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Question Booklet Series

Question Booklet

B

CIVIL ENGINEERING/TECHNOLOGY

(Objective)

Time Allowed : 2 Hours

Maximum Marks : 50

Read the following instructions carefully before you begin to answer the questions.

IMPORTANT INSTRUCTIONS

1. This Question Booklet contains 100 questions in all.
2. All questions carry equal marks.
3. Attempt all questions.
4. Immediately after commencement of the examination, you should check up your Question Booklet and ensure that the Question Booklet Series is printed on the top right-hand corner of the Booklet and the Booklet contains 20 printed pages and no page or question is missing or unprinted or torn or repeated. If you find any defect in this Booklet, get it replaced immediately by a complete Booklet of the same series.
5. You must write your Roll Number in the space provided on the top of this page. Do not write anything else on the Question Booklet.
6. An OMR Answer Sheet will be supplied to you separately by the Invigilator to mark the answers. You must write your Name, Roll No. and other particulars on the first page of the OMR Answer Sheet provided, failing which your OMR Answer Sheet will not be evaluated.
7. You will encode your Roll Number and the Question Booklet Series A, B, C or D as it is printed on the top right-hand corner of this Question Booklet with Black/Blue ballpoint pen in the space provided on Page-2 of your OMR Answer Sheet. If you do not encode or fail to encode the correct series of your Question Booklet, your OMR Answer Sheet will not be evaluated correctly.
8. Questions and their responses are printed in English only in this Booklet. Each question comprises four responses—(A), (B), (C) and (D). You are to select ONLY ONE correct response and mark in your OMR Answer Sheet. In case you feel that there are more than one correct response, mark the response which you consider the best. In any case, choose ONLY ONE response for each question. Your total marks will depend on the number of correct responses marked by you in the OMR Answer Sheet.
9. In the OMR Answer Sheet, there are four circles—(A), (B), (C) and (D) against each question. To answer the questions you are to mark with Black/Blue ballpoint pen ONLY ONE circle of your choice for each question. Select one response for each question in the Question Booklet and mark in the OMR Answer Sheet. If you mark more than one answer for one question, the answer will be treated as wrong. Any erasure or change is not allowed.
10. You should not remove or tear off any sheet from the Question Booklet. You are not allowed to take this Question Booklet and the OMR Answer Sheet out of the Examination Hall during the examination. After the examination has concluded, you must hand over your OMR Answer Sheet to the Invigilator. Thereafter, you are permitted to take away the Question Booklet with you.
11. Failure to comply with any of the above instructions will render you liable to such action or penalty as the Commission may decide at their discretion.

SEAL

1. If a function $f(z)$ is analytic in a domain D , then its n th derivative at a point a of D is given by

(A) $f^{(n)}(a) = \frac{n!}{2\pi i} \int_C \frac{f(z) dz}{(z-a)^{n+1}}$

(B) $f^{(n)}(a) = \frac{n}{2\pi i} \int_C \frac{f(z) dz}{(z-a)^{n+1}}$

(C) $f^{(n)}(a) = \frac{n!}{\pi i} \int_C \frac{f(z) dz}{(z-a)^{n+1}}$

(D) $f^{(n)}(a) = \frac{n!}{\pi i} \int_C \frac{f(z) dz}{(z-a)^n}$

where C is any closed contour in D about the point a .

2. Which statement is not correct?

(A) If a function $f(z)$ is analytic for all finite values of z and is bounded, then $f(z)$ is a constant.

(B) If $f(z)$ is analytic within the circle C given by $|z-a|=R$ and if $|f(z)| \leq M$ on C , then $|f^{(n)}(a)| \leq \frac{Mn!}{R^n}$.

(C) The derivative of an analytic function is analytic.

(D) If C is the circle given by $|z-a|=R$, the value of the integral $\int_C \frac{1}{z-a} dz$ is πi .

3. If C is the circle $|z|=1$, the value of the integral

$$\int_C \frac{\sin^6 z}{(z-\pi/6)^3} dz$$

is

(A) $\frac{21}{16} \pi i$ (B) $\frac{7}{16} \pi i$

(C) $\frac{\pi i}{16}$ (D) $\frac{5\pi i}{16}$

4. The expansion of the function

$$f(z) = \frac{1}{z^2 - 3z + 2}$$

for the region $|z| > 2$ is

(A) $\sum_{n=0}^{\infty} \left(1 - \frac{1}{2^{n+1}}\right) z^n$

(B) $-\sum_{n=0}^{\infty} \frac{z^n}{2^{n+1}} - \sum_{n=0}^{\infty} \frac{1}{z^{n+1}}$

(C) $\sum_{n=0}^{\infty} (2^n - 1) \frac{1}{z^{n+1}}$

(D) None of the above

5. Suppose that 80% of all tourists who come to India will visit Delhi, 70% of them will visit Mumbai and 60% of them will visit both Delhi and Mumbai. What is the probability that a tourist coming to India will visit Delhi or Mumbai or both?

(A) 0.9

(B) 0.1

(C) 0.6

(D) 0.8

6. A can hit a target four times in 5 shots, B three times in 4 shots and C two times in 3 shots. Calculate the probability that B and C may hit and A may lose.

- (A) $\frac{2}{5}$ (B) $\frac{1}{10}$
 (C) $\frac{2}{15}$ (D) $\frac{1}{5}$

7. Find the median for the following distribution :

Gross profit as percentage of sales	0-10	10-20	20-30	30-40	40-50
Number of companies	22	38	46	35	20

- (A) 25
 (B) 24.46
 (C) 24
 (D) 25.46

8. For grouped data, the standard deviation is given by the formula

- (A) $\frac{\sum f_i |x_i - \bar{x}|}{\sum f_i}$
 (B) $\sqrt{\frac{\sum f_i (x_i - \bar{x})^2}{\sum f_i}}$
 (C) $\frac{\sqrt{\sum f_i (x_i - \bar{x})^2}}{\sum f_i}$

(D) None of the above

9. If the range of integration has been divided into n equal parts, then Weddle's rule for numerical quadrature is applicable when n is an integral multiple of

- (A) 2 (B) 3
 (C) 4 (D) 6

10. The value of $\text{curl}(\vec{u} \times \vec{v})$ is

- (A) $(\vec{v} \cdot \nabla)\vec{u} - (\vec{u} \cdot \nabla)\vec{v} + (\text{div}\vec{v})\vec{u} - (\text{div}\vec{u})\vec{v}$
 (B) $(\vec{v} \cdot \nabla)\vec{u} - (\vec{u} \cdot \nabla)\vec{v} - \vec{v} \times \text{curl}\vec{u} - \vec{u} \times \text{curl}\vec{v}$
 (C) $\vec{v} \cdot \text{curl}\vec{u} - \vec{u} \cdot \text{curl}\vec{v}$
 (D) $\vec{u} \times \text{curl}\vec{v} + (\text{curl}\vec{u}) \times \vec{v}$

11. The Newton-Raphson iteration formula is

- (A) $x_{n+1} = x_n - \frac{f(x_n)}{f'(x_n)}$
 (B) $x_{n+1} = x_n + \frac{f(x_n)}{f'(x_n)}$
 (C) $x_{n+1} = x_n + \frac{f'(x_n)}{f(x_n)}$
 (D) $x_{n+1} = x_n - \frac{f'(x_n)}{f(x_n)}$

12. Given $\frac{dy}{dx} = \frac{y-x}{y+x}$ with $y=1$

when $x=0$. The approximate value of y for $x=0.1$ by Picard's method is

- (A) 0.9
 (B) $0.9 + 2 \log 1.1$
 (C) $2 \log 1.1$
 (D) 1

$\frac{16}{5} = 3.2$

13. If $\lambda_r (r = 1, 2, \dots, n)$ be the characteristic values of a non-singular matrix A , then the characteristic values of A^{-1} are

(A) $\frac{1}{\lambda_r} (r = 1, 2, \dots, n)$

(B) $\frac{|A|}{\lambda_r} (r = 1, 2, \dots, n)$

(C) $|A|\lambda_r (r = 1, 2, \dots, n)$

(D) $\frac{1}{|A|\lambda_r} (r = 1, 2, \dots, n)$

14. If the characteristic values of a square matrix of third order are $-2, 4, -5$, then its trace is equal to

(A) 40

(B) -18

(C) -3

(D) 4

15. If the matrix $\begin{bmatrix} 5 & 8 & 6 \\ 3 & 2 & 4 \\ 1 & 7 & 9 \end{bmatrix}$

expressed as $A+B$, where A is symmetric and B is skew-symmetric, then B is equal to

(A) $\begin{bmatrix} 5 & 11/2 & 7/2 \\ 11/2 & 2 & 11/2 \\ 7/2 & 11/2 & 9 \end{bmatrix}$

(B) $\begin{bmatrix} 0 & 5/2 & 5/2 \\ -5/2 & 0 & -3/2 \\ -5/2 & 3/2 & 0 \end{bmatrix}$

(C) $\begin{bmatrix} 0 & -5/2 & -5/2 \\ 5/2 & 0 & 3/2 \\ 5/2 & -3/2 & 0 \end{bmatrix}$

(D) $\begin{bmatrix} 5 & 11/2 & 7/2 \\ 11/2 & 2 & 11 \\ 7/2 & 11 & 9 \end{bmatrix}$

16. If the characteristic values of a square matrix of third order are $1, 3, 4$, then the value of its determinant is

(A) 8

(B) 12

(C) 19

(D) 96

17. The system of equations

$$x + y + 2z = 4$$

$$2x - y + 3z = 6$$

$$x - y - z = 1$$

has

- (A) a unique non-zero solution
- (B) infinitely many solutions
- (C) finitely many solutions
- (D) no solution

18. The characteristic roots of the matrix

$$\begin{bmatrix} 3 & 1 & 0 \\ 0 & -4 & -2 \\ 0 & 0 & -1 \end{bmatrix}$$

are

- (A) -4, -1, 3
- (B) -1, 3, 4
- (C) -4, 1, 3
- (D) 1, 3, 4

19. Which statement is not correct?

- (A) Matrix multiplication is associative.
- (B) Matrix multiplication is distributive over matrix addition.
- (C) Matrix addition is commutative.
- (D) Matrix multiplication is commutative.

20. If A be an $n \times n$ matrix, then the value of $\text{adj}(\text{adj } A)$ is

- (A) $|A| A$
- (B) $|A|^{n-2} A$
- (C) $|A|^{n-1} A$
- (D) $|A|^n A$

21. Which function is continuous at $x = 0$?

- (A) $\sin(1/x)$
- (B) $1/x^2$
- (C) $\tan^{-1}(1/x)$
- (D) $\tan x$

22. $\lim_{x \rightarrow 0} (1+x)^{1/x}$ is equal to

- (A) $1/e$
- (B) e
- (C) 1
- (D) $e-1$

23. If we expand $\sin\left(\frac{\pi}{4} + \theta\right)$ in powers of θ , the coefficient of $\frac{\theta^3}{3!}$ is

- (A) $-\frac{1}{\sqrt{2}}$ (B) $\frac{1}{\sqrt{2}}$
(C) $-\frac{1}{2}$ (D) $\frac{1}{2}$

24. Writing mean value theorem as $f(b) - f(a) = (b - a)f'(c)$, $a < c < b$ the value of c for $f(x) = x(x - 1)$, $a = 0$, $b = \frac{1}{2}$, is

- (A) $\frac{1}{4}$
(B) $\frac{1}{3}$
(C) $\frac{1}{5}$
(D) $\frac{1}{6}$

25. If u is a homogeneous function of x and y of degree n , the value of $x^2 \frac{\partial^2 u}{\partial x^2} + 2xy \frac{\partial^2 u}{\partial x \partial y} + y^2 \frac{\partial^2 u}{\partial y^2}$ is

- (A) $(n - 1)u$
(B) $n(n - 1)u$
(C) $n^2 u^2$
(D) $2nu$

26. The minimum value of the function $x^3 + y^3 - 3xy$ is

- (A) -1
(B) 0
(C) 4
(D) 1

27. An appropriate substitution for the integral

$$\int \frac{1 + x^{1/2}}{1 + x^{1/3}} dx$$

is

- (A) $x = t^2$
(B) $x = t^3$
(C) $x = t^6$
(D) $x = t^{12}$

28. The value of the integral

$$\int_0^{\pi/2} \frac{\sqrt{(\sin x)} dx}{\sqrt{(\sin x)} + \sqrt{(\cos x)}}$$

is

- (A) π
(B) $\frac{3\pi}{4}$
(C) $\frac{\pi}{2}$
(D) $\frac{\pi}{4}$

29. If S denotes the surface of the cube bounded by the planes $x=0, x=1, y=0, y=1, z=0, z=1$, then

$$\iint_S \{(x^3 - yz)\hat{i} - 2x^2y\hat{j} + 2\hat{k}\} \cdot \hat{n} dS$$

is equal to

- (A) 1 (B) $\frac{1}{3}$
(C) $\frac{1}{5}$ (D) $\frac{1}{6}$

30. The unit normal to the surface $x^2 + 4y^2 - 3z^2 - 2 = 0$ at the point $(1, 1, 1)$ is

- (A) $\frac{\hat{i} + 4\hat{j} - 3\hat{k}}{\sqrt{26}}$
(B) $\hat{i} + 4\hat{j} - 3\hat{k}$
(C) $\frac{1}{\sqrt{3}}(\hat{i} + \hat{j} + \hat{k})$
(D) $\frac{1}{\sqrt{11}}(\hat{i} - 3\hat{j} - \hat{k})$

31. Equations of the form

$$\frac{dy}{dx} + Py = Qy^n$$

where P and Q are functions of x alone, can be reduced to the linear form by dividing by y^n and putting

- (A) $\frac{1}{y^{n-1}} = v$ (B) $\frac{1}{y^n} = v$
(C) $\frac{1}{y^{n+1}} = v$ (D) $\frac{1}{y^{n-2}} = v$

32. The general solution of the differential equation

$$(xp - y)^2 = p^2 - 1, p \equiv \frac{dy}{dx}$$

is

- (A) $(cx - y)^2 = c^2$
(B) $(cx - y)^2 = c^2 - 1$
(C) $x^2 - y^2 = 1$
(D) $x^2 - y^2 = c^2$

33. The particular integral of the differential equation

$$\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + 5y = e^{2x} \sin x$$

is

- (A) $-\frac{1}{10}e^{2x}(\cos x - 2\sin x)$
(B) $-\frac{1}{10}e^{2x}(\sin x - 2\cos x)$
(C) $-\frac{1}{10}e^{2x} \cos x$
(D) $-\frac{1}{10}e^{2x} \sin x$

34. Putting $x = e^t$ and denoting $\frac{d}{dt}$ by D , the differential equation

$$x^3 \frac{d^3y}{dx^3} + 3x^2 \frac{d^2y}{dx^2} + x \frac{dy}{dx} + y = x + \log x$$

is transformed into

- (A) $D^3y = e^t + t$
(B) $(D^3 + 1)y = e^t + t$
(C) $(D^3 - 1)y = e^t + t$
(D) $(D^3 + 3D + 1)y = e^t + t$

35. $L\{e^{-3t} \sin 2t\}$ is equal to

(A) $\frac{2}{s^2 - 6s + 13}$

(B) $\frac{2}{s^2 + 6s + 13}$

(C) $\frac{2}{s^2 + 4}$

(D) $\frac{2}{s^2 + 6s + 8}$

36. If $L\{F(t)\} = f(s)$, then $L\{t^n F(t)\}$ is equal to

(A) $(-1)^n \frac{d^n}{ds^n} f(s)$

(B) $\frac{d^n}{ds^n} f(s)$

(C) $(-1)^{n-1} \frac{d^n}{ds^n} f(s)$

(D) $(-1)^{n+1} \frac{d^n}{ds^n} f(s)$

37. $L^{-1}\left\{\frac{s}{(s^2 + a^2)^2}\right\}$ is equal to

(A) $\frac{t}{a} \cos at$

(B) $\frac{t}{a} \sin at$

(C) $\frac{t}{2a} \sin at$

(D) $\frac{t}{2a} \cos at$

38. Solve $\frac{\partial^2 y}{\partial t^2} = c^2 \frac{\partial^2 y}{\partial x^2}$ such that

$y = a \cos pt$ when $x = l$, and $y = 0$ when $x = 0$.

(A) $y = \frac{a}{\sin \frac{pl}{c}} \cos pt \sin \frac{px}{c}$

(B) $y = a \cos pt \sin \frac{px}{c}$

(C) $y = \frac{a}{\sin \frac{pl}{c}} \sin pt \sin \frac{px}{c}$

(D) $y = a \sin pt \sin \frac{px}{c}$

39. Cauchy-Riemann equations in polar form are

(A) $\frac{\partial u}{\partial r} = \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = -\frac{\partial v}{\partial r}$

(B) $\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = -r \frac{\partial v}{\partial r}$

(C) $\frac{\partial u}{\partial r} = \frac{1}{r} \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = r \frac{\partial v}{\partial r}$

(D) $\frac{\partial u}{\partial r} = r \frac{\partial v}{\partial \theta}, \frac{\partial u}{\partial \theta} = -\frac{1}{r} \frac{\partial v}{\partial r}$

40. The analytic function $f(z) = u + iv$, in which the real part is $u = e^x(x \cos y - y \sin y)$, is

(A) $ze^z + c$

(B) $e^z + c$

(C) $ze^{-z} + c$

(D) $e^{-z} + c$

41. Air pollutants include

1. oxygen
2. methane
3. CO

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 3 only
(C) 2 and 3
(D) 2 only

42. Effluent turbidity is lowest when filtration of water is done through

- (A) slow sand filter
(B) rapid sand filter
(C) pressure filter
(D) horizontal filter

43. In very high-class swimming pool, disinfection of its water is done through

- (A) ultraviolet (UV) rays
(B) bleaching powder
(C) chlorine gas
(D) KMnO_4

44. In context of building drainage, the vent pipe carries

- (A) gases
(B) sewages
(C) water
(D) solids

45. An air quality index (AQI) accounts for

1. only one air pollutant
2. many air pollutants
3. all air pollutants

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 2 and 3
(C) 1 and 3
(D) 1 and 2

46. In incineration method of refuse disposal

1. volume is much reduced
2. smoke gets generated
3. microorganisms are turned quite harmless

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 1 and 2
(C) 2 and 3
(D) 1 and 3

47. In open dumping, which components of refuse can be included?

1. Street sweepings
2. Ashes
3. Some rubbish

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 1 and 2
(C) 2 and 3
(D) 1 and 3

48. In India where rainfall occurs for a few months every year, which system of sewerage would be appropriate for a metro city?

- (A) Separate sewers
(B) Combined sewers
(C) Open combined drains
(D) Open separated drains

49. The term refuse includes

1. excreta
2. putrescible solid waste
3. non-putrescible solid waste

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 1 and 2
(C) 2 and 3
(D) 1 and 3

50. In context of building drainage, WC stands for

1. water closet
2. waste control
3. waste closet

Select the correct answer using the code given below.

- (A) 1 only
(B) 1 and 2
(C) 1 and 3
(D) 2 and 3

51. The sewage sickness occurs during

- (A) sewage treatment
(B) sewage farming
(C) sewage flow in open drains
(D) sewage storing in a pond

52. During anaerobic digestion of sludge, which of the following is evolved?

- (A) Methane
(B) Oxygen
(C) Ozone
(D) Steam

53. The concept of overflow rate is used in the design of
- sedimentation tank
 - activated sludge process
 - sewers
 - sludge digesters

54. Which of the following parameters define the strength of a sewage?
- Suspended solids
 - BOD
 - Total dissolved solids

Select the correct answer using the code given below.

- 1, 2 and 3
- 1 and 2
- 2 and 3
- 1 and 3

55. In closed airtight sludge digestion, the process of purification is
- aerobic
 - anaerobic
 - chemical adsorption
 - chemical absorption

56. While characterizing sludges, SVI stands for
- Sewage Volume Index
 - Sludge Volume Index
 - Solids Volume Index
 - Sanitary Volume Index

57. In a grit channel, the velocity of flow is of
- no concern at all
 - zero value
 - constant value
 - varying value

58. Which of the following parameters are involved while considering palatability of water?

- Turbidity
- Colour
- Taste and odour

Select the correct answer using the code given below.

- 1, 2 and 3
- 1 and 2
- 2 and 3
- 1 and 3

59. Which of the following parameters affect the wholesomeness of drinking water?
- Excessive amounts of organic matter
 - Pathogens
 - Toxicants

Select the correct answer using the code given below.

- 1, 2 and 3
- 1 and 2
- 2 and 3
- 1 and 3

60. In water pollution context, organic matter is represented generally by BOD as
- (A) biological oxygen demand
 - (B) biochemical oxygen demand
 - (C) bed oxygen demand
 - (D) bacteriological oxygen demand
61. The mean velocity gradient has the dimension of
- (A) length/time²
 - (B) length/time
 - (C) time⁻¹
 - (D) time
62. Pollution in a river increases with
- (A) increasing river flow
 - (B) decreasing river flow
 - (C) uniform river flow
 - (D) presence of fish in a river
63. The BOD assimilation rate
- (A) is inversely proportional to BOD remaining
 - (B) is directly proportional to BOD remaining
 - (C) depends on the volume of water
 - (D) depends on the depth of water
64. In a foolproof manner, a river can be prevented from getting polluted from the city's generated wastewater through
1. construction of some dams on both sides of the river's city stretch
 2. construction of some kind of retaining walls on both sides of the river in its city stretch
 3. construction of some kind of canal or huge pipe sewer on both sides of the river for intercepting the flow of wastewater flowing towards the river
- Select the correct answer using the code given below.
- (A) 1 and 2
 - (B) 1, 2 and 3
 - (C) 2 and 3
 - (D) 1 and 3

65. Which of the following are generally related in a filter?

1. Effective size is the size that allows 10% of sand to pass through.
2. Sand is totally mixed in a rapid sand filter.
3. Non-uniformity coefficient of sand is the ratio of size allowing 60% of sand to pass through and effective size.

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 1 and 2
(C) 1 and 3
(D) 2 and 3

66. The Gt value used in the design of flocculation channel should be

- (A) 1000 to 9000
(B) 10000 to 100000
(C) 150000 to 200000
(D) more than 200000

67. Which subject-qualified students can be allowed admission for advanced design course on Sewage Treatment?

- (A) M.Sc. in Chemistry
(B) M.Sc. in Botany
(C) B.Tech or BE in Civil Engineering
(D) M.Sc. in Zoology

68. BOD assimilation follows the

- (A) exponential law
(B) linear law
(C) evaporation law
(D) condensation law

69. A river's velocity depends on

1. bed slope
2. river flow rate
3. river's cross-sectional area

Select the correct answer using the code given below.

- (A) 1, 2 and 3
(B) 1 and 2
(C) 1 and 3
(D) 2 and 3

70. The non-scouring velocity in concrete sewers is generally allowed to be

- (A) less than 1 m/s
(B) between 1 m/s and 2 m/s
(C) between 2 m/s and 3 m/s
(D) above 5 m/s

[P.T.O.]

71. The most economical disinfection of municipal water supply is done by the

- (A) use of ultraviolet rays (UV)
- (B) use of chlorine
- (C) use of bromine
- (D) use of iodine

72. The dilution ratio of a stream carrying $10 \text{ m}^3/\text{sec}$ flow rate and receiving wastewater of $1 \text{ m}^3/\text{s}$ flow rate will be

- (A) 11
- (B) 10
- (C) 0.11
- (D) 0.1

73. A fill-and-draw type of sedimentation tank can have a plan shape of

- 1. square
- 2. rectangle
- 3. circle

Select the correct answer using the code given below.

- (A) 1 and 2
- (B) 1 and 3
- (C) 1, 2 and 3
- (D) 2 and 3

74. Which of the following phenomena are responsible for BOD removal in rivers?

- 1. Settling of organic impurities
- 2. Exponential assimilation of organic impurities
- 3. Adsorption of organic impurities

Select the correct answer using the code given below.

- (A) 1, 2 and 3
- (B) 1 and 2
- (C) 1 and 3
- (D) 2 and 3

75. At national level in India, Ganga is the name of a

- (A) lake
- (B) stream
- (C) river
- (D) pond

76. The M.Sc. in Environmental Science course offered by most Indian universities is basically a course of

- (A) engineering
- (B) science
- (C) humanity
- (D) technology

77. Secchi disc is used for field measurement of a water body's

- (A) temperature
- (B) turbidity
- (C) chloride concentration
- (D) pH

78. In a public water supply system, the presence of residual chlorine (supposed to be around 0.2 mg/L) is identified by

- (A) water's colour
- (B) water's turbidity
- (C) water's smell
- (D) water's pH

79. Stokes' law/equation is applicable only when particle's settling velocity

- (A) is in the laminar range of Reynolds' number
- (B) is in the transition range of Reynolds' number
- (C) is in the turbulent range of Reynolds' number
- (D) is extremely high

80. In a market, solid waste problem can be managed effectively by

1. jointly employing ragpicker boys for collecting various types of wastes and selling them to consumers, kavaris, etc.
2. asking each shopkeeper to manage their own surroundings
3. allowing animals to roam into market for feasting upon the solid wastes

Select the correct answer using the code given below.

- (A) 1, 2 and 3
- (B) 1 and 2
- (C) 1 and 3
- (D) 2 and 3

81. If 5 million litre wastewater is mixed completely with a pond containing 50 million litre water, the pond water's resultant BOD (assuming BOD of wastewater and pond water as 100 mg/L and 10 mg/L respectively) would be close to

- (A) 52 mg/L
- (B) 17 mg/L
- (C) 106 mg/L
- (D) 20 mg/L

82. A jar test in water treatment system is done to determine
1. optimum dose of coagulant
 2. duration of time for effective flocculation
 3. type of coagulant
- Select the correct answer using the code given below.
- (A) 1 and 2
(B) 2 and 3
(C) 1, 2 and 3
(D) 1 and 3
83. In water treatment, flocculation would mean
- (A) charge neutralization or destabilization of colloids
(B) promoting the joining together of the destabilized colloids
(C) settling of colloids
(D) settling of flocs
84. MoEF, a Ministry of the Government of India, stands for
- (A) Ministry of Engineering Fortunes
(B) Ministry of Environment and Forests
(C) Ministry of Environmental Forestry
(D) Ministry of Engineering and Forests
85. In context of water treatment process, the term coagulation means
- (A) settling of colloids
(B) settling of flocs
(C) charge neutralization or destabilization of colloids
(D) promoting the joining together of the destabilized colloids
86. In water, a very high concentration of chlorides act like a poison for
1. agricultural use of such water
 2. the use of such water for industrial cooling
 3. swimming in such water
- Select the correct answer using the code given below.
- (A) 1, 2 and 3
(B) 1 only
(C) 1 and 2
(D) 2 and 3
87. Bacteriological tests must essentially be done for
- (A) water to be used for industrial cooling
(B) water to be used for drinking water supply
(C) water to be used for agricultural farming
(D) water to be used for cultivation of fish

88. Hardy-Cross method is a popular method for

- (A) designing a sedimentation tank
- (B) analyzing a water distribution network
- (C) designing a sewerage system
- (D) designing a grit channel

89. When a CI pipe carrying drinking water is laid above ground, use is made of

1. spigot and socket type of joint
2. expansion joint
3. screw joint

Select the correct answer using the code given below.

- (A) 1 and 3
- (B) 2 only
- (C) 1 only
- (D) 1, 2 and 3

90. Balancing capacity concept is used for the design of a

- (A) septic tank
- (B) sedimentation tank
- (C) service reservoir
- (D) slow sand filter

91. Which single-most water quality parameter is most significant while determining the suitability of water for agricultural use?

- (A) Oxygen
- (B) Chloride
- (C) BOD
- (D) Coliform

92. A primary sedimentation tank is designed essentially to remove

- (A) flocculated solids
- (B) algae
- (C) settleable solids
- (D) colloids

93. Impurities penetrate deep into the sand bed during filtration through a

- (A) slow sand filter
- (B) rapid sand filter
- (C) radial filter
- (D) horizontal filter

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94. Noise pollution causes
- (A) blindness
 - (B) nerve-related problems
 - (C) malaria
 - (D) kidney-related problems
95. Which single-most water quality parameter is most significant while determining the suitability of water for the cultivation of fish?
- (A) Total dissolved solids
 - (B) BOD
 - (C) Temperature
 - (D) Dissolved oxygen
96. A secondary sedimentation tank is designed essentially to remove
- (A) settleable solids
 - (B) flocculated solids
 - (C) colour
 - (D) odour
97. Impurities do not penetrate deep into the sand bed during filtration through a
- (A) rapid sand filter
 - (B) radial filter
 - (C) slow sand filter
 - (D) horizontal filter
98. In building drainage, stack manifests a/an
- (A) horizontal pipe
 - (B) vertical pipe
 - (C) inclined pipe
 - (D) pipe carrying gases
99. In a house situated along a city road, the noise pollution can be reduced by
- (A) making a wire fence around the house
 - (B) making a ditch around the house
 - (C) growing thick bushes around the house
 - (D) making brick pavement around the house
100. Which single-most water quality parameter is most significant while determining the suitability of water for use for industrial cooling?
- (A) Dissolved oxygen
 - (B) BOD
 - (C) Temperature
 - (D) Chloride