

PGCET-2023

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.	The total observed runoff volume during a storm of 6 hr duration with a uniform intensity of 15 mm/hr is 21.6 M.m ³ . If the area of the basin is 300 sq. km, the average infiltration rate would be :			
	A	18 mm	B	3 mm/hr
	C	18 cm	D	3 cm/hr
2.	A curve/line traced by a single fluid particle during its motion is called :			
	A	Streamline	B	Streakline
	C	Pathline	D	Potential line
3.	How many additional rain gauges are required in a catchment, if the error allowed in estimation of mean rainfall is to be reduced by one fourth than the present one?			
	A	Four times that of present number	B	Fifteen times that of present number
	C	Nine times that of present number	D	One fourth times that of present number
4.	The Newton's law of viscosity is a relationship between:			
	A	Shear stress and pressure	B	Viscosity and temperature
	C	Pressure and viscosity	D	Shear stress and velocity gradient
5.	Velocity distribution for turbulent flow in the pipes follows a :			
	A	Parabolic law	B	Hyperbolic law
	C	Linear law	D	Logarithmic law
6.	The areal characteristics of a rain storm are represented by a:			
	A	Hyetograph	B	Double Mass curve
	C	Depth area duration curve	D	Mass curve

7.	A floating body will remain in stable equilibrium so long as :			
	A	The Metacentre (M) lies below the centre of gravity (G)	B	The Metacentre (M) lies above the centre of gravity (G)
	C	The Metacentre (M) and centre of gravity (G) are at same position	D	None of these
8.	If there are 10 stream in a drainage basin of area 100 sq km and the total length of all the streams is 1000 km, the drainage density of the basin is :			
	A	100	B	10
	C	1000	D	1
9.	Froude's number is the square root of the ratio of inertia force of the flowing fluid to the :			
	A	Viscous force	B	Elastic force
	C	Gravity force	D	Pressure force
10.	If a 4 hour unit hydrograph has a peak ordinate of 30 cumecs, the peak ordinate for a 8 hour for this basin will be:			
	A	Equal to 30 cumecs	B	Equal to 60 cumecs
	C	Less than 30 cumecs	D	More than 30 cumecs
11.	A rectangular canal of 1.8 m width carries a discharge of 18 m ³ /sec, the depth of flow at critical condition would be:			
	A	2.2 m	B	2.8 m
	C	3.2 m	D	3.6 m
12.	Bank storage in a dam reservoir :			
	A	Decrease the computed reservoir capacity	B	Increase the computed reservoir capacity
	C	Sometimes increases and sometimes decreases the computed reservoir capacity	D	Has no effect on the computed reservoir capacity.
13.	If the depth of water before and after the jump is 1 m and 4 m respectively, the consequent loss of head would be :			
	A	0.563 m	B	1.688 m
	C	3 m	D	0.188 m
14.	If the concentration of sodium, calcium and magnesium ions in the irrigation water is 400, 120 and 80milli equivalents per litre respectively, the Sodium-Absorption ratio will be :			
	A	40	B	2
	C	0.5	D	20

15.	Which of the following turbine is suitable for specific speed requirement of greater than 300 (in SI unit)?			
	A	Francis	B	Pelton (Single Jet)
	C	Pelton (Multiple Jets)	D	Kaplan
16.	The ratio of the quantity of water stored into the root zone of the crops to the quantity of water actually delivered into the field is called:			
	A	Efficiency of water conveyance	B	Efficiency of water application
	C	Efficiency of water storage	D	Efficiency of water use
17.	A ridge canal is also called as:			
	A	Watershed canal	B	Contour canal
	C	Side slope canal	D	None of these.
18.	The vertically downward acceleration of 0.1 g acting on the dam will			
	A	Increases the resisting weight of the dam by 10%	B	Increase the uplift by 10%
	C	Decreases the resisting weight of the dam by 10%	D	No effect
19.	Which one of the following is use to control seepage through the foundation of the earthen dam:			
	A	Relief wells	B	Chimney drain
	C	Horizontal blanket/filter	D	Toe filter
20.	The cross section of the natural silt transporting channels tends to have the shape of:			
	A	Trapezium	B	Triangular
	C	Semi-ellipse	D	Rectangle
21.	What will be the air resistance experience by a car having a frontal area of 2.15 m^2 and moving at the speed of 10 K.P.H. The coefficient of air resistance is 0.39 kg/m^3 :			
	A	3.5 N	B	6.5 N
	C	2.5 N	D	0.84 N
22.	If the percentage cross country slope of a terrain is 22, what would the type of terrain?			
	A	Level	B	Mountainous
	C	Rolling	D	Steep

23.	The relation between Capacity (C) of a highway in vehicles per hour per lane , speed (V) in K.P.H and Average spacing (S) between successive moving vehicle in metres can be expressed as:			
	A	$C=S/V$	B	$S=V/C$
	C	$C=(1000S)/V$	D	$C=(1000V)/S$
24.	Grade Compensation at the horizontal curve of radius R is limited to:			
	A	$50/R$	B	$75/R$
	C	$45/R$	D	$65/R$
25.	Instantaneous speed of a vehicle at a specified section or a location is called :			
	A	Space mean speed	B	Running speed
	C	Travel speed	D	Spot speed
26.	On a right angled road intersection, if one road is declared as one way, the number of conflict points would be :			
	A	24	B	6
	C	11	D	8
27.	The sign showing speed limit on a highway is a:			
	A	Warning sign	B	Regulatory sign
	C	Informatory sign	D	None of these
28.	Flakiness index test is not required for the aggregate smaller than:			
	A	10mm	B	12.5 mm
	C	6.3 mm	D	8mm
29.	Following is not the test used for determining the quality of bitumen:			
	A	Float test	B	Soundness test
	C	Ductility test	D	Penetration test
30.	Dowel bars in rigid pavement are provided at :			
	A	Expansion Joint	B	Longitudinal joint
	C	Construction Joint	D	None of these
31.	Surveys which are carried out to provide a national grid of control for preparation of accurate maps of large areas are known as :			
	A	Geographical surveys	B	Plane surveys
	C	Geodetic surveys	D	Topographical surveys

32	The true bearing of a line whose magnetic bearing is $52^{\circ} 30'$ and magnetic declination is $1^{\circ} 30'E$ will be:			
	A	54°	B	51°
	C	$52^{\circ} 30'$	D	$57^{\circ} 30'$
33	In case of angular measurements being more precise than the linear measurements, the traverse can be balanced by :			
	A	Graphical method	B	Theodolite correction
	C	Bowditch's rule	D	Transit rule
34	The error due to eccentricity of the inner and outer axes of a theodolite can be eliminated by :			
	A	Reading both verniers and taking the mean of the two	B	Taking both face observations and taking the mean of the two
	C	Double sighting	D	Taking means of the observations distributed over different positions of the graduated circle
35	The point where the alignment changes from the straight line to a curve:			
	A	Point of tangency	B	Point of curve
	C	Apex	D	Centre of curvature
36	In leveling, the curvature correction as applied to the staff reading is:			
	A	Always positive	B	Always negative
	C	Can be Positive or negative	D	None of the above
37	The expression for sleeper density for a Broad Gauge track if 19 sleepers are used under a rail length is:			
	A	$M+5$	B	$M+8$
	C	$M+7$	D	$M+6$
38	Wear of rails may be reduced by :			
	A	Increasing the number of rail joints	B	Decreasing the number of rail joints
	C	Using low carbon steel rail	D	Increasing the spacing of sleepers
39	As per the recommendation of ICAO, the basic runway length should be increased at the rate of 7% per _____ rise in elevation of airport above the mean sea level.			
	A	100 m	B	200 m
	C	300 m	D	400 m

40	The weight added to improve the stability of ship when it has discharged its cargo is known as:			
	A	Gross tonnage	B	Net tonnage
	C	Cargo tonnage	D	Ballast
41	The structure constructed at the tip of a breakwater near the harbour entrance is called:			
	A	Pierhead	B	Dolphin
	C	Slip	D	Wharve
42	If the porosity of a soil sample is 40%, what will be the voids ratio of that sample :			
	A	0.600	B	0.667
	C	2.500	D	0.525
43	For a well graded soil, the coefficient of curvature should be between :			
	A	0.5-1.0	B	8-10
	C	1-3	D	6-8
44	The maximum water content at which a reduction in water content will not cause a decrease in the volume of soil mass is called :			
	A	Liquid limit	B	Plastic limit
	C	Shrinkage limit	D	Plasticity index
45	The relation between average permeability parallel(K_x) and perpendicular(K_y) to the bedding plane with reference to the direction of flow can be expressed as :			
	A	$K_x > K_z$	B	$K_x < K_z$
	C	$K_x = K_z$	D	$K_x = 1/K_z$
46	The ratio expressed as percentage volume of water an aquifer will retain after saturation against the force of gravity to its own volume is called :			
	A	Specific yield	B	Storage coefficient
	C	Specific retention	D	Coefficient of transmissibility
47	What will be the passive earth pressure exerted by a backfill whose angle of shearing resistance is 30° :			
	A	$1/3$	B	3
	C	$1/2$	D	2
48	The minimum gross pressure intensity at the base of the foundation at which the soil fails in shear is called:			
	A	Ultimate bearing capacity	B	Net ultimate bearing capacity
	C	Safe bearing capacity	D	Net safe bearing capacity

49	In a thin cylindrical shell , the ratio of hoop stress to longitudinal stress is:			
	A	4	B	6
	C	2	D	8
50	Which one of the following statement is correct?			
	A	Load intensity on a beam is the first derivative of bending moment	B	Shear force is the first derivative of bending moment
	C	Bending moment is the first derivative of shear force	D	None of these
51	A Circular shaft is subjected to twisting moment T and bending moment M. The ratio of maximum shear stress to maximum bending stress is given by :			
	A	$2M/T$	B	$M/2T$
	C	$T/2M$	D	M/T
52	The ratio of (S/t), S Stiffness of beam of constant EI at the near end when far end is hinged ,to (t) the stiffness of same beam at the near end when far end is fixed is :			
	A	$3/4$	B	$1/2$
	C	$4/3$	D	$2/4$
53	The Muller –Breslau principle for influence line is applicable for :			
	A	Simple beams	B	Statically determinate beam and frame
	C	Redundant trusses	D	All of the above
54	A steel plate is 30 cm wide and 10 mm thick. A rivet of nominal diameter 18 mm is driven .the net sectional area of the plate is :			
	A	28.05 cm^2	B	20 cm^2
	C	27 cm^2	D	26.05 cm^2
55	For a laced column the minimum width of the lacing bar when using 20 mm nominal diameter rivets is:			
	A	65 mm	B	60 mm
	C	55 mm	D	50 mm
56	The minimum grade of reinforced concrete in sea water as per IS 456- 2000 :			
	A	M 20	B	M 30
	C	M 40	D	M 15

57	What is the minimum area of tension reinforcement in beam when Fe 415 is used?			
	A	0.8 %	B	0.12 %
	C	0.2 %	D	0.15%
58	The effective length of a structural steel compression member of length L effectively held in position and restrained against rotation at one end but neither held in position nor restrained against rotation at the other end is :			
	A	L	B	1.2 L
	C	1.5 L	D	2 L
59	For a continuous slab 3 m x 3.5 m size the minimum overall depth of slab to satisfy vertical deflection limits is :			
	A	94 mm	B	50 mm
	C	75 mm	D	120 mm
60	A reinforced concrete beam is subjected to the following bending moments Dead load – 20 KN-m Live load - 30 KN-m Seismic load-10 KN-m The design bending moment for limit state of collapse is:			
	A	80 KN-m	B	72 KN-m
	C	75 KN-m	D	60 KN-m
61	As per IS 456-2000, Basic values of span to effective depth ratios for spans up to 10 m for continuous beams is:			
	A	35	B	20
	C	26	D	7
62	Annual average limit of the air pollutants mentioned in ambient air quality standard is the arithmetic mean of how many measurements:			
	A	30	B	54
	C	56	D	104
63	The primary pollutant which is formed due to incomplete combustion of organic matter is :			
	A	Carbon monoxide	B	Carbon dioxide
	C	Sulphur dioxide	D	Ozone

64	Tolerance limits for industrial effluents discharged into inland surface waters is given in:			
	A	IS 2296:1982	B	IS 2490-1:1981
	C	IS 7967:1976	D	IS 2298-2:1981
65	Humans can detect sound in the frequencies of :			
	A	1-5 Hz	B	5-10 Hz
	C	1-200 Hz	D	16-20000 Hz
66	The temperature gradient of ambient air is called:			
	A	Environmental lapse rate	B	Adiabatic lapse rate
	C	Dry adiabatic lapse rate	D	Super adiabatic lapse rate
67	Line used to mark 65 and 75 Ldn around a runway of an airport is called:			
	A	Noise level lines	B	Noise Contour
	C	Noise line	D	Agonic lines
68	The dropping of leaves due to effect of air pollution is called :			
	A	Chlorosis	B	Necrosis
	C	Abscission	D	Epinasty
69	What would be the BOD of the sample if Initial DO and final DO during the BOD test was 6.0 mg/L and 2 mg/L respectively. The volume of sample taken was 5 ml.			
	A	240 mg/L	B	20 mg/L
	C	90 mg/L	D	300 mg/L
70	How much acidic is sample of pH 3 compared to pH 6?			
	A	3 times	B	10^3 times
	C	2 times	D	10^{-3} times
71	Blue baby diseases is caused due to presence of excess :			
	A	Nitrate in water	B	Sulphate in water
	C	Turbidity in water	D	Chlorides in water
72	Surface overflow rate of a sedimentation tank is measured in which unit?			
	A	$\text{m}^3/\text{m}^2/\text{day}$	B	$\text{m}^3/\text{m}/\text{day}$
	C	L/day	D	mg/L

73	Which indicator is used for determination of hardness by Versenate method using EDTA as titrant :			
	A	Starch solution	B	Phenolphthalein
	C	Erio chrome Black T	D	Methyl orange
74	Rate of filtration for a rapid sand filter is between:			
	A	100-200 lit/hour/m ²	B	3000-6000 lit/hour/m ²
	C	1000-2000 lit/hour/m ²	D	6500-15000 lit/hour/m ²
75	All non-putrescible solid waste except ashes is called :			
	A	Rubbish	B	Garbage
	C	Sullage	D	Sewage
76	Which of the following cannot be used for controlling the emissions of particulate matter :			
	A	Gravity settling chambers	B	Fabric filters
	C	Electrostatic precipitators	D	Incinerators
77	In a test for relative stability of the wastewater, the period of incubation comes out to be 8 days, what would be relative stability if the test temperature is 20°C ?			
	A	84.2%	B	98.2%
	C	64.2%	D	15.8%
78	Which of the following biological treatment unit is an attached growth process :			
	A	Activated Sludge Unit	B	Aerated Lagoon
	C	Oxidation pond	D	Trickling filter
79	Which of the following treatment unit removes the inorganic particles of specific gravity greater than or equal to 2.65 in the sewage treatment plant:			
	A	Screen	B	Digester
	C	Secondary sedimentation tank	D	Grit chamber
80	Imhoff cone is used to determine:			
	A	Total solids	B	Settleable solids
	C	Dissolved solids	D	Suspended solids
81.	The value of the probability of an event that cannot exist among the following:			
	A	2/3	B	0
	C	10%	D	- 0.3

82.	If two unbiased dices are thrown, the probability of getting the sum as 4 is ____.			
	A	1/36	B	1/12
	C	1/9	D	None of these
83.	In a Binomial distribution, if number of trials 'n', probability of success (p) and probability of failure (q) are same (i.e. p = q) then $P(X = x) = \underline{\hspace{2cm}}$.			
	A	${}^nC_x (0.5)^x$	B	${}^nC_x (p)^{n-x}$
	C	${}^nC_n (0.5)^n$	D	${}^nC_x (0.5)^n$
84.	Which of the following method starts with only one initial approximation?			
	A	Bisection method	B	False Position
	C	Newton Raphson	D	None of these
85.	If the Eigen value for the matrix A is 7 then what is the Eigen value for the matrix A^{-2} ?			
	A	1/49	B	1/7
	C	7	D	49
86.	The function $f(z)$ for a complex variable $z = x + iy$; $i = \sqrt{-1}$, is given as $f(z) = 2kxy + i(x^2 - y^2)$. For what values of k, the function $f(z)$ is analytic?			
	A	-1	B	0
	C	1	D	2
87.	If x is the mean of data 3, x, 2 and 4, then the value of mode is ____			
	A	0	B	3
	C	5	D	2
88.	If $y = f(x)$ is the solution of $\frac{d^2y}{dx^2} = 0$ with boundary conditions $y(0) = 5$, $\frac{dy}{dx} = 2$ when $x = 10$ then find $f(5)$.			
	A	-5	B	12
	C	15	D	27
89.	The directional derivative of $f(x, y, z) = xyz$ at point $(-1, 1, 3)$ in the direction of the vector $i - 2j + 2k$ is			
	A	7	B	7/3
	C	3/7	D	-7/3
90.	Evaluate the integral $\int_{2.5}^4 \ln(x) dx$ using trapezoidal rule with five sub intervals. The value of integral is ____			
	A	1.25	B	1.50
	C	1.75	D	2

91.	Laplace transform of Dirac Delta function $\delta(t-a)$ is _____.			
	A	e^{-as}	B	e^{as}
	C	se^{-as}	D	se^{as}
92.	The Inverse Laplace transform of $\tan^{-1}\left(\frac{1}{s}\right)$ is _____.			
	A	$\frac{\cos t}{t}$	B	$\frac{\sin t}{t}$
	C	$\frac{\cot t}{t}$	D	$\frac{\tan t}{t}$
93.	The particular integral of the differential equation $(D+1)^2 y = e^{-x}$ is _____			
	A	$x^2 e^{-x}$	B	$x e^{-x}$
	C	$\frac{x^2}{2} e^{-x}$	D	$\frac{x^2}{2} e^x$
94.	For an implicit function $f(x, y) = c$ the value of $\frac{dy}{dx}$ is _____			
	A	$\frac{f_x}{f_y}$	B	$\frac{f_y}{f_x}$
	C	$-\frac{f_y}{f_x}$	D	$-\frac{f_x}{f_y}$
95.	Evaluate the integral $\int_2^\infty x e^{-x} dx$.			
	A	$-2/e^2$	B	$3/e^2$
	C	$1/e^2$	D	1
96.	If $u = 2xy$, $v = x^2 - y^2$ and $x = r \cos \theta$, $y = r \sin \theta$ then $\frac{\partial(u, v)}{\partial(r, \theta)}$ is _____			
	A	r	B	$4r^3$
	C	$-r$	D	$-4r^3$
97.	Which of the following statements are true in general? Statement 1: Singular matrix is always a square matrix. Statement 2: Every square matrix is symmetric matrix. Statement 3: Every square matrix satisfies its own characteristic equation.			
	A	Only statement 1	B	Statement 1 and 2
	C	Statement 1 and 3	D	All of above
98.	If the mean of the Poisson distribution is 25 then the value of the variance is _____			
	A	0	B	5
	C	25	D	125
99.	Which of the following method is used to find solution of Ordinary Differential Equation?			
	A	Euler's method	B	Newton Raphson method
	C	Bisection Method	D	Successive approximation method

100.	Function of two variables $f(x, y)$ has Minima at point (a, b) if _____			
A	$rt - s^2 < 0$ and $r < 0$	B	$rt - s^2 > 0$ and $r < 0$	
C	$rt - s^2 < 0$ and $r > 0$	D	$rt - s^2 > 0$ and $r > 0$	