 - Coarse aggregates try to separate out from the finer material.

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SECTION "B"

Attempt **ALL** Questions. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. A **mix design table** should be included with this question paper.

1. Explain the mechanical properties of construction materials, highlighting their key characteristics and how they impact their performance in construction. Explain the various defects in timber, supported by a clear and well-labeled sketch. [2+3=5]
2. Compare and differentiate between wrought iron, cast iron, mild steel, and hard steel, highlighting their composition, properties, and applications. What is bitumen emulsion? Explain the conditions under which it is used, and describe the differences between asphalt, bitumen, and tar. [2+3=5]
3. Briefly describe the harmful ingredients present in good brick earth and their effects on brick properties. Explain the necessity of bonds in brickwork. Discuss the different types of bonds used in construction, highlighting their specific purposes, patterns, and applications in various masonry works. [2+3=5]
4. Define workability of concrete. A laboratory experiments conducted at Mahendranagar on a particular mix showed a strength of 40 MPa for fully matured concrete. Find whether formwork can be removed for an identical concrete placed at Mustang at the age of 14 days when the average temperature is 3°C if the concrete is likely to be subjected to a stripping stress of 30.0 MPa. Use the constants $A = 32$ and $B = 54$. [1+4=5]
5. Explain the functions of the constituents C_3S , C_2S , C_3A , and C_4AF when mixed with water. How many types of voids are present in a hydrated cement paste? What are their typical dimensions? Discuss the significance of the C-S-H interlayer space with respect to properties of the hydrated cement paste. [2+3=5]
6. Explain how the Interfacial Transition Zone (ITZ) is affected, using the stress-strain relationship of non-linear elastic concrete. Discuss the significance of drying shrinkage, thermal shrinkage, and creep in concrete. [3+3=6]
7. Many factors have an influence on the compressive strength of concrete. Briefly explain which one of the two options listed below will result in higher strength at 28 days:
 - a. Water-cement ratio of 0.5 vs. 0.4.
 - b. Moist curing temperature of 25°C vs. 10°C [1.5+1.5=3]

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8. 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 45 MPa. [6]
- Maximum nominal size of aggregate: 20 mm
 - Workability: 120 mm (slump, pumpable)
 - Degree of site control: Good
 - Type of aggregate: Crushed angular aggregate
 - Maximum cement content not including fly ash: 450 kg/m^3
 - Chemical admixture type: Superplasticizer - normal
 - Specific gravity of cement: 2.88
 - Chemical admixture: Superplasticizer conforming to IS 9103
 - Fine aggregate: Conforming to grading Zone II
 - Specific gravity of
 - Coarse aggregate: 2.74
 - Fine aggregate: 2.65
 - Chemical admixture: 1.145
 - Water absorption
 - Coarse aggregate: 0.5 percent
 - Fine aggregate: 1.0 percent

