

Roll No



**PRESIDENCY UNIVERSITY
BENGALURU**

**SCHOOL OF ENGINEERING
MID TERM EXAMINATION - DEC 2023**

Semester : Semester I - B.Tech CIV - 2023

Course Code : CIV1008

Course Name : Sem I - CIV1008 - Basic Engineering Science

Program : B.Tech. Civil Engineering

Date :

Time : -

Max Marks : 50

Weightage : 50%

Instructions:

- (i) Read all questions carefully and answer accordingly.
- (ii) Question paper consists of 3 parts.
- (iii) Scientific and non-programmable calculator are permitted.
- (iv) Do not write any information on the question paper other than Roll Number.

PART A

ANSWER ALL THE QUESTIONS

(5 X 2 = 10M)

1. Write the importance of structural Engineering ?

(CO1) [Knowledge]

Structural engineering deals with the analysis & design of various components of a civil engineering structure.

Model
Answer

Analysis deals with estimating the loads, forces & stresses on the component. Design deals with selecting an appropriate material & deciding suitable dimensions for the structural component such that they resist the loads safely without failure

2. State the objectives of the foundation.

(CO1) [Knowledge]

Four points (4x0.5 = 2 M)

Model
Answer

- To distribute the load from the structure to soil evenly and safely
- To anchor the building to the ground so that under lateral loads building will not move
- To prevent the building from overturning due to lateral forces
- To give level surface for the construction of super structure

3. Classify the bridge based on structural action.

(CO1) [Knowledge]

Model Answer

Any four (4x0.5 = 2M)

Beam bridges

Cable stayed bridges

Suspension bridges

Cantilever bridge

Truss bridge

Arch bridge

4. List out the different types of Urban Roads.

(CO1) [Knowledge]

List out any four : (4x0.5M = 2 M)

Model Answer
Expressways
Arterial Roads
Sub-arterial Roads
Collector Roads
Local street

5. Write brief note on "Water Resources and Irrigation Engineering"

(CO1) [Knowledge]

Model Answer
This field of civil engineering deals with managing the water resources (rivers, ground water) of the country. It also deals with the process of supplying water by artificial means to fields for raising crops. This branch deals with the construction & maintenance of dams for storage of water and canal networks for conveying water

PART B

ANSWER ALL THE QUESTIONS

(4 X 5 = 20M)

6. The railway track is a permanent way for all trains. There are some railway track components in the construction of railway tracks. Explain briefly about the different components of the railway track.

(CO1) [Comprehension]

1. Rails: (1.5M)

- Rails are the members of the track laid in two parallel lines to provide an unchanging, continuous, and level surface for the movement of trains.**
- To be able to withstand stresses, they are made of high-carbon steel.**
- They carry out the function of transmitting the load to a large area of the formation through sleepers and the ballast.**

2. Sleepers: (1.5M)

- Sleepers are the transverse ties that are laid to support the rails.**
- They have an important role in the track as they transmit the wheel load from the rails to the ballast.**
- Model Answer* **Sleepers hold the rails in their correct gauge and alignment.**
- Answer* **It also helps in transferring the load evenly from the rails to a wider area of the ballast.**

3. Ballast: (1M)

- Ballast is a layer of broken stones, gravel, moorum, or any other granular material placed and packed below and around sleepers for distributing load from the sleepers to the formation.**
- It provides drainage as well as longitudinal and lateral stability to the track.**

4. Formation (Subgrade): (1M)

- Subgrade is the naturally occurring soil which is prepared to receive the ballast.**
- The prepared flat surface, which is ready to receive the ballast, along with sleeps and rails, is called the formation.**
- The formation is an important constituent of the track, as it supports the entire track structure.**

7. Mechanization is the process of shifting from working largely or exclusively by hand to do that work using machines. Write any five advantages of Mechanisation in the Construction Industry.

(CO2) [Comprehension]

Any Five points (Each point carries 1 mark)

- 1. The work can be done speedily which avoid time and cost over-runs.**
- 2. Large quantity of materials can be handled, so the size of the project can be increased**
- 3. Complex projects can be carried out easily.**
- 4. High quality standards can be maintained.**
- 5. Optimum use of material, man power & finance.**
- 6. Shortage of skilled and efficient man power can be overcome.**
- 7. Easier and safer work for construction workers.**
- 8. Increased sustainability over a building's lifetime.**
- 9. Little to no building-site construction waste**

Model
Answer

8. Shallow foundations are constructed where soil layer at shallow depth is able to support the structural loads. The depth of shallow foundations are generally less than its width. List out the different types of shallow foundations and Explain any two types of shallow foundation.

(CO1) [Comprehension]

Model Answer **List of shallow foundations (1M)**
Explanation for two types (2x2 =4M)

9. Civil engineers build the world we live in. Civil engineers have many roles and responsibilities that make civil engineering an important part in our daily life. Discuss the various role of Civil Engineers.

(CO1) [Comprehension]

Any five points (5x1 = 5M)

- **Providing shelter to people in the form of low-cost houses to high rise apartments**
- **Laying ordinary village roads to express highways**
- **Constructing irrigation tanks, multipurpose dams, canals for supplying water to agricultural fields**
- **Supplying safe and potable water for public industrial uses**
- **Protecting our environment by adopting sewage treatment solid waste disposal techniques**
- **Constructing hydro-electric thermal power plants for generating electricity**
- **Providing other means of transportation such as railways, harbour and airports**
- **Constructing bridges across streams, rivers and across seas**
- **Tunneling across mountains also under water to connect places easily reduce distance**

Model
Answer

PART C

ANSWER THE FOLLOWING QUESTION

(1 X 20 = 20M)

10. a). A bridge is a structure which provides a safe passage for a road or railway track over obstacles, without closing the obstacle below. Bridges are constructed with several components which are responsible for the strength and stability of the structure. Explain in detail the different components of a bridge. (10)
- b). Different components of a road play an important part in ensuring the safety and service life of a road. The components of a road are designed to meet the design and functional requirements. Discuss in detail about the various road elements. (10)

(CO1) [Application]

a) 5 components. Explanation of each component carries 2 marks

Deck Slab Deck is bridge floor directly carrying traffic loads. Deck transfers loads to the Girders depending on the decking material.

Girder: Girder/Beam is the part of superstructure which is under bending along the span. It is the load bearing member which supports the deck slab.

Bearings: Bearings transfers loads from the girders to the pier caps. Bearing is a component which supports part of the bridge and which transmits forces from one part to another part of the structure while permitting angular and/or linear movement between parts.

Bed Blocks: Bed block rests over the top of the piers & abutments is generally provided to evenly distribute the dead and live loads on the pier and abutments. They are usually made up of Reinforced Cement Concrete.

Abutments: Abutments are vertical structures used to retain the earth behind the structure. The dead and the live loads from the bridge superstructure is also supported by the bridge abutments.

Piers: Pier is a part of the substructure which supports the superstructure and which transfers loads coming on the superstructure to the foundations. Depending up on aesthetics, site, space and economic constraints various shapes of piers are adopted to suit to the requirement. Mostly Reinforced Concrete or pre-stressed concrete are adopted for the construction of piers

Foundation: Foundation is the component which transfers loads from the substructure to the bearing strata. Depending on the geotechnical properties of the bearing strata, shallow or deep foundations are adopted.

Usually, piles and well foundations are adopted for bridge foundations.

Model
Answer

b) 5 parts. Explanation of each part carries 2 marks

Road Elements

- Pavement
- Camber
- Kerb
- Shoulders
- Medians

Pavement:

A highway pavement is a structure consisting of superimposed layers of processed materials above the natural soil sub-grade, whose primary function is to distribute the applied vehicle loads to the sub-grade.

The ultimate aim is to ensure that the transmitted stresses due to wheel load are sufficiently reduced, so that they will not exceed bearing capacity of the sub-grade.

Camber:

- Camber is a transverse slope provided to the road to drain off surface water.
- Camber depends on type of rainfall and pavement.
- Excessive camber causes transverse tilt of vehicle.

Kerb:

- Kerb is a boundary between pavement and footpath or median.
- It remarkets the road boundary and provide lateral support to the pavement.

Shoulders:

- Shoulder is an extra space provided to the road to use an emergency lane.
- Shoulder is much rougher than road so that it can't be used as a regular traffic lane.