KATHMANDU UNIVERSITY
End Semester Examination
September 2024

Marks Scored:

Level : B.E.
Year : I

Course : CIEG 101
Semester : II

Exam Roll No. :

Time: 30 mins.

F. M. : 10

Registration No.:

Date : 13 SEP 2024

SECTION "A"
[20Q. × 0.5 = 10 marks]

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

1. Which of the following material has the highest carbon content?
   a. Cast Iron b. Wrought Iron c. Mild Steel d. Hard Steel

2. The ability of a material to resist scratching, abrasion, cutting, or penetration.
   a. Stiffness b. Brittleness c. Hardness d. Malleability

3. Which of the following is the primary component of timber?
   a. Cellulose b. Silica c. Lime d. Carbon

4. When iron pyrites are present in clay used for brick making, what happens during the firing process?
   a. Pyrites oxidize, causing expansion b. Pyrites reduce, leading to stronger bricks
   c. Pyrites evaporate, leaving voids d. No significant changes occur

5. Which of the following types of glass is best known for its resistance to heat and thermal shock?
   a. Bottle Glass b. Soda-lime glass c. Potash Lead glass d. Borosilicate glass

6. What is the primary purpose of using a quarrying process known as 'splitting' in stone extraction?
   a. To polish the surface of the stone
   b. To remove impurities from the stone
   c. To create large, manageable blocks of stone
   d. To enhance the color of the stone

7. What is the purpose of using aggregate in concrete?
   a. To improve the thermal insulation b. To provide strength and bulk to the mix
   b. To enhance the aesthetic appearance d. To increase the flexibility of concrete

8. What is the main purpose of curing concrete?
   a. To increase its temperature
   b. To allow it to harden and develop strength
   c. To remove excess water
   d. To mix the ingredients thoroughly

9. Which compound in cement is responsible for early strength gain?
   a. Tetracalcium aluminoferrite (C4AF) b. Dicalcium silicate (C2S)
   c. Tricalcium aluminate (C3A) d. Tricalcium silicate (C3S)

10. Which of the following types of cement is best suited for construction in marine environments?
a. Rapid Hardening Cement
b. Sulfate Resisting Cement
c. Low Heat Cement
d. White Cement

11. Which type of admixture is used to make concrete self-leveling and more flowable?
a. Retarder
b. Air-entraining agent
c. Superplasticizer
d. Accelerator

12. Which test is commonly used to measure the workability of fresh concrete?
a. Compression test
b. Slump test
c.Flexural test
d. Tensile strength test

13. At what age is the compressive strength of concrete typically measured?
a. 3 days
b. 7 days
c. 14 days
d. 28 days

14. What is the gel/space ratio of a sample of concrete made with 500 gm. of cement with 0.5 water/cement ratio on full hydration?
a. 0.802
b. 0.972
c. 1.326
d. 0.248

15. What is the typical range for the water-cement ratio in concrete mix design?
a. 0.20 to 0.30
b. 0.40 to 0.60
c. 0.60 to 0.80
d. 0.10 to 0.20

16. What is the first step in concrete mix design calculation?
a. Determining the slump value
b. Selection of water-cement ratio
c. Calculation of cement content
d. Estimating the target strength

17. Which of the following is essential for effective construction planning?
a. High project cost
b. Detailed schedule and resource allocation
c. Minimum workforce
d. Maximized profit margins

18. What does PPE stand for in construction safety?
a. Personal Protective Equipment
b. Project Planning and Execution
c. Preliminary Project Estimate
d. Preventive Protection Equipment

19. Which of the following materials is commonly used in the construction of pavements and roadways?
a. Clay
b. Marble
c. Asphalt
d. Granite

20. Which of the following is NOT a function of material management?
a. Procurement
b. Inventory control
c. Project scheduling
d. Warehousing

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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.

1. Describe the interconnection between Igneous, Sedimentary and Metamorphic Rocks with example. Explain with procedure, how does the Charpy impact test determine whether a material is brittle or ductile? [2+3]

2. Explain the defects in timber with neat sketch. Explain the manufacturing process of Brick with neat sketch. [2+3]

3. What do you mean by the initial setting time and final setting time of the cement? How the knowledge of these two help the engineers in construction work? Explain the structure of hydrated cement paste. [2.5+2.5]

OR

Explain the properties of construction materials? Explain different methods of dressing of stone. [2+3]

4. Point out the advantages of concrete as a structural material. How do you measure the workability of fresh concrete, explain with experimental procedure? [2+3]

5. What do you understand by grading aggregate? How does it affect the strength of concrete? Calculate the gel/space ratio and the theoretical strength of a sample of concrete made with 400 gm. of cement with 0.65 water/cement ratio, on full hydration and at 40 per cent hydration. [2+3]

6. Describe with the features of the stress-strain curve what do the different regions of the curve represent in terms of concrete's behavior under load? [1+4]

7. Design a concrete mix for M40 grade using IS method. The concrete is to be made with OPC (Ordinary Portland Cement), with a maximum nominal size of aggregate being 20 mm. The workability requirement is a 75 mm slump, and the concrete is non-pumpable. The mix design account for severe exposure conditions, with a maximum cement content of 450 kg/m^3 and a chemical admixture used is superplasticizer. The specific gravities of the materials are as follows: cement is 2.88, coarse aggregate is 2.74, fine aggregate is 2.65 and chemical admixture 1.145. Water absorption is 0.5% for coarse aggregate and 1.0% for fine aggregate, with no moisture content for either. [6]

8. Write Short Notes on ***ANY TWO***: [2 Q. × 2 = 4]
   a. Sustainable Construction Practices
   b. Safety Challenges in Construction
   c. Curing of Concrete