Ph.D. COMMON ENTRANCE TEST-JANUARY 2025

SUBJECT – Civil Engineering

PART B

Roll No:

Duration: 60 minutes **Maximum Marks: 50**

Instructions:

1. **This entrance test question paper is not to be taken out of the examination hall**
2. **Question paper consists of Section A and Section B**
3. **Section A consists of 30 MCQs carrying 1 Mark each. Write the Alphabet of the correct answer in the space given.**
4. **Section B consists of Descriptive questions carrying 5 marks each. Restrict your answer to 500 words. Additional plain sheets have been attached to the question paper to answer Section B**

SECTION – A

Answer the following questions by writing the Alphabet of the correct answer in the Box given: **30 X 1 = 30**

1. A bending moment may be defined as:
   A. Arithmetic sum of the moments of all the forces on either side of the section
   B. Algebraic sum of the moments of all the forces on either side of the section
   C. Arithmetic sum of the forces on either side of the section
   D. None of these.

2. If a soil has a liquid of 50 % and a plasticity index of 25 %, find the plastic limit of the soil?
   A. 20%
   B. 25%
   C. 40%
   D. 50%

3. Pycnometer method is used to calculate
   A. Latent heat
   B. Specific gravity
   C. Specific heat
   D. Tensile strength

4. The ratio of shearing stress to shearing strain within elastic limit is known as
   A. Modulus of elasticity
   B. Shear modulus of elasticity
   C. Bulk modulus of elasticity
   D. Tangent modulus of elasticity

5. The Critical Path Method (CPM) is used for:
   A. Resource allocation
   B. Project scheduling
   C. Quality control
   D. Finance Management

6. The coefficient of discharge of an orifice is the ratio of:
   A. Actual discharge to theoretical discharge
   B. Actual velocity to theoretical velocity
   C. Actual pressure to theoretical pressure
   D. None of these

7. For nominal mix concrete M 15, the required weight of fine and coarse aggregates is 350 kg and the volume of water is
   A. 30 Liters
   B. 32 Liters
   C. 34 Liters
   D. 45 Liters

8. Which type of cement is suitable for marine construction?
   A. Ordinary Portland Cement (OPC)
   B. Sulphate Resistant Cement (SRC)
   C. Rapid Hardening Cement (RHC)
   D. All of these

9. Manning's equation is used to calculate:
   A. Flow velocity in an open channel
   B. Pressure in a pipeline
   C. Seepage velocity in soils
   D. Total discharge

10 The Richter scale measures:
   A. Earthquake intensity
   B. Earthquake magnitude
   C. Earthquake duration
   D. Earthquake location

11 What is the main ingredient in concrete that reacts with water to form a solid matrix?

A. Sand
B. Cement
C. Aggregate
D. Soil

12 GIS is used for:

A. Data encryption
B. Spatial analysis
C. Structural analysis
D. Digitization

13 The California Bearing Ratio (CBR) is a measure of:

A. Soil compaction
B. Subgrade strength
C. Asphalt quality
D. Damping ratio

14 In hydrology, the term "infiltration" refers to:

A. Water runoff from a watershed
B. Water absorption into the soil
C. Evaporation of surface water
D. River discharge

15 The method used to analyze indeterminate structures with redundant members is:

A. Slope-deflection method
B. Moment distribution method
C. Force method
D. Stress analysis

16 Which type of pile derives its load-carrying capacity mainly from skin friction?

A. End-bearing pile
B. Friction pile
C. Sheet pile
D. None of these

17 The Rational Method is used for the estimation of:

A. Groundwater flow
B. Peak runoff rate
C. River discharge
D. Evaporation

18 What is the purpose of a Gantt chart in project management?

A. Resource allocation
B. Schedule visualization
C. Cost estimation
D. Vibration measurement

19 EIA is conducted to:

A. Assess the economic viability of a project
B. Evaluate the environmental consequences of a project
C. Determine the social impact of a project
D. Fund management

20 The natural frequency of a structure depends on its:

A. Damping ratio
B. Stiffness and mass
C. Mode shape
D. Economic viability

21 Geotextiles are used primarily for:

A. Waterproofing
B. Reinforcement
C. Insulation
D. Vibration control

22 The Highway Capacity Manual (HCM) provides guidelines for:

A. Bridge design
B. Pavement design
C. Traffic flow analysis
D. Structural monitoring

23 What is the purpose of adding superplasticizers to concrete?

A. Increase strength
B. Improve workability
C. Accelerate curing
D. Reduce the strength

24 LiDAR is a technology used for:

A. Satellite communication
B. Bridge inspection
C. Topographic mapping
D. Satellite control

25 Dynamic compaction is a method used for:

A. Soil stabilization
B. Soil compaction
C. Foundation settlement control
D. Structural health monitoring

26 Biochemical Oxygen Demand (BOD) is a measure of:

A. Oxygen concentration in water
B. Organic pollution in water
C. Inorganic pollution in water
D. Total dissolved solids

27 A cantilever retaining wall is stable if:

A. The wall is tall
B. The base width is sufficient
C. Backfill is loosely compacted
D. Vibration provided

28 Life-cycle cost analysis involves the consideration of costs over the:

A. Design phase
B. Construction phase
C. Entire life of the project
D. Engineer's salary

29 The concept of "Zoning" in urban planning refers to:

A. Building height restrictions
B. Land use regulations
C. Road network planning
D. All of these

30 As compared to gravity dams, earthen dams;

A. Are costlier
B. Are less susceptible to failure
C. Require sound rock foundations
D. Require less skilled labour.

Section - B

Answer any four questions (Each question carry 5 marks 4*5 = 20

1. Discuss the potential benefits of BIM in enhancing project coordination, communication, and efficiency.

2. Elaborate the challenges associated with underground construction in urban environments and strategies for minimizing environmental impact.

3. Explain the importance of nonlinear dynamic analysis in predicting the behavior of structures under extreme loading conditions.

4. How the soil-structure interaction is crucial in the design of deep foundations.

5. Provide insights into innovative technologies and approaches for industrial wastewater treatment, considering environmental sustainability.

6. Discuss the mechanisms involved in self-healing concrete technology and potential applications in enhancing the durability of civil engineering structures.