



**NATIONAL INSTITUTE OF TECHNICAL TEACHERS
TRAINING AND RESEARCH
(DEEMED TO BE UNIVERSITY UNDER DISTINCT CATEGORY)
CHANDIGARH**

Ph.D. Entrance Examination - January 2025

Subject / Branch / Department :	Civil Engineering
Roll No. :	
Candidate Name :	
Date of Examination :	

Maximum Marks: 25 (There is no negative marking)

- Notes:** (a) Only one option to be tick-marked out of the four options given as answer
 (b) The Candidate must put his/her signature with date at the bottom of each page
 (c) For any rough work, please use ONLY back-sides of pages which are left blank

Q1.	If c is a constant, solution of the equation below is; $\frac{dy}{dx} = 1 + y^2$
(a)	$y = \sin(x + c)$
(b)	$y = \cos(x + c)$
(c)	$y = \tan(x + c)$
(d)	$y = e^x + c$
Q2.	Which of the following statements is NOT true?
(a)	The measure of skewness is dependent upon the amount of dispersion.
(b)	In a symmetric distribution, the values of mean, mode and median are the same.
(c)	In a positively skewed distribution, mean > median > mode.
(d)	In a negatively skewed distribution, mode > mean > median.
Q3.	The following function has a local minima at which value of x $f(x) = x\sqrt{5 - x^2}$
(a)	$(-\sqrt{5})/2$
(b)	$\sqrt{5}$
(c)	$(\sqrt{5})/2$
(d)	$-\sqrt{5}/2$
Q4.	The major and minor principal stresses at a point are 3 MPa and -3 MPa respectively. The maximum shear stress at this point is
(a)	Zero

(b)	3 MPa
(c)	6 MPa
(d)	9 MPa
Q5.	A cantilever beam curved in plane is subjected to lateral loads will develop at any section
(a)	Bending moment and shearing force
(b)	Bending moment and twisting moment
(c)	Twisting moment and shearing force
(d)	Bending moment, twisting moment and shearing force
Q6.	Which of the following term denotes the fluctuation in activity time without impacting the project completion?
(a)	Total Float
(b)	Slack
(c)	Earliest Activity Time
(d)	Latest Occurrence Time
Q7.	The compound which is largely responsible for initial setting and early strength gain of Ordinary Portland Cement is
(a)	C ₃ A
(b)	C ₃ S
(c)	C ₂ S
(d)	C ₄ AF
Q8.	Match the information given in Group-I with those in Group-II
	Group – I
	P. Factor to decrease ultimate strength to design strength
	Q. Factor to increase working load to ultimate load from design
	R. Statical method of ultimate load analysis
	S. Kinematical mechanism method of ultimate load analysis
	Group – II
	1. Upper bound on ultimate load
	2. Lower bound on ultimate load
	3. Material partial safety factor
	4. Load factor
(a)	P-1; Q-2; R-3; S-4
(b)	P-2, Q-1; R-4; S-3
(c)	P-3; Q-4; R-2; S-1
(d)	P-4; Q-3; R-2; S-1
Q9.	The critical bending compressive stress in the extreme fibre of a structural steel section is 1000 MPa. It is given that the yield strength of the steel is 250 MPa, width of flange is 250 mm and thickness of flange is 15 mm. As per the provisions of IS: 800-2007, the non-dimensional slenderness ratio of the steel cross-section is:

(a)	0.50
(b)	2.00
(c)	0.25
(d)	0.75

Q10. A retaining wall of height H with smooth vertical backface supports a backfill inclined at an angle β with the horizontal. The backfill consists of cohesionless soil having angle of internal friction ϕ . If the active lateral thrust acting on the wall is P_a which one of the following statements is TRUE?

(a)	P_a acts at a height $H/3$ from the base of the wall and at an angle β with the horizontal
(b)	P_a acts at a height $H/2$ from the base of the wall and at an angle ϕ with the horizontal
(c)	P_a acts at a height $H/2$ from the base of the wall and at an angle β with the horizontal
(d)	P_a acts at a height $H/3$ from the base of the wall and at an angle ϕ with the horizontal

Q11. The notation "SC" as per Indian standard Soil Classification System refers to

(a)	Clayey silt
(b)	Sandy clay
(c)	Silty clay
(d)	Clayey sand

Q12. The action of negative skin friction on the pile is to

(a)	Increase the ultimate load on the pile
(b)	Reduce the allowable load on the pile
(c)	Maintain the working load on the pile
(d)	Reduce the settlement of the pile

Q13. If the path of an irrigation canal is below the level of a natural stream, the type of cross drainage structure provided is

(a)	Aqueduct
(b)	Super passage
(c)	Sluice gate
(d)	Level crossing

Q14. Consider a two-dimensional flow through isotropic soil along x-direction and z-direction. If h is the hydraulic head, the Laplace's equation of continuity is expressed as:

(a)	$\frac{\partial^2 h}{\partial x^2} + \frac{\partial^2 h}{\partial x \partial z} + \frac{\partial^2 h}{\partial z^2} = 0$
(b)	$\frac{\partial^2 h}{\partial x^2} + \frac{\partial^2 h}{\partial z^2} = 0$
(c)	$\frac{\partial h}{\partial x} + \frac{\partial h}{\partial x} \frac{\partial h}{\partial z} + \frac{\partial h}{\partial z} = 0$
(d)	$\frac{\partial h}{\partial x} + \frac{\partial h}{\partial z} = 0$

Q15. In a certain month, the reference crop evapotranspiration at a location is 6mm day. If the crop coefficient and soil coefficient are 1.2 and 0.8 respectively, the actual evapotranspiration in mm/day is;

- (a) 8.00
- (b) 7.20
- (c) 6.80
- (d) 5.76

Q16. As per IS 10500:2012, for drinking water in the absence of alternate source of water, the permissible limits for chloride and sulphate, in mg/L, respectively are

- (a) 250 and 200
- (b) 1000 and 400
- (c) 200 and 250
- (d) 500 and 1000

Q17. Water distribution systems are sized to meet the;

- (a) Maximum hourly demand
- (b) Average hourly demand
- (c) Maximum daily demand and fire demand
- (d) Average daily demand and fire demand

Q18. Which of the following is not present in the acid rain;

- (a) HNO_3
- (b) H_2SO_4
- (c) H_2CO_3
- (d) CH_3COOH

Q19. There are 20,000 vehicles operating in a city with an average annual travel of 12,000 km per vehicle. The NO_x emission rate is 2.0 g/km per vehicle. The total annual release of NO_x will be;

- (a) 4,80,000 kg
- (b) 4,800 kg
- (c) 480 kg
- (d) 48 kg

Q20. The super elevation to be provided in horizontal curves of radius R in hill roads is given by;

(a)	$V^2/127R$
(b)	$V^2/17.5R$
(c)	$V^2/225R$
(d)	$(V+8)^2/127R$

Q21. Optimum signal cycle in Webster Method is given by C:

(a)	$C = (1.5 L + 10) / (1 + Y)$
(b)	$C = (1.5 L + 5) / (1 + Y)$
(c)	$C = (1.5 L + 5) / (1 - Y)$
(d)	$C = (1.65 L + 5) / (1 - Y)$

Q22. For the hottest month of the year at the proposed airport site, the monthly mean of the average daily temperature is 39°C. The monthly of the maximum daily temperature is 48°C for the same month of the year. From the given information, the calculated Airport Reference Temperature (in °C), is

(a)	42
(b)	39
(c)	36
(d)	48

Q23. If aggregate size of 50-40 mm is to be tested for finding out the portion of elongated aggregates using length gauge, the slot length of the gauge should be;

(a)	81 mm
(b)	45 mm
(c)	53 mm
(d)	90 mm

Q24. The interior angles of four triangles are given below:

Triangle	Interior Angles
P	85°, 50°, 45°
Q	100°, 55°, 25°
R	100°, 45°, 35°
S	130°, 30°, 20°

Which of the triangles are ill-conditioned and should be avoided in Triangulation surveys?

(a)	Both P and R
(b)	Both Q and S
(c)	Both P and S
(d)	Both Q and R

Q25. Optimal flight planning for a photogrammetric survey should be carried out considering;

(a)	Only side-lap
(b)	Only end-lap
(c)	Either side-lap or end-lap
(d)	Both side-lap as well as end-lap



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Answer Key

Civil Engineering

1.	c
2.	d
3.	d
4.	b
5.	d
6.	a
7.	b
8.	c
9.	a
10.	a
11.	d
12.	b
13.	b
14.	b
15.	d

16.	b
17.	c
18.	d
19.	a
20.	c
21.	c
22.	a
23.	a
24.	b
25.	d
