

B.TECH (CSE) Entrance Test Sample Paper with Answer Keys

Name:

Roll Number:

Total Time :- 2 Hrs.

Questions: 100 MCQs

Total Marks :- 200

SECTION-A
MATHEMATICS-60 Questions

- Let A and B have 3 and 6 elements respectively. What can be the maximum and minimum number of elements in A U B
(a) 9 and 6 (b) 6 and 3 (c) 9 and 3 (d) 6 and 12
- $(1+i)^{10} + (1-i)^{10} =$
(a) -1 (b) 1 (c) 0 (d) 2
- If $\begin{pmatrix} 2 & 3 & 2 \\ 0 & 5 & 1 \\ 0 & 3 & 2 \end{pmatrix} \begin{pmatrix} 1 \\ 1 \\ x \end{pmatrix} = 0$, the value of x are:
(a) 1, 8 (b) -1, 8 (c) -1, -8 (d) 1, -8
- The matrix $\begin{pmatrix} 0 & -4 & 1 \\ 4 & 0 & -5 \\ -1 & 5 & 0 \end{pmatrix}$ is
(a) Orthogonal (b) Idempotent (c) Skew-symmetric (d) Symmetric
- $\lim_{n \rightarrow \infty} \left\{ \left(1 + \frac{1}{n}\right)^n + \left(1 + \frac{1}{n}\right)^{-n} \right\}$
(a) exists and is equal to 0 (b) does not exist
(c) exists and equal to e + 1/e (d) exists and equal to e
- For differentiability of a function, continuity is
(a) Sufficient (b) Necessary (c) Sufficient and Necessary (d) none of these
- Differential coefficient of $e^{\sqrt{x}}$ with respect to \sqrt{x} is -----
(a) $e^{\sqrt{x}}$ (b) $\frac{e^{\sqrt{x}}}{2\sqrt{x}}$ (c) $e^{\sqrt{x}} \cdot \frac{\sqrt{x}}{2}$ (d) $e^{\sqrt{x}} \cdot 2\sqrt{x}$
- Rolle's theorem is associated with his name, He is
(a) An English mathematician (b) German mathematician

- (c) French mathematician (d) Russian mathematician
9. The slope of the curve $y = ae^{-x/b}$ at the point where it crosses the y-axis is -----
 (a) a/b (b) -a/b (c) b/a (d) -b/a
10. The maximum value of $\frac{\log x}{x}$ in $(0, \infty)$ is -----
 (a) e (b) 1/e (c) 1 (d) none of these
11. $\int \frac{\cos x \sin x}{1 + \sin^4 x} dx$ is equal to
 (a) $\frac{1}{2} \sin^{-1}(\tan^2 x)$ (b) $\frac{1}{2} \tan^{-1}(\sin^2 x)$ (c) $\frac{1}{2} \cos^{-1}(\cot^2 x)$ (d) $\frac{1}{2} \cot^{-1}(\cos^2 x)$
12. $\int \frac{1/x}{x} dx$ is equal to
 (a) 2 (b) 0 (c) 1 (d) 1/2
13. The coordinates of the foot of the perpendicular drawn from the point (2,3) to the straight line $x+y = 11$ are -----
 (a) (4,7) (b) (6,5) (c) (7,4) (d) (5,6)
14. Image of the point (2,3) along the line $y = x$ is -----
 (a) (-2, 3) (b) (3,2) (c) 2, -3) (d) (-2, -3)
15. The tangent at (3,4) to the circle $x^2 + y^2 = 16$ is -----
 (a) $3x + 4y = 0$ (b) $3x+4y = 16$ (c) $3x - 4y = 16$ (d) $4x+3y = 16$
16. Find $\lim_{x \rightarrow 0} \frac{\sqrt{1+x} - 1}{x}$
 (a) 0 (b) 1 (c) ∞ (d) $\frac{1}{2}$
17. The function given by $f(x) = |x|$ at $x = 0$ is
 (a) continuous & differentiable (b) discontinuous & differentiable
 (c) continuous & not differentiable (d) discontinuous & not differentiable
18. Find the angle between two vectors \vec{a} and \vec{b} with magnitude 1 and 2, respectively and such that $\vec{a} \cdot \vec{b} = 1$
 (a) $\pi/2$ (b) $\pi/3$ (c) 0 (d) π
19. Find λ if the vectors $\vec{a} = \hat{i} + 3\hat{j} + \hat{k}$, $\vec{b} = 2\hat{i} - \hat{j} - \hat{k}$ and $\vec{c} = \lambda\hat{i} + 7\hat{j} + 3\hat{k}$ are coplanar
 (a) $\lambda = 1$ (b) $\lambda = 2$ (c) $\lambda = -1$ (d) $\lambda = 0$

20. If $A = \begin{bmatrix} 3 & 2 \\ 1 & 4 \end{bmatrix}$ then $A(adjA)$ equals
 (a) $\begin{bmatrix} 10 & 0 \\ 0 & 10 \end{bmatrix}$ (b) $\begin{bmatrix} 0 & 10 \\ 10 & 0 \end{bmatrix}$ (c) $\begin{bmatrix} 10 & 1 \\ 1 & 10 \end{bmatrix}$ (d) none of the above
21. If α, β, γ are the roots of $2x^3 - 3x^2 + 6x + 1 = 0$, then $\alpha^2 + \beta^2 + \gamma^2$ is
 (a) $15/4$ (b) -3 (c) $-15/4$ (d) $33/4$
22. The equation of the plane passing through the point $(3, -3, 1)$ and parallel to the plane $2x + 3y + 5z + 6 = 0$ is
 (a) $2x + 3y + 5z + 2 = 0$ (b) $2x + 3y + 5z - 2 = 0$ (c) $2x + 3y + 5z + 3 = 0$ (d) $2x + 3y + 5z - 3 = 0$
23. If $x + iy = \sqrt{2} + 3i$, then $x^2 + y^2$ is
 (a) 7 (b) 5 (c) 13 (d) $\sqrt{2} + 3$
24. Find the slope of the tangent to the curve $y = x^3 - x + 1$ at the point whose x -coordinate is 2
 (a) 11 (b) 0 (c) 2 (d) 7
25. Which of the following function is strictly decreasing on $(0, \pi/2)$?
 (a) x (b) $\sin x$ (c) $\cos x$ (d) $\tan x$
26. Find the value of the integral $\int_0^{\pi/2} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$
 (a) $\pi/2$ (b) $\pi/4$ (c) 0 (d) π
27. Find the order and the degree of the differential equation

$$\left(\frac{d^3 y}{dx^3}\right)^2 + 2\left(\frac{d^2 y}{dx^2}\right) - 5\left(\frac{dy}{dx}\right) + y = 0$$
 (a) order 2, degree 2 (b) order 2, degree 3 (c) order 3, degree 2 (d) order 3, degree 3
28. If $P(A) = 6/11$, $P(B) = 5/11$ and $P(A \cup B) = 7/11$, find $P(A \cap B)$
 (a) $4/11$ (b) 1 (c) $30/121$ (d) $1/11$
29. Find the range of the function f given by $f(x) = 1 + 3\cos 2x$
 (a) $[-1, 1]$ (b) $[0, 4]$ (c) $[-2, 4]$ (d) $[-2, 1]$
30. If ω is one of the imaginary cube roots of unity, find the value of $\begin{vmatrix} 1 & \omega & \omega^2 \\ \omega & \omega^2 & 1 \\ \omega^2 & 1 & \omega \end{vmatrix}$
 (a) 0 (b) 1 (c) ω^3 (d) ω

31. A square matrix $A = [a_{ij}]$ is called symmetric matrix if for all i and j
 (a) $a_{ij} = -a_{ij}$ (b) $a_{ij} = a_{ji}$ (c) $a_{ii} = a_{jj}$ (d) $a_{ij} = a_{ii}$
32. Area of the triangle whose vertices are $A(-1, -8)$, $B(-2, 3)$ & $C(3, 2)$ is
 (a) 10 sq. units (b) 20 sq. units (c) 15 sq. units (d) 30 sq. units
33. $\begin{vmatrix} 1 & \omega^2 & \omega^2 \\ \omega^2 & 1 & \omega \\ \omega^2 & \omega & 1 \end{vmatrix}$ is equivalent to
 (a) 0 (b) 1 (c) -3ω (d) 3ω
34. $\lim_{x \rightarrow 1} \frac{x^3 - 1}{x - 1}$ is equivalent to
 (a) 3 (b) 0 (c) ∞ (d) 1
35. Solution of the differential equation $\frac{dy}{dx} = e^{x+y}$ is
 (a) $e^{-y} = e^x + c$ (b) $-e^y = e^x + c$ (c) $e^y = -e^x + c$ (d) $-e^{-y} = e^x + c$
36. Area of the region bounded between the line $x = 3$ and curve $y^2 = 4x$ is
 (a) $2\sqrt{3}$ sq. units (b) $4\sqrt{3}$ sq. units (c) 0 (d) $8\sqrt{3}$ sq. units
37. In a simultaneous throws of a pair of dies, the probability of getting a doublet of prime numbers is
 (a) $\frac{1}{12}$ (b) $\frac{1}{6}$ (c) $\frac{1}{2}$ (d) $\frac{1}{3}$
38. The function $\begin{cases} \frac{|x|}{x}, & x \neq 0 \\ 1, & x = 0 \end{cases}$ is
 (a) continuous at every point (b) continuous at origin (c) discontinuous at origin
 (d) discontinuous at everywhere
39. The equation of tangent to the curve $\sqrt{x} + \sqrt{y} = \sqrt{a}$ at the point $\left(\frac{a^2}{4}, \frac{a^2}{4}\right)$ is
 (a) $x + y = a$ (b) $x + y = 2a$ (c) $x + y = a^2$ (d) $2x + 2y = a^2$

40. $\lim_{x \rightarrow a} \frac{\log x - \log a}{x - a}$ is
 (a) 0 (b) $\frac{1}{a}$ (c) ∞ (d) a
41. If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x + \dots \infty}}}$ then $\frac{dy}{dx}$ is
 (a) 0 (b) $\frac{1}{x}$ (c) $\frac{1}{x(2y-1)}$ (d) $\frac{1}{2y-1}$
42. The solution of differential equation $\frac{dy}{dx} + 2y = e^{-x}$ is
 (a) $ye^{-x} = 2e^x + c$ (b) $ye^{2x} = e^x + c$ (c) $y = e^x + c$ (d) none of these.
43. $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$
 (a) 0 (b) 1 (c) $\frac{\pi}{2}$ (d) $\frac{\pi}{4}$.
44. $\int e^x(\sin x + \cos x) dx$ is
 (a) $e^x \cos x + c$ (b) $\sin x + c$ (c) $e^x + c$ (d) $e^x \sin x + c$.
45. Equation of normal to the curve $y = 2x^2 + 3\sin x$ at $x = 0$ is
 (a) $x + 3y = 0$ (b) $x + y = 0$ (c) $3x + y = 0$ (d) $x = y$.
46. $\lim_{x \rightarrow 0} \frac{\sin x - x}{x}$
 (a) ∞ (b) 0 (c) 1 (d) not defined
47. $\lim_{x \rightarrow 0} \frac{\tan x - x}{x}$
 (a) ∞ (b) 0 (c) $\frac{\pi}{2}$ (d) not defined
48. $\lim_{x \rightarrow 0} \frac{e^{ax} - e^{-ax}}{\log(1 + bx)}$
 (a) $2a/b$ (b) $3a/b$ (c) a/b (d) 0

49. $\lim_{x \rightarrow \frac{\pi}{4}} \frac{\sec^2 x - 2 \tan x}{1 + \cos 4x}$

- (a) 1/3 (b) 1/2 (c) 1/4 (d) 1/6

50. $\lim_{x \rightarrow 0} \frac{\cos x - \log(1+x) - 1 + x}{\sin^2 x}$

- (a) 0 (b) 1 (c) 2 (d) 3

51. $\lim_{x \rightarrow \infty} \frac{x^n}{e^x}$

- (a) 1 (b) 0 (c) -1 (d) 2

52. $\int_0^{\pi/2} \frac{\sin x}{\sin x + \cos x} dx$

- (a) 1 (b) $\pi/2$ (c) $\pi/4$ (d) 0

53. $y^2 = (x-a)(x-b)(x-c)$ is symmetric about

- (a) x-axis (b) y-axis (c) both the axis (d) none of the axis

54. $\int_0^{\pi/2} (\sin^2 x \cos^2 x) dx$

- (a) 1 (b) $\pi/2$ (c) $\pi/8$ (d) 0

55. The area bounded by the curve $x^{1/2} + y^{1/2} = a^{1/2}$ and co-ordinate axes is

- (a) $a^2/6$ (b) $a/2$ (c) $a/3$ (d) $a^2/8$

56. The area bounded by the curves $y = x^3$ and $y = 4x^2$ is

- (a) $32/3$ (b) $64/3$ (c) $16/3$ (d) $8/3$

57. If $(x+2y) dx + (2x + y) dy = 0$, then its solution is

- (a) $y^2 + 4xy + x^2 = c$ (b) $y + 4xy + x = c$ (c) $y = x$ (d) $y^2 = x$

58. $\frac{dy}{dx} = e^{2x-y} + x^3 e^{-y}$, then

- (a) $e^y = (e^{2x}/2) + x^4/4 + c$ (b) $e^y = (e^{2x}/2) + c$ (c) $e^y = x^4/4 + c$ (d) $y^2 = x$

59. $(x^2+1) \frac{dy}{dx} + (y^2+1) = 0$, $y(0)=0$, then

(a) $y = \frac{1-x}{1+x}$ (b) $y = \frac{-x}{1+x}$ (c) $y = \frac{x}{1+x}$ (d) $y = \frac{x^2}{1+x}$

60. $y' + y = e^{e^x}$, then

(a) $y e^x = e^{e^x} + c$ (b) $y = e^{e^x} + c$ (c) $y = e^{e^x} + x$ (d) $y e^x = e^{-x} + c$

SECTION –B

PHYSICS- 20 Questions

61. The necessary and sufficient condition for a particle executing S. H. M. is

- (a) Constant period
- (b) Proportionality between acceleration and displacement from mean position
- (c) Constant acceleration
- (d) Proportionality between restoring force and displacement from mean position

62. A particle executes S.H.M. The total energy of the particle is maximum at

- (a) mean position
- (b) extreme position
- (c) midway between mean and extreme positions
- (d) the total energy is same at all positions

63. The bending of light rays round the corners of an obstacle is called

- a) interference,
- b) b) diffraction
- c) c) dispersion,
- d) d) polarization

64. Which are the following statements indicate that the light waves are

transverse.

- e) Light waves can travel in vacuum,
- f) b) Light waves show interference,
- g) Light waves can be polarized;
- h) d) Light waves can be diffracted.

65. Loudness of sound depends upon-----of the sound wave

- (a) Frequency
- (b) Wavelength
- (c) Amplitude
- (d) Pitch

66. The Moment of Inertia of a body does not depends upon its

- (a) axis of rotation
- (b) angular velocity
- (c) form of mass
- (d) position of axis of rotation

67. Which method can be applied to determine the purity of a metal

- (a) Boyles Law
- (b) Pascals Law
- (c) Archimedes principle
- (d) Newtons Law

68. Which of the following related to threshold frequency

- (a) Photo current decreases with voltage
- (b) Photo electric emission is not possible
- (c) Photo current increases with voltage
- (d) Photo current is constant

69. Which one of the following pair of phenomena illustrates the particle aspect of wave-particle duality?

- (a) Compton effect and Bragg's law,
- (b) Photoelectric effect and Compton effect,
- (c) Compton effect and Pauli's principle,
- (d) Bragg's law and photoelectric effect.

70. How stationary waves are formed

- (a) A transverse wave superposing a longitudinal wave
- (b) Two waves of the same speed superposing
- (c) Two waves of the frequency travelling in the same direction
- (4) Two waves of the frequency travelling in the opposite direction

71. What is wavelength of visible spectrum?

- (a) $1300 \text{ \AA} - 3000 \text{ \AA}$
- (b) $3900 \text{ \AA} - 7600 \text{ \AA}$
- (c) $7800 \text{ \AA} - 8000 \text{ \AA}$
- (d) $8500 \text{ \AA} - 9800 \text{ \AA}$

72. The relation between frequency n , wavelength λ and velocity v of a wave is

- (a) $n = v\lambda$
- (b) $v = n\lambda$
- (c) $n = \frac{\lambda}{v}$
- (d) $n = \frac{1}{v}$

73. The velocity of sound is maximum in

- (a) Water
- (b) Air
- (c) Vacuum

(d) Metal

74. What is phase difference between two successive troughs in the transverse wave?

(a) $\frac{\pi}{2}$

(b) π

(c) $\frac{3\pi}{2}$

(d) 2π

75. When there are no external forces, the shape of a liquid drop is determined by

(a) Surface tension of the liquid

(b) Density of liquid

(c) Viscosity of liquid

(d) Temperature of air only

76. Average kinetic energy of molecules is

(a) Directly proportional to square root of temperature

(b) Directly proportional to absolute temperature

(c) Independent of absolute temperature

(d) Inversely proportional to absolute temperature

77. The mean kinetic energy of one gram-mole of a perfect gas at absolute temperature T is

(a) $\frac{1}{2}kT$

(b) $\frac{1}{2}RT$

(c) $\frac{3}{2}kT$

(d) $\frac{3}{2}RT$

78. Kepler's second law regarding constancy of areal velocity of a planet is a consequence of the law of conservation of

- (a) energy
- (b) angular momentum
- (c) linear momentum
- (d) none of these

79. Boyle's law is applicable in,

- (a) Isochoric process
- (b) Isothermal process
- (c) Isobaric process
- (d) Isotonic process

80. Absorptive power of perfectly black body is

- (a) Zero
- (b) Infinity
- (c) One
- (d) Constant

SECTION-C

CHEMISTRY- 20 QUESTIONS

81. The units of surface tension and viscosity of a liquid are, respectively

- (a) $\text{kg m}^{-1} \text{s}^{-1}$, N m^{-1}
- (b) $\text{kg m}^2 \text{s}^{-1}$, N m^{-2}
- (c) N m^{-1} , $\text{kg m}^{-1} \text{s}^{-1}$
- (d) N m^{-1} , $\text{kg m}^2 \text{s}^{-1}$

82. The heat change at constant volume is equal to

- (a) ΔH
- (b) ΔG
- (c) ΔU

(d) RT

83. The Gibbs phase rule is

(a) $F = P - C + 2$

(b) $P = F - C + 2$

(c) $F = C - P + 2$

(d) $P = F - C + 1$

84. Isotonic solutions have

(a) same freezing point

(b) same boiling point

(c) same osmotic pressure

(d) same surface tension

85. The paramagnetic molecule is

(a) O_2

(b) N_2

(c) ClO_3

(d) Cl_2

86. From the periodic table, what is the atomic number of aluminum?

(a) 26

(b) 13

(c) 18

(d) 39

87. Which one of the following is a strong acid?

(a) $CaSO_4$

(b) NH_3

(c) $NaOH$

(d) HNO_3

88. Which of the following are saturated aliphatic hydrocarbons?

- (a) Alkenes
- (b) alkanes
- (c) alkynes
- (d) nixanes

89. Of the following, which has units of "Pascal":

- (a) force
- (b) volume
- (c) pressure
- (d) viscosity

90. The structure of an ammonia molecule can best be described as:

- (a) linear
- (b) tetrahedral
- (c) triangular planar
- (d) pyramidal

91. Bohr's model of the atom was able to accurately explain:

- (a) The energies of the spectral lines for each element.
- (b) Why electrons travel in circular orbits around the nucleus.
- (c) Why spectral lines appear when atoms are heated.
- (d) none of the above answers is correct.

92. Which of the following compounds contains a double bond?

- (a) acetylene
- (b) butane
- (c) propane
- (d) butene

93. In any chemical reaction, a quantity that decrease to a minimum is:

- (a) free energy
- (b) entropy
- (c) temperature

(d) enthalpy

94. Of the following liquids, which is most dense?

- (a) water
- (b) gasoline
- (c) acetone
- (d) chloroform

95. When vinegar and baking soda are mixed together, which gas is formed?

- (a) oxygen
- (b) nitrogen
- (c) carbon dioxide
- (d) hydrogen

96. Orbitals hold:

- (a) A maximum of one electron each
- (b) A maximum of two electrons each
- (c) A number of electrons that depends on the energy level.
- (d) A number of electrons that depends on the type of orbital.

97. The atoms in sugar are bound by what type of bond?

- (a) Ionic
- (b) covalent
- (c) hydrogen
- (d) van der Waals

98. What is the name given to the equation $PV = nRT$?

- (a) ideal gas equation
- (b) law of partial pressure
- (c) quadratic equation
- (d) Raoult's equation

99. Which of the following elements can form the great number of covalent bonds?

- (a) carbon
- (b) nitrogen
- (c) oxygen
- (d) sulfur

100. An example of a chemical property is:

- (a) density
- (b) acidity
- (c) mass
- (d) solubility

ANSWER KEYS

Section-A (Mathematics)

- 1. (a)
- 2. (c)
- 3. (c)
- 4. (c)
- 5. (c)
- 6. (b)
- 7. (a)
- 8. (c)
- 9. (b)
- 10. (b)
- 11. (b)
- 12. (b)
- 13. (d)
- 14. (b)
- 15. (b)
- 16. (d)
- 17. (c)
- 18. (b)
- 19. (d)
- 20. (a)
- 21. (c)
- 22. (b)
- 23. (b)
- 24. (a)

- 25. (c)
- 26. (b)
- 27. (c)
- 28. (a)
- 29. (c)
- 30. (a)
- 31. (b)
- 32. (d)
- 33. (c)
- 34. (a)
- 35. (d)
- 36. (d)
- 37. (a)
- 38. (c)
- 39. (d)
- 40. (b)
- 41. (c)
- 42. (b)
- 43. (d)
- 44. (d)
- 45. (a)
- 46. (b)
- 47. (b)
- 48. (a)
- 49. (b)
- 50. (a)
- 51. (b)
- 52. (c)
- 53. (a)
- 54. (c)
- 55. (d)
- 56. (b)
- 57. (a)
- 58. (a)
- 59. (a)
- 60. (a)

Section-B (Physics)

- 61. (d)
- 62. (d)
- 63. (b)
- 64. (c)
- 65. (c)
- 66. (b)
- 67. (c)
- 68. (b)
- 69. (b)

- 70. (d)
- 71. (b)
- 72. (b)
- 73. (d)
- 74. (d)
- 75. (a)
- 76. (b)
- 77. (d)
- 78. (b)
- 79. (b)
- 80. (c)

Section-C (Chemistry)

- 81. (c)
- 82. (c)
- 83. (c)
- 84. (c)
- 85. (a)
- 86. (b)
- 87. (d)
- 88. (b)
- 89. (c)
- 90. (d)
- 91. (c)
- 92. (d)
- 93. (a)
- 94. (d)
- 95. (c)
- 96. (b)
- 97. (b)
- 98. (a)
- 99. (d)
- 100. (b)