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PRESIDENCY UNIVERSITY BENGALURU

**SET-B**

SCHOOL OF ENGINEERING

**END TERM EXAMINATION – MAY/JUNE 2024**

**Semester :** Semester IV - 2022

**Course Code :** CIV2020

**Course Name :**  - Alternative Building Materials

**Program :** B. Tech.

**Date :** June 21, 2024

**Time :** 9:30 AM - 12:30 PM

**Max Marks :** 100

**Weightage:** 50%

**Instructions:**

1. *Read all questions carefully and answer accordingly.*
2. *Question paper consists of 3 parts.*
3. *Scientific and non-programmable calculator are permitted.*
4. *Do not write any information on the question paper other than Roll Number.*

# PART A

## Answer any 10 Questions 10\*2 = 20 Marks

* 1. What are pozzolanic materials? List any two advantages.

(CO1) [Knowledge]

* 1. Mention any six types of waste materials generated from the agro industry that can be potentially used as a construction material.

(CO1) [Knowledge]

* 1. Outline the properties of a good reinforcing fibre in the preparation of Fibre Reinforced Polymer composites.
  2. List the types of fibres used in Fibre Reinforced Polymer compoites.
  3. Define embodied carbon of a material. Mention the unit of measurement.
  4. List any four green building rating systems.
  5. Define Life Cycle Assessment of a building material.
  6. List any four sustainability features of a green building.
  7. Mention the various stages of measurement of embodied energy.
  8. Define combination mortar.

(CO1) [Knowledge] (CO1) [Knowledge] (CO2) [Knowledge] (CO2) [Knowledge] (CO2) [Knowledge] (CO2) [Knowledge] (CO2) [Knowledge] (CO3) [Knowledge]

* 1. List the types of burnt bricks used in masonry construction.
  2. Mention any two proportions of mortar and its application.
  3. List any four types of alternative wall construction.
  4. Distinguish between English and Flemish bond in wall construction.

# PART B

## Answer any 8 Questions 8\*5 = 40 Marks

(CO3) [Knowledge] (CO3) [Knowledge] (CO4) [Knowledge] (CO4) [Knowledge]

* 1. Blending of Lime-Pozzolana is an intimate mixture of lime and Pozzolana will set in the presence of water, forming calcium silicate and calcium aluminates compounds. Briefly explain the Dry and Wet blending of Lime and Pozzolana.

(CO1) [Comprehension]

* 1. Fibre Reinforced Polymer composites have found application in various branches of engineering and technology. During the initial years it was predominantly used in aerospace structures due to its light weight and high strength where cost was not the governing factor. Indicate any four applications of FRP composites.

(CO1) [Comprehension]

* 1. Pozzolana is a material which consists essentially of amorphous silica or a mixture of amorphous silica and alumina. This is not cementitious by itself, but forms cementitious compounds when it combines with calcium hydroxide at ambient temperature in the presence of moisture. Write a short note on (i) Fly ash (ii) Rice husk ash.

(CO1) [Comprehension]

* 1. Over the past few decades, rooftops have become a large contributor to excessive heat issues. Cool roofing is an emergent and powerful technology used for temperature control of buildings and areas. Describe any four cool roofing solutions.

(CO2) [Comprehension]

* 1. Solar power can be used for multiple applications, which can be characterized as either active solar applications or passive solar applications. Active solar technologies are used to directly convert solar energy into another form of useful energy, such as electricity or heat conversion. Explain any three active solar applications that uses sun's energy.

(CO2) [Comprehension]

* 1. Integrating green building materials into building projects can help reduce the environmental impacts associated with the extraction, transport, processing, fabrication, installation, reuse, recycling, and disposal of these building industry source materials. List the factors that influence the choice of building materials for the construction of a green building.

(CO2) [Comprehension]

* 1. Geothermal energy is thermal energy stored beneath the earth’s surface. It is clean, renewable, and popular because it can be harnessed from almost anywhere in the world to produce heat and electricity. Describe the applications of geothermal energy in green buildings.

(CO2) [Comprehension]

* 1. Mention the various tests conducted on the cement mortar to determine the mechanical properties of the bond.

(CO3) [Comprehension]

* 1. Briefly describe the manufacturing process of wire cut bricks used in masonry construction.

(CO3) [Comprehension]

* 1. List any five criteria that influences the choice of right masonry block in wall construction.

(Co3)[Comprehension]

* 1. Construction of walls can be carried out in a number of ways. Different types of walls may also be recognized. In one of the simplest sub-divisions one can consider walls to be Load bearing and Non- load bearing. Distinguish between a load bearing and non-load bearing wall.
  2. Write a short note on composite masonry construction.

(CO4) [Comprehension] (CO4) [Comprehension]

# PART C

## Answer any 4 Questions 4\*10=40 Marks

* 1. The rapid urbanization of developed countries and the difficulty in disposing of industrial wastes have created opportunities for the construction industry to use them. A wide variety of wastes are already in use with concrete as substitutes for cement and aggregates, as well as reinforcing materials. Briefly explain the use of any four industrial waste materials in the construction.

(CO1) [Application]

* 1. Any building can be a green building, whether it’s a home, an office, a school, a hospital, a community centre, or any other type of structure, provided it includes green features. Explain briefly any four green features of a green building.

(CO2) [Application]

* 1. Embodied energy is considered as an indicator of the overall environmental impact of building materials and systems. Higher the embodied energy greater the impact and vice-versa. Embodied energy of a material or system can be calculated. Calculate the total embodied energy for the RCC beam structure of volume 5 cubic meter. Assume the embodied energy of concrete and steel as 0.0075 MJ/Kg and 6 MJ/Kg respectively.

(CO2) [Application]

* 1. Cement mortar needed for small works is hand mixed and that for large works is mixed by a mixing machine. A concrete mixer is suitable for the latter method. Briefly explain the steps involved in the preparation of mortar by both the methods.

(CO3) [Application]

* 1. Table-moulded bricks are manufactured using clay soil. The process of moulding the bricks is the same as ground moulding, but in this case, the moulds are placed on the table. Briefly explain the manufacturing process of table moulded bricks.

(CO3) [Application]

* 1. Ferro-cement is a special form of reinforced concrete. It is a composite material consisting of cement- sand mortar (matrix) reinforced with layers of small diameter wire meshes. It differs from conventional reinforced concrete primarily by the manner in which the reinforcement is arranged within the brittle matrix. Discuss briefly the functional aspects of materials used in ferrocement construction.

(CO4) [Application]