

SUB: Environmental 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.	A windrose diagram is a representation of meteorological conditions. Which of the following is not included in windrose diagram representation?			
	A	Wind Speed	B	Wind Direction
	C	Mixing height	D	Percentage of time
2.	From the cost and removal efficiency perspective, which of the following pollutant control devices is preferred for effective removal of the particulates above 40 μm in size?			
	A	Inertial Separators	B	Settling Chamber
	C	Electrostatic Precipitators	D	Cyclonic Separators
3.	Which of the following material is least sensitive to air pollutants?			
	A	Sandstone	B	Brick
	C	Unalloyed steel	D	Nickel-plated steel
4.	The _____ is the major chemical scavenger in the troposphere and it controls the atmospheric lifetime of most gases in the troposphere.			
	A	Hydroxyl radical	B	Photochemical smog
	C	Ozone	D	Volatile organic compounds
5.	Night time noise level as per the Noise Regulations, 2000 are			
	A	Same as day time	B	Stricter than day time
	C	More relaxed	D	None of the mentioned
6.	Which of the following thermal process for MSW is carried out in absence of oxygen?			
	A	Incineration	B	Pyrolysis
	C	Combustion	D	Gasification
7.	The absorbing reagent Potassium TetrachloroMercurate (TCM) is used in sampling and analysis of:			
	A	SO ₂	B	CO
	C	NO ₂	D	VOC
8.	Catalytic converter in automobiles convert unburnt hydrocarbon into			
	A	Carbon & water vapor	B	Carbon monoxide & water vapor
	C	Carbon dioxide & water vapor	D	Methane
9.	A project not be permitted if EIA reveals impacts that are			
	A	Non reversible	B	Reversible
	C	Conditionally acceptable	D	Short term
10.	As per the EIA notification 2006, projects are categorized on the basis of			
	A	Size	B	Cost

	C	Importance of economy	D	All of the above
11.	Which of the following is an adsorbent used for the removal of SO ₂ from flue gas?			
	A	Zeolite	B	Lime stone
	C	Ion exchange resin	D	Silica gel
12.	The amount of air pressure fluctuation created by the source of sound is called			
	A	Sound Power	B	Sound Pressure
	C	Sound pressure level	D	Sound power level
13.	What is the percentage range of methane in the biogas?			
	A	10-20 %	B	20-40 %
	C	40-50 %	D	50-75 %
14.	_____ is the first stage of anaerobic process.			
	A	Acetogenesis	B	Hydrolysis
	C	Methanogenesis	D	Nitrification
15.	In Biotower, _____ is a very important parameter for inert media to increase the biomass growth.			
	A	Size	B	Bulk Density
	C	Material	D	Specific surface area
16.	_____ activated sludge process has minimum F/M & maximum MCRT.			
	A	Step aeration	B	Modified aeration
	C	Extended aeration	D	Conventional
17.	The flow of the wastewater in rotating biological contactor is _____ to the shaft.			
	A	upflow	B	perpendicular
	C	parallel	D	None of this
18.	In conventional Activated Sludge Process, range value of F/M ratio is			
	A	0.05 to 0.1	B	0.1 to 0.2
	C	0.2 to 0.4	D	0.4 to 0.6
19.	Lag phase is also known as			
	A	Rapid Growth Period	B	Generation Period
	C	Death Period	D	Initial Adjustment Period
20.	_____ is used for determination of sludge volume index.			
	A	Separating funnel	B	Multiphotometer
	C	Density meter	D	Inhoff cone
21.	Intercepting traps are usually provided at the junction of			
	A	House sewer and municipal sewer	B	Sullage pipe and floors of kitchen
	C	Roof drain	D	Ventilating column and lateral sewer
22.	Relative length for Tube Settler is			
	A	ratio of length of tube to diameter of tube	B	ratio of diameter of tube to length of tube
	C	ratio actual tube length to angle of tube	D	ratio of angle of tube to actual tube length
23.	For automatic coarse screen, headloss should be			
	A	Less than 0.05 m	B	Less than 0.15 m
	C	More than 0.15	D	Between 0.15m to 0.25 m
24.	For design of outlet structure of sedimentation tank, which parameter is important?			

	A	Weir Overflow Rate	B	Scour Velocity
	C	Surface Overflow Rate	D	Detention Time
25.	_____ shaped sewer sections are mostly used in dry weather.			
	A	Circular	B	Egg
	C	Horse-shoe	D	Rectangular
26.	_____ is a preliminary treatment of wastewater.			
	A	Neutralization	B	Coagulation
	C	Adsorption	D	Screening
27	Sedimentation treatment is not used to reduce			
	A	total dissolved solids	B	suspended solids
	C	floating material	D	readily settleable solids
28	“Sewage Effluent” defined under the section 2 of The Water (Prevention & control of pollution) Act, 1974 not include _____			
	A	Sullage	B	Human excreta
	C	Effluent generated from treatment & disposal facility	D	Effluent from sewerage system
29	Out of following which is not treatment alternatives for removal of arsenic?			
	A	Coagulation	B	Adsorption
	C	Air stripping	D	Oxidation
30	Ion exchange reactions are _____.			
	A	reversible	B	irreversible
	C	catalytic	D	biological
31	Advanced oxidation processes are used to oxidize _____.			
	A	biodegradable organics	B	inorganic matter
	C	metals	D	complex organics
32	The range of Velocity gradient for paddle flocculator is			
	A	5 to 10 sec ⁻¹	B	10 to 75 sec ⁻¹
	C	100 to 200 sec ⁻¹	D	more than 500 sec ⁻¹
33	Washing out of settled flocs from sludge zone is known as _____			
	A	short circuiting	B	settling
	C	scouring	D	screening
34	Manhole covers are generally circular in shape			
	A	For strengthen the cover	B	For architectural reasons
	C	To prevent falling of the cover into the manhole	D	To make the convenient entry for cleaning
35	_____ membranes are used for water with high suspended solids.			
	A	Hollow fibre	B	Spiral-wound
	C	Plate and frame	D	Tube type
36	The path of settlement of flocculant particle in settling zone will be			
	A	Spiral	B	Wavy Line
	C	Straight line	D	Parabolic
37	The electrical potential between the actual shear plane and the bulk solution is called			
	A	Stern Potential	B	Zeta Potential
	C	Surface potential	D	None of Above
38	The dry adiabatic lapse rate is			
	A	6 °C/1000m	B	7.5 °C/1000m
	C	<1 °C/1000m	D	10 °C/1000 m

39	Air Stripping is used to remove _____.		
	A	ammonia	B pesticides
	C	total dissolved solids	D refractory organics
40	Process of eliminating the surface charge on a particle is called		
	A	destabilization	B flocculation
	C	coagulation	D sedimentation
41	Pulse-jet cleaning in bag filter is accomplished by:		
	A	Reversing the flow of air into the baghouse	B injecting water
	C	Shaking each bag in the compartment	D Injecting a blast of compressed air into each bag
42	In ESPs, particles are held onto the collection plates by		
	A	A strong electric force field	B Intermolecular cohesive and adhesive forces
	C	A high-voltage, pulsating, direct current	D Electric sponsors
43	_____ is used to control particulates & gaseous pollutants simultaneously from flue gas		
	A	Venturi Scrubber	B Bag filter
	C	Cyclone Separator	D Packed bed Scrubber
44	Flocculation is the process of		
	A	removing relatively large floating and suspended solids	B Settling of flocs
	C	dewatering of sludge	D large flocs formation through gentle mixing
45	At break point of chlorination		
	A	Chlorine is used to oxidise	B Residual chloride is zero
	C	Residual chloride is maximum	D Residual chlorine reappears
46	Commonly used type of pipe in water supply distribution schemes is		
	A	Cast iron pipes	B R.C.C. pipes
	C	G.I. pipes	D Hume pipes
47	The purpose of solenoid valve in bag filter is		
	A	to maintain velocity in bag filter	B to pass high pressure air for very short period of time
	C	to remove solids from hopper	D to maintain pressure in bag filter
48	Settling chamber uses _____ as particulate removal mechanism to remove pollutants from flue gas.		
	A	gravitational force	B diffusion
	C	filtration	D electro precipitation
49	Migration velocity in Electrostatic Precipitator is also termed as:		
	A	saltation velocity	B superficial velocity
	C	radial velocity	D drift velocity
50	Fine screens are used at intake work to remove		
	A	entry of volatile matter	B entry of small fish
	C	entry of bacteria	D entry of dissolved matter
51	Permeate spacer in spiral wound membrane is _____		

	A	permeable	B	impermeable
	C	semipermeable	D	liquid type
52	Electrocoagulation is the process of destabilization of _____			
	A	oil	B	gases
	C	soluble inorganics	D	radio active materials
53	_____ distribution system is suitable for irregular developed towns.			
	A	Grid Iron	B	Ring
	C	Dead end	D	Radial
54	When lime is used for phosphorous removal, pH requirement is _____.			
	A	above 10	B	7.1 to 10
	C	6 to 7	D	below 6
55	Adsorption is reversible is an assumption of _____.			
	A	MTZ isotherm	B	Langmuir isotherm
	C	BET isotherm	D	Freundlich isotherm
56	In Membrane bioreactor _____ is not required.			
	A	secondary settling tank	B	membrane unit
	C	blower	D	back-pulse system
57	which is not a purpose of equalization tank			
	A	to remove odors	B	to settle solids
	C	to improve treatment efficiency	D	to reduce cost of treatment
58	Which of the following authority has power to grant consolidated consent & authorization to an industry?			
	A	MoEF& CC	B	Sate Pollution Control Board
	C	Central Government	D	State Government
59	The maximum time _____ for which hazardous waste can be stored onsite as per Hazardous and Other Wastes (Management and Transboundary Movement) Rules, 2016.			
	A	60 days	B	120 days
	C	30 days	D	90 days
60	Following is not the purpose of phosphate buffer in BOD test;			
	A	To eliminate early onset of nitrifying oxygen demand	B	To furnish nutrients like nitrogen and phosphorus
	C	To provide proper osmotic condition	D	To provide micro nutrients for microorganism
61	Which of the following is not a solids processing method?			
	A	Sludge Blanket Reactor	B	Sludge Drying Beds
	C	Filter Press	D	Centrifuge
62	The off route time for municipal solid waste collection system includes			
	A	The time spent in waiting unload	B	The time spent for collection vehicle to unload
	C	The time spent in loading the collection vehicle	D	The time spent in checking in and out a end of the day
63	In nephelometer, light from source is incident on sample, intensity of light _____ by sample is measured in NTU.			
	A	Transmitted	B	Reflected
	C	Absorbed	D	Scattered at 90 ⁰ angle
64	Select the correct option for characteristic of stratified lake.			

	A	Epilimnion is the coolest layer	B	Thermocline is having benthic demand
	C	Sharp temperature change in hypolimnion	D	Epilimnion is having capacity of reaeration
65	Reaeration capacity of river is not depend on_____			
	A	Photosynthetic activity of planktons.	B	Concentration of organic matter.
	C	Concentration of refractory organic compounds.	D	Temperature of river water.
66	_____ standards are specified in the consent granted to the industries.			
	A	Stream	B	Drinking water
	C	Effluent	D	None of these
67	_____ industrial wastewater is easily biodegradable.			
	A	Rolling Mill	B	Dairy
	C	Pesticide	D	Dye
68	In Nitrification, oxidation of Nitrite to Nitrate is carried out by _____.			
	A	nitrobactor	B	nitrosomonas
	C	nitrosococcus	D	nitrosospira
69	At which pH hydroxide alkalinity is present?			
	A	pH < 8.5	B	pH>10
	C	8.5<pH <10	D	pH =10
70	Which chemical is used to reduce the interference caused by nitrite in COD test?			
	A	Mercuric chloride	B	Silver sulphate
	C	Sulfamic acid	D	Sulfuric acid
71	Chlorides precipitates at _____ in Argentometric method			
	A	7 < pH <8	B	pH > 7
	C	pH < 7	D	pH >10
72	As per the latest GPCB audit scheme, the environmental audit work per team shall not more than _____ industries.			
	A	fifteen	B	ten
	C	twelve	D	twenty
73	The working principle of spectrophotometer is _____			
	A	Henry's Law	B	Lamberts – Beer's Law
	C	Charles's Law	D	Rault's Law
74	The uniformity coefficient is			
	A	D ₉₀ /D ₆₀	B	D ₆₀ /D ₉₀
	C	D ₁₀ /D ₆₀	D	D ₆₀ /D ₁₀
75	The results obtained after experiment in gas chromatograph is called _____			
	A	Chromatograph	B	Chromatophore
	C	Chromatogram	D	Chromatone
76	Which activity is most preferred in integrated solid waste management hierarchy?			
	A	Recycling	B	Waste to Energy
	C	Source Reduction and Reuse	D	Land Filling
77	High concentration of nitrogenous matter into waterways may lead to _____.			
	A	biomagnification	B	toxicity
	C	eutrophication	D	bioaccumulation

78	Light and heavy components separate from solid waste by			
	A	Air classifiers	B	Shredder
	C	Disc screen	D	Pulverizer
79	The temporary hardness in water is due to _____			
	A	OH^-	B	CO_3^{2-}
	C	HCO_3^-	D	H^+
80	Which of the following method is not used to quantify the solid waste?			
	A	Load Count Method	B	Energy Balance
	C	Weight Volume Method	D	Material Balance
81	Which are the eigen values of the matrix $A = \begin{bmatrix} 1 & 2 & 2 \\ 0 & 2 & 1 \\ -1 & 2 & 2 \end{bmatrix}$?			
	A	1, 1, 1	B	2, 2, 2
	C	0, 1, 2	D	1, 2, 2
82	The rank of the matrix $A = \begin{bmatrix} 1 & 1 & 0 & 0 \\ 0 & 1 & 0 & 1 \\ 0 & 0 & 1 & 0 \end{bmatrix}$ is....			
	A	3	B	1
	C	2	D	4
83	What is an integrating factor of $y(x+y)dx + x(x-y)dy = 0$?			
	A	$2x^2y$	B	$\frac{1}{2xy}$
	C	$\frac{1}{x^2y}$	D	none of these
84	The general solution of $y - x \frac{dy}{dx} - \left(\frac{dy}{dx} + 1 \right)^3 = 0$ is.....			
	A	$y = x + (y+1)^3$	B	$y = cx + (c+1)^3$
	C	$y = cx - (c+1)^3$	D	none of these
85	The particular solution of $\frac{d^2y}{dx^2} + \frac{dy}{dx} - 2y = 0$, where $y(0) = 4$ and $y'(0) = -5$, $y_1 = e^x$ is.....			

	A	$y = 3e^x + e^{-2x}$	B	$y = e^x + e^{-2x}$
	C	$y = e^x + 3e^{-2x}$	D	$y = e^x - 3e^{-2x}$
86	The Wroskian of $\frac{d^2 y}{dx^2} - 4 \frac{dy}{dx} + 4y = f(x)$ is...			
	A	e^{4x}	B	e^{-4x}
	C	$x e^{4x}$	D	$e^{2x}(x+1)$
87	If \vec{v} be any vector function then $\text{div}(\text{curl } \vec{v}) = \dots$			
	A	0	B	$\vec{0}$
	C	not defined	D	none of these
88	If a vector field \vec{F} is conservative and curve C is closed then $\oint_C \vec{F} \cdot d\vec{r} = \dots$			
	A	$\vec{0}$	B	0
	C	vector function	D	none of these
89	The inverse Laplace transforms of $\tan^{-1}\left(\frac{2}{s}\right)$ is.....			
	A	$\frac{\sin t}{t}$	B	$\frac{\sin 2t}{2t}$
	C	$t \sin t$	D	$\frac{\sin 2t}{t}$
90	In Gauss elimination method to solve a system of simultaneous linear equations, the coefficient matrix A of the system $AX = B$ is brought into			
	A	diagonal matrix	B	an upper triangular matrix
	C	identity matrix	D	zero matrix
91	The rate of convergence of Newton-Raphson method is			
	A	quadratic	B	linear
	C	cubic	D	biquadratic
92	The error in the trapezoidal rule is of the order.....			
	A	h^4	B	h^5

	C	h^2	D	h^7
93	Which of the following methods is one of the predictor-corrector method to solve first order linear differential equation numerically?			
	A	Picard's method	B	Milne's method
	C	Taylor's series method	D	Runge-Kutta fourth order method
94	Which of the following functions is not an entire function?			
	A	e^z	B	$\cos z$
	C	$\sin z$	D	none of these
95	A bounded entire function is constant. This is stated in theorem.			
	A	Liouville's	B	Cauchy's residue
	C	Morera's	D	Cauchy-Goursat
96	Which of the following points is not a pole of $f(z) = \frac{1}{z^2 - z^6}$?			
	A	$z = 2$	B	$z = -1$
	C	$z = 1$	D	$z = i$
97	The function $f(x, y) = x^3 + y^3 - 3x - 12y + 20$ has saddle point at			
	A	$(1, 2)$	B	$(-1, -2)$
	C	$(-1, 2)$	D	none of these
98	The Fisher's measure of kurtosis is expressed as $\gamma_2 = \beta_2 - 3$, If $\beta_2 < 3$ then the curve is			
	A	mesokurtic	B	platykurtic
	C	leptokurtic	D	all of above
99	Two cards are drawn successively with replacement from a well-shuffled pack of 52 cards. If X denotes the number of kings in a draw of two cards then $P(X \leq 1)$ is.....			
	A	$\frac{144}{169}$	B	$\frac{24}{169}$
	C	$\frac{1}{169}$	D	none of these
100	In usual notation, if the mean of the Poisson distribution is 4 then the $P(\lambda - 2\sigma < X < \lambda + 2\sigma)$ is			
	A	0.9306	B	0.0694
	C	2	D	not defined