

# PGCET-2022

Seat No. \_\_\_\_\_

SUB: Civil Engineering

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.	In RCC cantilever beam, the main bars are provided			
	A	at top	B	at middle
	C	at bottom	D	at end of projection
2.	CBR is			
	A	Compressive strength	B	Shear strength
	C	Relative measure of strength	D	Absolute measure of strength
3.	Relation between radius of tubewell $r$ and inflow $Q$ is			
	A	$Q \propto r^2$	B	$Q \propto r^3$
	C	$Q \propto 4r$	D	None of the above
4.	Activated sludge process is			
	A	Physical process	B	Chemical process
	C	Biological process	D	Radioactive process
5.	Hydrograph is a plot between			
	A	Rainfall and runoff	B	Runoff and time
	C	Rainfall and time	D	Runoff and area
6.	Raising of outer edge of pavement surface with respect to inner edge on curve is called			
	A	Camber	B	Superelevation
	C	Embankment	D	Gradient
7.	Traverse surveying			
	A	is done by triangulation	B	is done by trigonometric levelling
	C	is done by angle measuring instrument	D	is done by aerial survey

8.	Area under Unit Hydrograph represents			
	A	Unit rainfall	B	Unit area
	C	Unit duration	D	Unit runoff
9.	Minimum required cover in RCC column is			
	A	25 mm	B	40 mm
	C	10 mm	D	250 mm
10.	As per IRC, minimum lane width for multi lane highway is			
	A	2.44 m	B	2.75 m
	C	3.5 m	D	5.0 m
11.	How many points of contra-flexures occur in a fixed beam subjected to a central point load?			
	A	0	B	1
	C	2	D	3
12.	For a simply supported beam of 4m span acted upon by a uniformly distributed load of 60kN/m over left half of the span, maximum bending moment would be			
	A	30.5 kNm (Sagging)	B	60 kNm (Hogging)
	C	60 kNm (Sagging)	D	67.5 (Sagging)
13.	For an I-Section symmetric about both axis, the shear center will be located _____			
	A	within the web	B	within top flange
	C	within bottom flange	D	outside the web
14.	For a column of length 'L' with both ends fixed, in calculation of Euler's crippling load, the effective length is taken as _____			
	A	$2 * L$	B	$L$
	C	$1.5 * L$	D	$0.5 * L$
15.	A simply supported beam of span 6m carries a central point load of 100 kN. The value of maximum slope = _____			
	A	$225/EI$	B	$450/EI$
	C	$4500/EI$	D	$675/EI$
16.	According to IS:456(2000), the approximate estimated flexural strength of concrete of grade M25 is _____.			
	A	28 GPa	B	3.5 GPa
	C	25 MPa	D	3.5 MPa

17.	In stiffness method system approach, the diagonal elements of stiffness matrix _____			
	A	are always zero	B	can sometimes be zero
	C	can sometimes be negative	D	are always non-zero positive
18.	The Stiffness coefficient $K_{12}$ indicates			
	A	Deformation at 2 due to unit force at 1	B	Force at 1 due to unit deformation at 2
	C	Deformation at 1 due to unit force at 2	D	Force at 2 due to unit deformation at 1
19.	Partial safety factor (for material strength) of steel for limit state of collapse is			
	A	1.5	B	1
	C	1.15	D	2
20.	As per IS: 800 (2007), which of the following is not a limit state of serviceability?			
	A	Vibration limit	B	Deflection limit
	C	Loss of Equilibrium	D	Fire Resistance
21.	A propped cantilever beam of span 6 m having plastic moment capacity $M_P$ carries a central point load. The collapse load = _____			
	A	$2 M_P$	B	$M_P$
	C	$4 M_P$	D	$6 M_P$
22.	A soil has a porosity of 30%. Its voids ratio in the loosest and densest state is 0.35 and 0.92 respectively. What will be its state of denseness?			
	A	Loose	B	Dense
	C	Very dense	D	None of the above
23.	For a soil sample, if the ratio of saturated unit weight to dry unit weight is equal to 1.2 and the specific gravity of solids $G$ is 2.65, then its void ratio will be _____			
	A	0.72	B	0.66
	C	0.53	D	0.94
24.	In a two-layer soil system, the top soil and bottom soil are of the same thickness but the coefficient of permeability of the top soil is twice that of the bottom soil having coefficient of permeability 'k'. When horizontal flow occurs, the equivalent coefficient of permeability of the system will be			
	A	$2k$	B	$1.5k$
	C	$1.25k$	D	$1.2k$

25.	Coulomb's equation for shear strength is given by			
	A	$c = s + \sigma \tan \phi$	B	$s = c + \sigma \tan \phi$
	C	$c = s - \sigma \tan \phi$	D	$s = c - \sigma \tan \phi$
26.	Mixture of sand, silt and clay size particles approximately in equal proportions: sometimes contains organic matter is called.			
	A	Laterite	B	Moorum
	C	Bentonite	D	Loam
27	Standard penetration test (SPT) was conducted at a site. The recorded values of blow count for every 15 cm penetration at depth of 1 m are 5, 9, and 10 respectively. The value of SPT blow count (N) that should be used is			
	A	15.50	B	15.00
	C	17.00	D	19.00
28	The maximum angle of inclination of an infinite slope in purely cohesionless soil for stability is			
	A	$B=\phi$	B	$B=\phi/3$
	C	$B=\phi/2$	D	Not related to $\phi$
29	Density index may be defined as			
	A	$\frac{e_{max} - e_{min}}{e_{max} - e_0}$	B	$\frac{e_{max} - e_0}{e_{max} - e_{min}}$
	C	$\frac{e_0 - e_{max}}{e_{max} - e_{min}}$	D	$\frac{e_{max} + e_{min}}{e_{max} - e_0}$
30	The relationship between percent air voids ( $n_a$ ) porosity ( $n$ ) and air content ( $a_c$ ) is given by			
	A	$n = n_a \cdot a_c$	B	$a_c = n \cdot n_a$
	C	$n_a = n \cdot a_c$	D	$a_c = n - n_a$
31	Thickness design of flexible pavement is not dependent on			
	A	CBR value of subgrade	B	Design life
	C	Traffic growth rate	D	Surface evenness

32	Equivalent Wheel Load Factor (VDF) is approximately worked out by which formula, where $P_1$ is given wheel load and $P$ is standard wheel load?			
	A	$\left(\frac{P_1}{P}\right)^4$	B	$\left(\frac{P}{P_1}\right)^4$
	C	$\left(\frac{P_1}{P}\right)^2$	D	$\left(\frac{P}{P_1}\right)^2$
33	Pitot tube is used to measure			
	A	Discharge	B	Viscosity
	C	velocity	D	Pressure
34	Water surface profiles that are asymptotic at one end and terminated at other end would include			
	A	H2 & S2	B	H3 & S2
	C	M2 & H2	D	M2 & H3
35	The design flood commonly adopted for barrages & minor dams in India is			
	A	Standard project flood or a 100 yr flood, whichever is higher	B	Probable maximum flood
	C	Peak flood	D	A flood of 50-100 yr return period
36	A lysimeter is used to measure			
	A	Evaporation	B	Evapotranspiration
	C	Transpiration	D	Infiltration
37	The crop among the following, which is expected to have the maximum duty, is			
	A	Rice	B	Cotton
	C	Sugarcane	D	Wheat
38	According to Khosla's theory of independent variables for seepage below ahydraulic structure, the exit gradient, in the absense of a downstream sheet pile, is			
	A	0	B	Infinite
	C	1	D	None of the above
39	The ratio of inertia force to viscous force is called			
	A	Reynold's number	B	Froude's number
	C	Euler's number	D	Mach number

40	The area under hyetograph gives_____			
	A	Catchment area	B	Rainfall depth
	C	Runoff volume	D	Discharge
41	For a triangular hydrograph having peak discharge 10 cumecs over the total time of 10 hrs, runoff volume in cubic-meter will be_____			
	A	100	B	3600
	C	360000	D	180000
42	The unit to measure duty is _____			
	A	Ha per cumecs	B	Cumecs per ha
	C	Cumecs	D	ha
43	Hydraulic mean depth for most economical trapezoidal section is____			
	A	half of its top width	B	half of its depth
	C	half of its base	D	equal to wetted perimeter
44	Ductility of bitumen is measured in			
	A	Kg/m	B	m <sup>2</sup> /N
	C	cm	D	cm/kg
45	The value of eccentricity limits for no tension in gravity dam should be			
	A	$\leq B/3$	B	$\leq B/2$
	C	$\leq B/6$	D	$\geq B/3$
46	High BOD/COD ratio represents			
	A	low biodegradability of organic matter	B	high biodegradability of organic matter
	C	Presence of pathogenic microorganism	D	presence of toxic material in the waste
47	Fine solid particles (0.1 to 1 mm) resulting from the incomplete combustion of organic particles is known as			
	A	smoke	B	dust
	C	mist	D	fume

48	Ozone layer is present in			
	A	mesosphere	B	troposphere
	C	exosphere	D	stratosphere
49	For incineration process minimum temperature in the chamber should be			
	A	-30°C	B	670°C
	C	1000°C	D	250°C
50	Which of the following form of nitrogen present in water indicates very first stage of decomposition			
	A	Organic nitrogen	B	Free ammonia
	C	nitrate	D	nitrite
51	The sludge of secondary sedimentation tank containing very high population of active bacterial mass is known as			
	A	Sludge cake	B	leachate
	C	Activated sludge	D	coagulant
52	General relation between Speed, volume and density of traffic can be expressed as			
	A	Volume = Speed x Density	B	Speed = Density x Volume
	C	Density = Speed x Volume	D	Volume = Speed/Density
53	The interface treatment in which spraying liquid bituminous binder of low viscosity over a non-bituminous surface is done, is called			
	A	Tack coat	B	Seal coat
	C	Prime coat	D	DBM
54	The bituminous layer construction in which aggregates are spread and compacted, bitumen is applied, key aggregates spread and rolled, is called			
	A	Bituminous Macadam	B	Penetration Macadam
	C	Dense bituminous Macadam	D	BUSG
55	The Marshall stability value and flow are respectively,			
	A	Load per unit area and rate of deformation	B	Load at failure and rate of deformation
	C	Load per unit area and total deformation	D	Maximum load carried and total deformation at maximum load

56	Which is the correct relation between the following?			
	A	Dissolved solid = Total solid + Suspended solid	B	Dissolved solid = Total solid – Suspended solid
	C	Total solid = Dissolved solid / Suspended solid	D	Dissolved solid = Suspended solid – Total solid
57	Which of the following is used for the control of taste and odour in water?			
	A	Sedimentation	B	Coagulation
	C	Filtration	D	Activated Carbon
58	Secondary settling tank			
	A	Reduces pH of wastewater	B	Removes pathogens
	C	Removes biomass	D	Removes dissolved solids
59	The acceptable limit for nitrate as per Indian drinking water standard is			
	A	250 ppm	B	145 ppm
	C	45 ppm	D	0 ppm
60	Which of the following is the major source of pollutant hydrogen sulphide?			
	A	Decaying organic matter	B	Auto exhaust
	C	Oil burners	D	Solar energy
61	_____ is the velocity at which the solid matter in sewage remained in suspended form.			
	A	Settling velocity	B	Self-cleansing velocity
	C	Mean velocity	D	Non Scouring velocity
62	For sewage, BOD/COD ratio will always be			
	A	Equal to 1	B	Less than 1
	C	More than 2	D	Between 1 and 2
63	Which of the following test is done to know the resistance to flow of bituminous material?			
	A	Penetration	B	Viscosity
	C	Ductility	D	Softening point
64	The recommended safe coefficient of friction for road surface is			
	A	0.015	B	1.5

	C	1/15	D	0.15
65	Creep is			
	A	Lateral movement of rail	B	Vertical movement of rail
	C	Longitudinal movement of rail	D	None of the above
66	STOP sign is the example of			
	A	Warning sign	B	Informatory sign
	C	Regulatory sign	D	Cautionary sign
67	Which factor is not used in calculating CSA value for flexible pavement design?			
	A	Axle load	B	Lane distribution factor
	C	Vehicle damage factor	D	Speed of vehicle
68	Higher PCU value of vehicle indicates			
	A	Higher volume of traffic	B	Lower volume of traffic
	C	Larger size vehicle	D	Smaller size vehicle
69	In harbor, Turning basin should have radius			
	A	Equal to length of largest ship	B	Equal to twice the length of the largest ship
	C	Equal to half length of the largest ship	D	Equal to four times length of the largest ship
70	Find the correct with respect to water transportation			
	A	Dead Weight Tonnage = Displacement load – Displacement light	B	Dead Weight Tonnage = Displacement load + Displacement light
	C	Displacement load=Dead Weight Tonnage - Displacement light	D	Displacement load= Displacement light - Dead Weight Tonnage
71	The scale using which it is possible to measure up to the accuracy of hundredths is:			
	A	Plain scale	B	Shrunk scale
	C	Diagonal scale	D	None of the above
72	The true bearing of a line whose magnetic bearing is $62^{\circ} 30'$ and magnetic declination is $2^{\circ} 30'E$ will be:			
	A	$65^{\circ}$	B	$60^{\circ}$
	C	$62^{\circ} 30'$	D	$67^{\circ} 30'$

73	Which of the following error cannot be eliminated by using method of repetition for measuring the horizontal angle by theodolite?			
	A	Error due to eccentricity of verniers	B	Error due to inaccurate graduations
	C	Error due to inaccurate bisection of object	D	Errors due to slips
74	The end of the curve where the alignment changes from a curve to the tangent is called:			
	A	Point of curve	B	Point of tangency
	C	Mid ordinate	D	Point of intersection
75	The instrument used for reproducing, enlarging or reducing the map is called:			
	A	Sextant	B	Pantagraph
	C	Planimeter	D	Clinometer
76	Angle between prolongation of preceding line and forward line of the traverse is called :			
	A	Swing Angle	B	Deflection Angle
	C	Interior Angle	D	Exterior Angle
77	Rate of increase of curvature along transition curve should be ____ the rate of increase of super-elevation.			
	A	>	B	<
	C	=	D	$\neq$
78	Closed contours of increasing values towards center represent			
	A	Hill	B	Depression
	C	Pass	D	River Bed
79	If the whole circle bearing (WCB) = $220^\circ$ , reduced bearing (RB) will be :			
	A	N $40^\circ$ E	B	E $40^\circ$ N
	C	S $40^\circ$ W	D	W $40^\circ$ S
80	If the Reduced Level (R.L.) of BenchMark (B.M.) is 200 m, the backsight is 1.32 m and foresight is 1.9 m , then R.L. of the forward station is			
	A	196.78 m	B	203.22 m
	C	200.58 m	D	199.42
81	Solution of differential equation $(2y - 3x)dx + xdy = 0$ is given by			
	A	$y = x^2 + c$	B	$yx^2 = x^3 + c$
	C	$yx^2 = c$	D	$y = x^3 + c$

82.	Solution of differential equation $\frac{d^2y}{dx^2} - 7\frac{dy}{dx} + 12y = e^x$ is given by			
	A	$y = c_1e^{-4x} + c_2e^{-3x} + \frac{1}{6}e^x$	B	$y = c_1e^{4x} + c_2e^{3x} - e^x$
	C	$y = c_1e^{4x} + c_2e^{-3x} - \frac{1}{6}e^x$	D	$y = c_1e^{4x} + c_2e^{3x} + \frac{1}{6}e^x$
83.	Laplace Transformation of $t \sin 5t$ is equal to			
	A	$\frac{10s}{(s^2 + 25)^2}$	B	$\frac{s}{(s^2 + 5)^2}$
	C	$\frac{1}{(s^2 + 25)^2}$	D	$\frac{10s}{(s^2 + 25)}$
84.	Inverse Laplace Transformation of $\frac{s+3}{(s^2+6s+25)}$ is equal to			
	A	$e^{-3t} \cos t$	B	$e^{-t} \cos 4t$
	C	$e^{-t} \cos t$	D	$e^{-3t} \cos 4t$
85.	$\lim_{x \rightarrow 0} \left( \frac{1}{x} - \frac{\log(1+x)}{x^2} \right)$ is equal to			
	A	2	B	0
	C	$\frac{1}{2}$	D	1
86.	If $U = \sin^{-1} \left( \frac{x^3+y^3}{x^2-y^2} \right)$ then $x \frac{\partial U}{\partial x} + y \frac{\partial U}{\partial y}$ is equal to			
	A	$\tan U$	B	$\tan 2U$
	C	$\cos U$	D	$\sin U$
87.	Vector Field $\vec{F} = (x^2 + y^2) i + (z^2 - 2xy) j + x^2 y^2 k$ is			
	A	Irrotational vector field	B	Solenoidal vector Field
	C	Both (A) and (B)	D	None of these
88.	What is the work done when force $\vec{F} = 2xyz i + (x^2z + 2y) j + x^2 y k$ moves particle from point (0,1,1) to (1,2,0)? ( $\vec{F}$ is a conservative vector field)			
	A	4	B	2
	C	3	D	1
89.	Which of the following is correct for the system $2x - y + z = 0$ , $3x + 2y + z = 0$ , $x - 3y + 5z = 0$			

	A	Non Trivial solution	B	Infinitely many solutions
	C	System is inconsistence	D	Trivial solution
90.	If $A = \begin{bmatrix} 5 & 7 & 0 \\ 0 & 3 & 0 \\ 3 & 4 & 1 \end{bmatrix}$ then an Eigen values of $A^2$ is			
	A	1, 9, 25	B	1, 5, 3
	C	1, $\frac{1}{5}, \frac{1}{3}$	D	1, 8, 27
91.	If $A = \begin{bmatrix} 5 & 10 & 15 \\ 10 & 15 & 20 \\ 15 & 20 & 25 \end{bmatrix}$ then rank of the matrix is.			
	A	1	B	2
	C	3	D	0
92.	If $f(z) = \frac{z+1}{z^2-11z+30}$ which are the points where $f(z)$ fails to be analytic ?			
	A	10, 3		-10, - 3
	C	5, 6		-5, -6
93.	Value of $\int_C \frac{1}{z^2-4z+4} dz$ , ( where $C$ is $ z  = 1$ ) is.			
	A	$10\pi i$	B	$5\pi i$
	C	$\pi i$	D	0
94.	Residue of $f(z) = \frac{z}{(z+2)(z-3)}$ at pole 3 is.			
	A	$\frac{3}{5}$	B	$\frac{5}{3}$
	C	3	D	5
95.	The Mean, Median and mode of 7, 2, 5, 5, 1 are.			
	A	Mean=5, Median=4, Mode= 4	B	Mean=4, Median=5, Mode= 5
	C	Mean=5, Median=7, Mode= 5	D	Mean=2, Median=5, Mode= 2
96.	In a bolt manufacturing company. It is found that there is a small chance 0.2 for any bolt to be defective. What is the Mean and Standard deviation of the binomial distribution of defective bolt in a total of 100 ?.			
	A	20, 4	B	20, 5

	C	10, 4	D	10, 5
97.	There are 5 yellow, 2 red and 3 white balls are in the box. Three balls are randomly selected from the box. What is the probability that all are of different colour ?			
	A	0.5	B	0.125
	C	0.25	D	0.75
98.	Value of $\int_0^6 \frac{1}{1+x} dx$ with $h = 1$ by Simpsons $\frac{1}{3}$ rule is.			
	A	2.9588	B	1.9588
	C	0.9588	D	0.5988
99.	Using Newton- Raphson method what is the value of $\sqrt{5}$ , correct upto two decimal places.			
	A	2.2361	B	2.53
	C	2.35	D	2.613
100.	The area enclosed by the curve $r^2 = a^2 \sin \theta$ is given by			
	A	$a^2$	B	$2a^2$
	C	$3a^2$	D	None of theses