

Seat No. _____

SUB: CIVIL ENGINEERING (CE)

Time :1 Hour 30 minutes

Instructions:

- 1. Ensure that all pages are printed.**
- 2. Use Black ball pen only**
- 3. Change in option is not allowed**
- 4. There is no negative marking**
- 5. Use of non-programmable scientific calculator is allowed**

1.	For a fixed beam with span L and central point load having plastic moment capacity of M_p , the collapse load will be			
	A	$4 M_p / L$	B	M_p / L
	C	$6 M_p / L$	D	$8 M_p / L$
2.	Deflection of a beam including the effect of temperature, creep and shrinkage occurring after erection of partitions and application of finishes should not normally exceed			
	A	Span /350	B	20mm
	C	A or B whichever is less	D	A or B whichever is more
3.	The minimum quantity of cement content in one m^3 of a reinforced concrete in extreme environment exposure condition in (kg/m^3)			
	A	200	B	250
	C	300	D	360
4.	In a T – beam, when the depth of the web exceeds 750 mm, side face reinforcement shall not be less than			
	A	1 % of cross sectional area	B	0.1 % of cross sectional area
	C	0.1 % of flange area	D	0.1 % of web area
5.	Which statement is correct?			
	A	Higher slumps shows higher workability	B	Higher Compacting factor shows higher workability
	C	Vee-Bee test is suitable for low to very low workability	D	All of the above
6.	According to IS-456-2000, numbers of standard concrete mix are?			
	A	4	B	5

	C	6	D	7
7.	A simply supported beam has an effective span of 16 m. What shall be the limiting ratio of span to effective depth as per IS 456-2000?			
	A	26	B	20
	C	12.5	D	7
8.	The minimum 28-days cube compressive strength for pre-tensioned member is			
	A	20 kN/m ²	B	25 kN/m ²
	C	30 kN/m ²	D	40 kN/m ²
9.	A point on a Mohr's circle represents			
	A	Normal and shear stress	B	Principal stress and shear stress
	C	Major and minor principal stress	D	Maximum shear and Principal stress
10.	The role of super plasticizer in a cement paste is to			
	A	Disperse the particles	B	Remove air bubble
	C	To retard setting time	D	All of above
11.	The effective length of column having fixed support at one end and hinged support at another end shall be			
	A	L	B	2L
	C	L/2	D	L/√2
12.	In a diamond shape cross section, maximum shear stress lies at			
	A	Neutral axis		Above and below neutral axis
	C	Extreme fibre		Central fibre
13.	In a thin walled cylindrical pipe section having diameter 200 mm and thickness 1 mm, carries water at 5 N/mm ² pressure, hoop stress shall be			
	A	250 MPa	B	500 MPa
	C	125 MPa	D	Zero
14.	An overhang beam AB is having span L between supports and overhang length L/2 beyond support B. If a UDL 'w' is applied on length L/2 on either side of support B, the reaction at support A will be			
	A	wL/2	B	1.5wL/2
	C	Zero		wL
15.	The slope of bending moment diagram represents,			
	A	Maximum bending moment	B	Shear force
	C	Maximum shear force	D	Bending moment
16.	A cantilever beam carrying UDL over its entire span is to be replaced by a simply supported beam of same span. The maximum bending stress will be			
	A	Reduced by two times	B	Reduced by four times
	C	Increased by two times	D	Increased by four times
17.	Term $[EI \cdot d^2y/dx^2]$ represents			
	A	Bending moment	B	Shear force
	C	Slope of bending moment diagram	D	Maxima/minima condition for deflection
18.	Shear centre of a channel section placed as C will			
	A	Pass through web	B	Pass through flange
	C	Pass through centroid	D	None of the above

19.	Intermediate vertical stiffeners are provided in the plate girders to			
	A	Eliminate web buckling	B	Eliminate local buckling
	C	Transfer concentrated load	D	Prevent excessive deflection
20.	Which one of the following is the load factor?			
	A	Live load/Dead load	B	Failure load/ Working load
	C	Total load/Dead load	D	Dynamic load/Static load
21.	Texture classification is merely based on			
	A	Grain size	B	Consistency limits
	C	Grain size and consistency limit	D	Plasticity index
22.	The pore water pressure in the capillary zone is			
	A	Zero	B	Positive
	C	Negative	D	Very low
23.	Consolidation is			
	A	Function of the total stress	B	Function of the neutral stress
	C	Function of the effective stress	D	Does not depend upon the present stress
24.	The shear strength of a saturated clay from unconfined compression test is			
	A	Twice the unconfined compression strength	B	Half the unconfined compression strength
	C	Four times the unconfined compression strength	D	Thrice the unconfined compression strength
25.	The type of shear test (with regard to drainage conditions) in which no significant volume changes are expected and pore pressure develop throughout the test is			
	A	Consolidated undrained test	B	Unconsolidated undrained test
	C	Consolidated drained test	D	Slow test
26.	The presence of cohesion in soil mass			
	A	Increases the active pressure and decreases the passive resistance	B	Decreases both active pressure and t passive resistance
	C	Increases both active pressure and passive resistance	D	Decreases the active pressure and increases the passive resistance
27.	The maximum angle β of an infinite slope of a purely cohesionless soil is			
	A	Equal to the angle of internal friction	B	Equal to half of the angle of internal friction
	C	Equal to one third of the angle of internal friction	D	Does not depend upon the angle of internal friction
28.	Which statement is NOT correct in the case of compaction?			
	A	The compactive energy delivered in the case of modified Proctor test is 4.55times the standard Proctor test	B	The 100% saturation line and zero air void line are same
	C	The optimum moisture content is corresponding to maximum dry density in a soil sample	D	The height of fall of rammer in the case of modified Proctor test is 300mm

29.	The group efficiency of a pile group			
	A	Will be always less than 100%	B	Will be always greater than 100%
	C	May be less than 100% or more than 100% depending upon the type of soil, method of installation and pile spacing	D	Is more than 100% for pile groups in cohesionless soils and less than 100% for those in cohesive soils
30.	Two footings, one circular and other square, are founded on the surface of a pure cohesionless soil. The diameter of the circular footing is same as that of the side of the square footing. The ratio of their ultimate bearing capacities is			
	A	1	B	$\frac{1}{3}$
	C	$\frac{4}{3}$	D	$\frac{3}{4}$
31.	The total lateral earth pressure at a point in a soil mass is			
	A	Directly proportional to the square of the depth of soil	(B)	Inversely proportional to the square of the depth of soil
	C	Directly proportional to the depth of soil	(D)	Inversely proportional to the depth of soil
32.	The area of longitudinal steel reinforcement in a column should not be			
	A	Less than 0.8 % of the area of concrete section required for direct load	(B)	More than 6 % of the gross sectional area of column
	C	Either (A) and (B)	(D)	Both (A) and (B)
33.	In prestressed concrete, the maximum loss of stress in pre tensioning is due to			
	A	Creep in steel	B	Shrinkage in concrete
	C	Creep in concrete	D	Elastic shortening in concrete
34.	The slope deflection method in structural analysis falls in category of			
	A	Force method	B	Flexibility method
	C	Consistent deformation method	D	Displacement method
35.	Which of the rain gauge does not produce mass curve of precipitation as record?			
	A	Symon's raingauge	B	Tipping bucket raingauge
	C	Natural siphon type gauge	D	Weighing bucket type gauge
36.	The double-mass curve technique is adopted to			
	A	check the consistency of raingauge records	B	to find the average rainfall over a number of years
	C	to find the number of raingauge required	D	to estimate the missing rainfall data
37.	A hyetograph is a plot of			
	A	cumulative rainfall vs time	B	rainfall intensity vs time
	C	rainfall depth vs duration	D	discharge vs time

38.	A 6-hour storm had 6 cm of rainfall and the resulting runoff was 3.0 cm. If the infiltration index (ϕ -index) remains at the same value the runoff due to 12 cm of rainfall in 9 h in the catchment is			
	A	9.0 cm	B	4.5 cm
	C	6.0 cm	D	7.5 cm
39.	The shape of the recession limb of a hydrograph depends on			
	A	basin as well as storm characteristics	B	storm characteristics only
	C	basin characteristics only	D	base flow only
40.	The basic assumptions of the unit-hydrograph theory are			
	A	nonlinear response and time invariance	B	time invariance and linear response
	C	linear response and linear time variance	D	nonlinear time variance and linear response
41.	A triangular direct runoff hydrograph due to an isolated storm has a time base of 60 h and a peak flow of 30 m ³ /s that occurs at 20 h from the start. If the catchment area is 300 km ² , what is the rainfall excess in the storm?			
	A	108 mm	B	216 mm
	C	10.8 mm	D	8.3 mm
42.	Which theory is not used to design the weir/barrage on permeable foundation?			
	A	Bligh's creep theory	B	Lane weighted creep theory
	C	Rankine's theory	D	Khosla's theory
43.	Which factor does not affect duty of irrigation water?			
	A	Mode of applying water	B	Quality of crop
	C	Method of assessment	D	Canal conditions
44.	The shape of uplift pressure diagram in the case of a gravity dam (with no drainage gallery) storing water on upstream face with tail water will be			
	A	Trapezoidal	B	Triangle
	C	Rectangle	D	Square
45.	The upstream slope of an earthen dam is to be checked against			
	A	Steady seepage	B	Sudden drawdown

	C	Foundation shear	D	None of these
46.	Which type of spillway will face problem of cavitation?			
	A	Side channel spillway	B	Straight drop spillway
	C	Ogee spillway	D	Siphon spillway
47.	Falling drops of rain acquire spherical shape on account of			
	A	Viscosity	B	Surface tension
	C	Vapor pressure	D	Compressibility
48.	The vertical component of pressure force on a submerged curved surface is equal to			
	A	Its horizontal component	B	The force on a horizontal projection of the curved surface
	C	The weight of liquid vertically above the curved surface	D	The product of pressure at centroid and surface area
49.	If the stream function $\psi = 2xy$, then the velocity at a point (1,2) is equal to			
	A	2	B	4
	C	16	D	$\sqrt{20}$
50.	The discharge through V-notch varies as			
	A	$H^{1/2}$	B	$H^{3/2}$
	C	$H^{5/2}$	D	H
51.	Boundary layer separation is caused by			
	A	Release of bubbles from the fluid when the pressure goes below vapor pressure	B	An adverse pressure gradient
	C	Reduction of pressure gradient to zero	D	The boundary layer thickness reducing to zero
52.	For hydrodynamically rough boundary, the friction coefficient			
	A	Is constant	B	Varies inversely with Reynolds number
	C	Is function of Reynolds number and relative roughness	D	Is dependent on relative roughness only
53.	Critical depth in channel is expressed by			

	A	$Q^2T/gA^3=1$	B	$QT^2/gA^3=1$
	C	$QT/gA^3=1$	D	$Q^2T^2/gA^3=1$
54.	Mach number is ratio of inertia force to			
	A	Pressure force	B	Elastic force
	C	Surface tension force	D	Gravitational force
55.	The condition for M_2 profile to develop in a mild slope channel is, (here y_n is normal depth and y_c is critical depth of flow)			
	A	$y > y_n > y_c$	B	$y_n > y > y_c$
	C	$y_c > y_n > y$	D	$y > y_n = y_c$
56.	Continuity equation			
	A	Express the relation between energy and work	B	Relates momentum per unit volume for two points on a stream tube
	C	Relates mass rate of flow along a stream tube	D	Constant discharge through a long straight tapering pipe
57.	The head loss in turbulent flow in pipe			
	A	Varies directly as the velocity	B	Varies inversely as the square of the velocity
	C	Varies inversely as the square of the diameter	D	Varies approximately as the square of the velocity
58.	The pressure, in metres of oil (specific gravity=0.8) equivalent to 80m of water is			
	A	64m	B	80m
	C	100m	D	88m
59.	In networks of pipes			
	A	The head loss around each elementary circuit must be zero	B	The head loss in all circuit is the same
	C	The elevation of hydraulic grade line is assumed for each junction	D	Elementary circuits are replaced by equivalent pipes
60.	Turbulent boundary layer thickness is proportional to (Where X is the distance from leading edge)			
	A	$X^{1/5}$	B	$X^{4/5}$
	C	$X^{3/5}$	D	$X^{2/5}$
61.	Which is not used as coagulant in the treatment of water?			
	A	Aluminum sulphate	B	Copper sulphate
	C	Sodium aluminate	D	Ferric sulphate
62.	What is the permissible limit of chlorides in water?			
	A	150 ppm	B	200 ppm

	C	250 ppm	D	300 ppm
63.	Which does not remove permanent hardness in water?			
	A	Boiling	B	Lime soda process
	C	Base-exchange process	D	Demineralization process
64.	During the epidemics of water borne disease, high dose of chlorine given beyond break point is termed as			
	A	Super-chlorination	B	pre-chlorination
	C	post-chlorination	D	De-chlorination
65.	Which test does not determine residual chlorine in water ?			
	A	EDTA test	B	Starch-Iodide test
	C	Orthotolidine test	D	Orthotolidine-Arsenite test
66.	Which does not remove the colour, odour and taste from water ?			
	A	Treatment with activated carbon	B	Treatment with copper sulphate
	C	Aeration	D	Treatment with lime-soda
67.	Which statement is not correct?			
	A	The presence of nitrogen in sewage indicates the presence of organic matter	B	The presence of hydrogen sulphide gas in sewage indicates the anerobic decomposition
	C	Trickling filter works on the principal of anaerobic decomposition	D	Oxidation pond works on the principal of aerobic decomposition
68.	The removal of oil, grease from sewage takes place in			
	A	Grit chamber	B	Skimming tank
	C	Detritus tank	D	Sedimentation tank
69.	Which unit works on the principal of anaerobic decomposition?			
	A	Activated sludge process	B	Septic tank
	C	Oxidation pond	D	Trickling filter
70.	Which factor does not affect sludge digestion process?			
	A	Temperature	B	pH value
	C	Seeding with digested sludge	D	Oxygen content of sludge
71.	The reading taken on change point in the case of fly leveling is			
	A	Back sight	B	Fore sight
	C	Both Back sight and Fore sight	D	Intermediate sight
72.	The back bearing of line AB with fore bearing equal to $N 40^{\circ} E$ will be			
	A	$N 220^{\circ} E$	B	$S 40^{\circ} E$
	C	$S 40^{\circ} W$	D	$S 220^{\circ} W$

73.	Which statement is correct?			
	A	Prismatic compass give reading in the quadrantal bearing system	B	Surveyor's compass gives reading in whole circle bearing system
	C	The difference between true bearing and magnetic bearing is known as magnetic declination	D	The inclination of magnetic needle with vertical is known as angle of dip
74.	Which is not a mandatory sign on highways?			
	A	Give way	B	Narrow bridge
	C	No entry	D	One way traffic
75.	Which is not a method of origin and destination study traffic studies?			
	A	Home interview method	B	Traffic count method
	B	Return post card method	D	Road side interview method
76.	Which is regulatory sign on highways?			
	A	Pedestrian crossing	B	Men at work
	B	Right hand curve	D	Speed limit sign
77.	Which can accommodate maximum vehicle during off-street parking?			
	A	90° parking		60° parking
	C	45° parking		Parallel parking
78.	Which of the following study use '3-Es'			
	A	Parking study	B	Traffic capacity study
	C	Traffic volume study	D	Accident study
79.	A curve of joining the points of equal stress intensity is known as			
	A	Isohyet	B	Isobar
	C	Contour	D	Influence diagram
80.	Which statement is NOT correct?			
	A	Oven drying method is used for determination of water content in a soil mass	B	Sand replacement method is used to determine the specific gravity of soil sample
	C	Fine grained soil has larger void ratio than coarse grained soil	D	The porosity of soil cannot exceed 100%
81.	The eigen values of a real symmetric matrix are			
	A	Always zero.	B	always pure imaginary
	C	Either zero or pure imaginary	D	always real
82.	A is a 5 x 5 real matrix and $Ax = b$ is an inconsistent system of equations. The highest possible rank of A is			
	A	5	B	6

	C	7	D	4
83.	Given the matrix $A = \begin{bmatrix} 6 & 0 \\ 1 & 7 \end{bmatrix}$ then the eigen values are			
	A	1,6	B	6,0
	C	6,7	D	7,9
84.	The Taylor's expansion for $f(x) = 1 + 2\cos x - 4\sin x$ is			
	A	$3 - 4x - x^2 + \frac{2x^3}{3} + \frac{x^4}{12} + \dots$	B	$3 - 4x - x^2 + \frac{2x^3}{3} + \frac{x^4}{24} + \dots$
	C	$3 - 4x - x^2 + \frac{2x^3}{3} - \frac{x^4}{24} + \dots$	D	$3 - 4x - x^2 - \frac{2x^3}{3} + \frac{x^4}{24} + \dots$
85.	For $0 \leq x < \infty$, the critical point of the function $f(x) = e^{-x} - 2 - e^{-2x}$ at			
	A	$x = \ln 4$	B	$x = \ln 2$
	C	$x = \ln 16$	D	$x = 0$
86.	If $u = x^6 \ln \frac{x-y+z}{x+y+z}$ then the value of $x \frac{\partial u}{\partial x} + y \frac{\partial u}{\partial y} + z \frac{\partial u}{\partial z}$ is			
	A	u	B	$2u$
	C	$6u$	D	$8u$
87.	If $L = \lim_{x \rightarrow 0} \frac{\sin x - \tan x - x^2}{x \tan x}$ then value of L is			
	A	0	B	-1
	C	-1/3	D	-1/4
88.	For a scalar function $f(x, y, z) = 2x^2 + 4y^2 + 5z^2$, the gradient at the point P(1,1,-1) is			
	A	$4\bar{i} + 8\hat{j} - 10\bar{k}$	B	$4\bar{i} + 8\hat{j} + 10\bar{k}$
	C	$4\bar{i} - 8\hat{j} + \bar{k}$	D	$4\bar{i} - 8\hat{j} - 10\bar{k}$
89.	The divergence of the vector field $2x^2z\bar{i} + 3xy^2\hat{j} + yz^2\bar{k}$ at a point (1,1,1) is			
	A	0	B	4
	C	8	D	12
90.	An unbiased coin is tossed an infinite number of times. The probability that the fourth tail appears at the tenth toss is			
	A	0.052	B	0.072
	C	0.082	D	0.092
91.	A box contains 25 parts of which 9 are defective. Two are being drawn simultaneously in random manner from the box. The probability of both the parts being good is			
	A	42/125	B	2/5
	C	25/29	D	5/9

92.	A fair coin was tossed three times in succession and resulted in the following outcomes: (i) Head (ii) Head (iii) Head. The probability of obtaining "Tail" when the coin is tossed again is		
	A	0	0.5
	C	0.25	0.05
93.	Consider a differential equation $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 0$ then the solution is		
	A	$y = c_1 e^{-2x} + c_2 e^x$	B $y = c_1 e^{2x} + c_2 e^{-x}$
	C	$y = c_1 e^{-2x} + c_2 e^{-x}$	D $y = c_1 e^{2x} + c_2 e^x$
94.	Solution of $(2xy - 3x^2 + y^2)dx + (2xy + x^2)dy = 0$ is		
	A	$xy^2 + x^2y - x^3 = c$	B $xy^2 - x^2y + x^3 = c$
	C	$xy^2 + x^2y + x^3 = c$	D $xy^2 - x^2y - x^3 = c$
95.	Solution of the differential equation $y'' + y = e^{-5x}$ is		
	A	$y = c_1 \cos x + c_2 \sin x + \frac{e^{-5x}}{26}$	B $y = c_1 \cos x + c_2 \sin x - \frac{e^{-5x}}{26}$
	C	$y = c_1 \cos x + c_2 \sin x + \frac{x}{26}$	D $y = c_1 \cos x + c_2 \sin x - \frac{x}{26}$
96.	If real part of an analytic function is $u(x, y) = -x^2 + y^2$ then its imaginary part is		
	A	$4xy$	B $2xy$
	C	$-4xy$	D $-2xy$
97.	If c is a simple closed curve given by $ z = 1$ then $\oint_c \frac{dz}{z^2 + 10}$ is equal to		
	A	0	B 1
	C	$-2\pi i$	D $2\pi i$
98.	Inverse Laplace transforms of $\frac{1}{s^2 - 3s + 2}$ is		
	A	$e^{2t} + e^t$	B $e^{2t} - e^t$
	C	$-e^{-2t} + e^t$	D $-e^{-2t} - e^t$
99.	The iteration formula to find the 4 th root of a positive real number b by using the Newton-Raphson method is		
	A	$x_{k+1} = \frac{3x_k^4 + \sqrt[4]{b}}{4x_k^3}$	B $x_{k+1} = \frac{4x_k^4 - \sqrt[4]{b}}{4x_k^3}$
	C	$x_{k+1} = \frac{3x_k^4 + b}{4x_k^3}$	D $x_{k+1} = \frac{3x_k^4 - b}{4x_k^3}$
100.	The n th difference of a polynomial of degree n is		
	A	constant	B Zero
	C	$n!$	D N