



**Discipline: CIVIL ENGINEERING**  
(Faculty of Engineering & Technology)

**3<sup>rd</sup> PhD ENTRANCE TEST (PET-2018)**

Roll No: \_\_\_\_\_ Date: **3<sup>rd</sup> June 2018** Signature of the Candidate: \_\_\_\_\_

Q.1 A thin walled cylindrical pressure vessel having a radius 0.5m and wall thickness of 25 mm is subjected to an internal pressure of 700 kPa. The hoop stress developed is:

- (a) 0.014 MPa      (b) 0.14 MPa      (c) 1.4 MPa       (d) 14 MPa

Q.2 A hollow circular shaft has an outer diameter of 100 mm and wall thickness of 25 mm. The allowable shear stress in the shaft is 125 MPa. The maximum torque the shaft can transmit is:

- (a) 23 kNm      (b) 25 kNm      (c) 12.5 kNm      (d) 11.5 kNm

Q.3 Two people weighing  $W$  each are sitting on a plank of length  $L$  floating on water at  $L/4$  from either end. Neglecting weight of the plank, bending moment at the centre of the plank is:

- (a) Zero      (b)  $\frac{WL}{4}$       (c)  $\frac{WL}{8}$       (d)  $\frac{WL}{16}$

Q.4 If  $K$  is defined as the ratio of Young's modulus of elasticity and the permissible stress in compression of a material used in the construction of column, the Rankine's constant used in finding the load carrying capacity of column is proportional to:

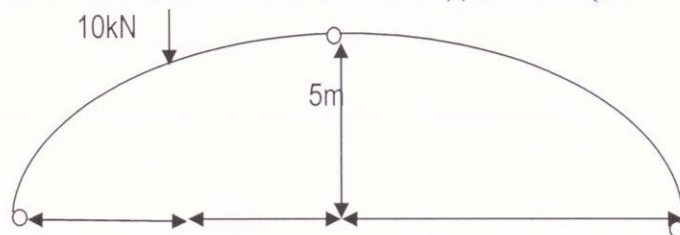
- (a)  $K$        (b)  $1/K$       (c)  $\sqrt{K}$       (d)  $1/\sqrt{K}$

Q.5 A beam simply supported at both ends of length ' $L$ ' carries two equal unlike couples  $M$  at two ends. If the flexural rigidity  $EI$  is constant throughout the beam, the central deflection of beam is given by:

- (a)  $\frac{ML^2}{4EI}$       (b)  $\frac{ML^2}{16EI}$        (c)  $\frac{ML^2}{8EI}$       (d)  $\frac{ML^2}{64EI}$

Q.6 A three hinged parabolic arch having a span of 20 m and a rise of 5 m carries a point load of 10kN at quarter span from the left end. The resultant reaction at the left support and its inclination with the horizontal are:

- (a) 2.50 kN and  $33.70^\circ$   
(b) 10 kN and  $33.70^\circ$   
(c) 9.01 kN and  $33.70^\circ$   
 (d) 9.01 kN and  $56.31^\circ$

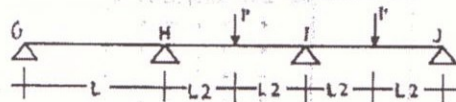


Q.7 A simply supported beam is subjected to a uniformly distributed load of intensity  $w$  per unit length on half of the span from one end. The length of the span and the flexural stiffness are denoted as  $L$  and  $EI$ , respectively. The deflection at mid span of the beam is:

- (a)  $\frac{5wL^4}{6144EI}$        (b)  $\frac{5wL^4}{768EI}$       (c)  $\frac{5wL^4}{384EI}$       (d)  $\frac{5wL^4}{192EI}$



- Q.8 As a construction material, plywood is preferred to thin planks of timber because of:
- (a) Good strength and dimensional stability in both lateral and longitudinal directions
  - (b) Good dimensional stability in both longitudinal and lateral directions
  - (c) Good strength in both longitudinal and lateral directions
  - (d) Economic and environmental considerations
- Q.9 The approximate ratio of strength of 160 x300 mm concrete cylinder to that of 150 mm cube of concrete is:
- (a) 1.25
  - (b) 1.00
  - (c) 0.85
  - (d) 0.60
- Q.10 Sinking fund is:
- (a) The fund for rebuilding a structure when its economic life is over
  - (b) Raised to meet maintenance cost
  - (c) The total sum to be paid to the municipal authorities by the tenants
  - (d) A part of money kept in reserve for providing additional structures and structural modifications
- Q.11 For a given activity, the optimistic time, pessimistic time and most probable estimates are 5, 17 and 8 days, respectively. The expected time is:
- (a) 3 days
  - (b) 9 days
  - (c) 12 days
  - (d) 18 days
- Q.12 The maximum strain under limit state of compression as per IS: 456 2000 is:
- (a) 0.0035
  - (b) 0.003
  - (c) 0.0025
  - (d) 0.002
- Q.13 In a doubly reinforced rectangular beam, the allowable stress in compression steel is:
- (a) Equal to the permissible stress in tension in steel
  - (b) More than the permissible stress in tension steel
  - (c) Less than the permissible stress in tension steel
  - (d) Half of the ultimate tensile strength of steel
- Q.14 A continuous beam is loaded as shown in the figure. Assuming plastic moment capacity equal to  $M_p$ , the minimum load at which the beam would collapse:

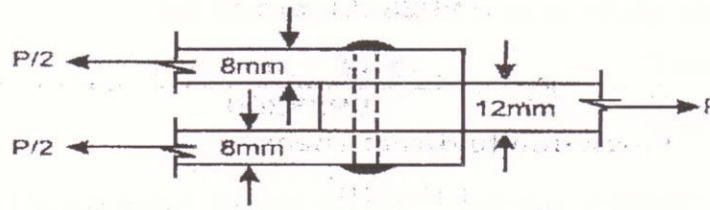


- (a)  $\frac{4M_p}{L}$
- (b)  $\frac{6M_p}{L}$
- (c)  $\frac{8M_p}{L}$
- (d)  $\frac{10M_p}{L}$





- Q. 15 A 12 mm thick plate is connected to two 8 mm thick plates on either side through a 16 mm diameter power driven field rivet as shown in figure. Assuming permissible shear stress as 90MPa and permissible bearing stress as 270 MPa in the rivet, the rivet value of the joint is:



- (a) 11.65 kN                      (b) 21.65 kN                      (c) 36.29 kN                      ✓ (d) 43.29 kN
- Q. 16 The description of *sandy silty clay* signifies that:
- (a) The soil contains unequal proportions of the three constituents in order sand > silt > clay  
 (b) The soil contains equal proportions of sand silt and clay  
 ✓ (c) The soil contains unequal proportions of the three constituents such that clay > silt > sand  
 (d) The soil contains unequal proportions of sand, silt and clay
- Q. 17 The effect of cohesion on a soil is to:
- ✓ (a) Reduce the active earth pressure intensity but to increase passive earth pressure intensity  
 (b) Increase the active earth pressure intensity but to reduce the passive earth pressure intensity  
 (c) Reduce both the active and passive earth pressure intensities  
 (d) Increase both the active and passive earth pressure intensities
- Q.18 For an anisotropic soil, permeabilities in  $x$  and  $y$  directions are  $K_x$  and  $K_y$ , respectively, in a two dimensional flow. The effective permeability  $K_{eq}$  for the soil is given by:
- (a)  $K_x + K_y$                       (b)  $K_x/K_y$                       (c)  $(K_x^2 + K_y^2)^{1/2}$                       ✓ (d)  $\sqrt{K_x K_y}$
- Q.19 For sampling saturated sands and other soft and wet soils satisfactorily, the most suitable soil sampler is:
- (a) Open drive thin walled tube sampler                      ✓ (b) Standard split spoon sampler  
 (c) Stationary piston sampler                      (d) Rotary sampler
- Q.20 In consolidation testing, curve fitting method is used to determine:
- (a) Compression Index                      (b) Swelling Index  
 ✓ (c) Coefficient of Consolidation                      (d) Time Factor
- Q.21 If an infinite slope of clay at a depth 5 m has cohesion of 10 kN/m<sup>2</sup> and unit weight of 20 kN/m<sup>3</sup>, the stability number will be:
- ✓ (a) 0.1                      (b) 0.2                      (c) 0.3                      (d) 0.4



- Q.22 For a body completely submerged in a fluid, the centre of gravity (G) and centre of buoyancy (O) are known. The body is considered to be in stable equilibrium if:
- (a) O does not coincide with the centre of mass of the displaced fluid
  - (b) G coincides with the centre of mass of the displaced fluid
  - (c) O lies below G
  - (d) G lies below O
- Q.23 A trapezoidal channel is 10 m wide at the base and has a side slope of 4 horizontal to 3 vertical. The bed slope is 0.002. The channel is lined with smooth concrete (Manning's coefficient is 0.012). The hydraulic radius (m) for a depth of flow 3 m is:
- (a) 1.5
  - (b) 2.1
  - (c) 3.1
  - (d) 3.5
- Q.24 The flow of water (mass density = 1000 kg/m<sup>3</sup> and kinematic viscosity = 10<sup>-6</sup> m<sup>2</sup>/s) in a commercial pipe having roughness  $k_s$  as 0.12 mm yields an average shear stress at the pipe boundary 600 N/m<sup>2</sup>. The value of  $k_s/\delta'$  ( $\delta'$  being thickness of laminar sub layer) for this pipe is:
- (a) 4
  - (b)  $\frac{1}{4}$
  - (c) 8
  - (d)  $\frac{1}{8}$

Common data for Q. 25-26

Ordinates of a 1hr unit hydrograph at 1hr intervals starting from time  $t = 0$  are 0, 2, 6, 4, 2, 1 and 0 m<sup>3</sup>/s.

- Q. 25 Catchment area represented by this unit hydrograph is:
- (a) 1 km<sup>2</sup>
  - (b) 2 km<sup>2</sup>
  - (c) 3.2 km<sup>2</sup>
  - (d) 5.4 km<sup>2</sup>
- Q.26 Ordinate of a 3-hr unit hydrograph for the catchment at  $t = 3$ hrs is:
- (a) 2 m<sup>3</sup>/s
  - (b) 4 m<sup>3</sup>/s
  - (c) 6 m<sup>3</sup>/s
  - (d) 8 m<sup>3</sup>/s
- Q.27 A tropical cyclone in the northern hemisphere is a zone of:
- (a) Low pressure with clockwise wind
  - (b) low pressure with anticlockwise wind
  - (c) High pressure with clockwise wind
  - (d) High pressure with anticlockwise wind
- Q. 28 For medium silt whose average grain size is 0.16 mm, Lacey's silt factor is likely to be:
- (a) 0.30
  - (b) 0.45
  - (c) 0.70
  - (d) 1.32
- Q. 29 Air binding phenomenon in rapid sand filter occurs due to:
- (a) Excessive negative head
  - (b) Mud ball formation
  - (c) Higher turbidity in the effluent
  - (d) Low temperature
- Q. 30 A city supply of 15000 cubic metres of water per day is treated with chlorine dosage of 0.5 ppm. For this purpose, the requirement of 25% bleaching powder per day would be:
- (a) 300 gm
  - (b) 300 kg
  - (c) 30 gm
  - (d) 30 kg





- Q.31 Electrical conductivity (EC) of water and total dissolved solids (TDS) are interrelated. The value of EC will:
- (a) Decreases with increase in TDS  
 (b) Increases with increase in TDS  
 (c) Decreases initially and then increases with increase in TDS  
 (d) Increases initially and then decreases with increase in TDS
- Q.32 One litre of sewage when allowed to settle for 30 minutes gives a sludge volume of  $27 \text{ cm}^3$ . If the dry weight of this sludge is 3 grams, its sludge volume index will be:
- (a) 9 (b) 18 (c) 36 (d) 72
- Q.33 Self purification of running streams may be due to:
- (a) Sedimentation Oxidation and Coagulation (b) Dilution, Sedimentation and Coagulation  
 (c) Dilution Sedimentation and Oxidation (d) Dilution Oxidation and Coagulation
- Q.34 As per IRC: 67 2001 a traffic sign indicating the speed limit on a road should be:
- (a) Circular shape with red background and white border  
 (b) Triangular shape with white background and red border  
 (c) Triangular shape with red background and white border  
 (d) Circular shape with white background and red border
- Q.35 The design speed for a two lane road is 80 Kmph. When a design vehicle with wheelbase of 6.6m is negotiating a horizontal curve on that road, the off tracking is measured as 0.096 m. The required widening of carriageway of the two lane road on the curve is approximately:
- (a) 0.85 m  (b) 0.75 m (c) 0.65 m (d) 0.55 m
- Q.36 Two major roads with two lanes each are crossing in an urban area to form an un-controlled intersection. The number of conflict points, when both roads are one way is 'X' and when both roads are two way is 'Y'. The ratio of X and Y is:
- (a) 0.25 (b) 0.50 (c) 0.75 (d) 1.0
- Q.37 Road roughness is measured using:
- (a) Benkelman beam (b) Dynamic cone penetrometer  
 (c) Bump Integrator (d) Falling weight deflectometer
- Q.38 The magnetic bearing of a line AB was  $N59^{\circ}30'W$  in the year 1967, when the declination was  $4^{\circ}10'E$ . If the present declination is  $3^{\circ}W$ , the whole circle bearing of the line is:
- (a)  $299^{\circ}20'$  (b)  $293^{\circ}20'$  (c)  $301^{\circ}40'$   (d)  $307^{\circ}40'$



Q.39 A light house of 120 m height is just visible above the horizon from a ship. The correct distance (m) between the ship and the light house considering combined correction for curvature and refraction is:

- (a) 42226                      (b) 4222.6                      (c) 422.26                      ✓ (d) 42.226 ;

Q.40 The local mean time at a place located in longitude  $90^{\circ}40'E$  when the standard time is 6 hrs and 30 minutes and the standard meridian is  $82^{\circ}30'E$  is:

- ✓ (a) 7 hrs, 02 minutes and 40 seconds                      (b) 5 hrs, 2 minutes and 40 seconds  
(c) 5 hrs, 57 minutes and 20 seconds                      (d) 6 hrs and 30 minutes



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