CBT - 01

1. The product $2^{\frac{1}{4}} \cdot 4^{\frac{1}{16}} \cdot 8^{\frac{1}{48}} \cdot 16^{\frac{1}{128}}$..... to ∞ is equal to

(a) $2^{\frac{1}{4}}$ (b) $2^{\frac{1}{2}}$ (c) 1 (d) 2

2. If f' (x) = $\tan^{-1}$ (secx + tanx), $-\frac{\pi}{2} < x < \frac{\pi}{2}$, and f(0) = 0, then f(1) is equal to :

(a) $\frac{1}{4}$ (b) $\frac{\pi+2}{4}$

(c) $\frac{\pi-1}{4}$ (d) $\frac{\pi+1}{4}$

3. The value of $\int_0^{2\pi} \frac{x\sin^8 x}{\sin^8 x + \cos^8 x} dx$ is equal to

(a) 2π (b) π^2 (c) 4π (d) $2\pi^2$

4. The value of

$\cos^3\left(\frac{\pi}{8}\right)\cdot\cos\left(\frac{3\pi}{8}\right)+\sin^3\left(\frac{\pi}{8}\right)\cdot\sin\left(\frac{3\pi}{8}\right)$ is

(a) $\frac{1}{2\sqrt{2}}$ (b) $\frac{1}{\sqrt{2}}$ (c) $\frac{1}{4}$ (d) $\frac{1}{2}$

5. If the matrices $A = \begin{bmatrix} 1 & 1 & 2 \\ 1 & 3 & 4 \\ 1 & -1 & 3 \end{bmatrix}$, B = adj A and C = 3A, then $\frac{|adj B|}{|C|}$ is equal to

(a) 72 (b) 8 (c) 16 (d) 2

6. A circle touches the y-axis at the point (0, 4) and passes through the point (2, 0). Which of the following lines is not a tangent to this circle ?

(a) 4x – 3y + 17 = 0 (b) 3x – 4y – 24 = 0

(c) 3x + 4y – 6 = 0 (d) 4x + 3y – 8 = 0

7. A spherical iron ball of 10 cm radius is coated with a layer of ice of uniform thickness that melts at a rate of 50 cm^3/min. When the thickness of ice is 5 cm, then the rate (in cm/min.) at which of the thickness of ice decreases, is:

(a) $\frac{5}{6\pi}$ (b) $\frac{5}{36\pi}$ (c) $\frac{1}{18\pi}$ (d) $\frac{1}{54\pi}$

8. Negation of the statement :

$\sqrt{5}$ is an integer or 5 is irrational is :

(a) $\sqrt{5}$ is not an integer or 5 is not irrational

(b) $\sqrt{5}$ is an integer and 5 is irrational

(c) $\sqrt{5}$ is irrational or 5 is an integer.

(d) $\sqrt{5}$ is not an integer and 5 is not irrational

9. The integral $\int \frac{dx}{(x+4)^{8/7}(x-3)^{6/7}}$ is equal to

(where C is a constant of integration)

(a) $\left(\frac{x-3}{x+4}\right)^{1/7} + C$

(b) $-\frac{1}{13}\left(\frac{x-3}{x+4}\right)^{-13/7} + C$

(c) $\frac{1}{2}\left(\frac{x-3}{x+4}\right)^{3/7} + C$

(d) $-\left(\frac{x-3}{x+4}\right)^{-1/7} + C$

10. If the number of five digit numbers with distinct digits and 2 at the 10^{th} place is 336 k, then k is equal to :

(a) 7 (b) 4 (c) 6 (d) 8

11. In an box, there are 20 cards, out of which 10 are labelled as A and the remaining 10 are labelled as B. Cards are drawn at random, one after the other and with replacement, till a second A-card is obtained. The probability that the second A-card appears before the third B-card is :

(a) $\frac{13}{16}$ (b) $\frac{15}{16}$ (c) $\frac{9}{16}$ (d) $\frac{11}{16}$

12. Let z be a complex number such that $\left|\frac{z-i}{z+2i}\right| = 1$ and $|z| = \frac{5}{2}$. Then the value of |z + 3i| is :

(a) $\sqrt{10}$ (b) $2\sqrt{3}$

(c) $\frac{7}{2}$ (d) $\frac{15}{4}$

13. If for some α and β in R, the intersection of the following three planes

x + 4y – 2z = 1

x + 7y – 5z = β

x + 5y + αz = 5

is a line in R^3, then $\alpha + \beta$ is equal to:

(a) 0 (b) – 10

(c) 10 (d) 2

14. The number of real roots of the equation,

$e^{4x} + e^{3x} - 4e^{2x} + e^x + 1 = 0$ is :

(a) 3 (b) 1
(c) 4 (d) 2

15. Let f be any function continuous on [a, b] and twice differentiable on (a, b). If for all x ∈ (a, b), f'(x) > 0 and f''(x) < 0, then for any c ∈ (a, b), $\frac{f(c)-f(a)}{f(b)-f(c)}$ is greater than

(a) 1 (b) $\frac{b-c}{c-a}$
(c) $\frac{c-a}{b-c}$ (d) $\frac{b+a}{b-a}$

16. If for all real triplets (a, b, c), $f(x) = a + bx + cx^2$; then $\int_0^1 f(x)$ dx is equal to :

(a) $\frac{1}{3}\left\{f(0)+f\left(\frac{1}{2}\right)\right\}$
(b) $\frac{1}{3}\left\{f(1)+3f\left(\frac{1}{2}\right)\right\}$
(c) $\frac{1}{6}\left\{f(0)+f(1)+4f\left(\frac{1}{2}\right)\right\}$
(d) $2\left\{3f(1)+2f\left(\frac{1}{2}\right)\right\}$

17. Let the observations xi(1 ≤ i ≤ 10) satisfy the equations, $\sum_{i=1}^{10}(x_i-5)=10$ and $\sum_{i=1}^{10}(x_i-5)^2=40$. If μ and λ are the mean and the variance of the observations, $x_1 - 3$, $x_2 - 3$, …… $x_{10} - 3$, then the ordered pair (μ, λ) is equal to :

(a) (3, 3) (b) (3, 6)
(c) (6, 6) (d) (6, 3)

18. If e_1 and e_2 are the eccentricities of the ellipse, $\frac{x^2}{18}+\frac{y^2}{4}=1$ and the hyperbola, $\frac{x^2}{9}-\frac{y^2}{4}=1$ respectively and (e_1, e_2) is a point on the ellipse, $15x^2 + 3y^2 = k$, then k is equal to

(a) 14 (b) 15
(c) 16 (d) 17

19. Let C be the centroid of the triangle with vertices (3, –1), (1, 3) and (2, 4). Let P be the point of intersection of the lines x + 3y – 1 = 0 and 3x – y + 1 = 0. Then the line passing through the points C and P also passes through the point

(a) (7, 6) (b) (–9, –7)
(c) (9, 7) (d) (–9, –6)

20. If $\begin{cases} \frac{\sin(a+2)x+\sin x}{x} & ; \ x<0 \\ b & ; \ x=0 \\ \frac{(x+3x^2)^{1/3}-x^{1/3}}{x^{4/3}} & ; \ x>0 \end{cases}$ is continuous at x = 0, then a + 2b is equal to :

(a) 1 (b) 0
(c) – 2 (d) – 1

21. The number of distinct solutions of the equation, $\log_{1/2}|\sin x| = 2 - \log_{1/2}|\cos x|$ in the interval [0, 2π], is

(a) 8 (b) 4
(c) 6 (d) 2

22. The projection of the line segment joining the points (1, –1, 3) and (2, –4, 11) on the line joining the points (–1, 2, 3) and (3, –2, 10) is :

(a) 5 (b) 10
(c) 4 (d) 8

23. The coefficient of x^4 in the expansion of $(1 + x + x^2)^{10}$ is…

(a)612 (b)302
(c)614 (d)615

24. If for x ≥ 0, y = y(x) is the solution of the differential equation, $(x + 1)dy = \{(x + 1)^2 + y - 3\}dx$, y(2) = 0, then y(3) is equal to :

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

25. if the vectors,
$\vec{p}=(a+1)\hat{i}+a\hat{j}+a\hat{k}, \vec{q}=a\hat{i}+(a+1)\hat{j}+a\hat{k}$ and
$\vec{r}=a\hat{i}+a\hat{j}+(a+1)\hat{k}, (a \in R)$ are coplanar and
$3(\vec{p}\cdot\vec{q})^2-\lambda|\vec{r}\times\vec{q}|^2=0$, then the value of λ is :

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

DPT - 01 ANSWER KEY (Mock Test)

1. (b)	**2.** (d)	**3.** (b)	**4.** (a)	**5.** (b)	**6.** (d)	**7.** (c)	**8.** (d)	**9.** (a)	**10.** (d)
11. (d)	**12.** (c)	**13.** (c)	**14.** (b)	**15.** (c)	**16.** (c)	**17.** (a)	**18.** (c)	**19.** (d)	**20.** (b)
21. (8)	**22.** (8)	**23.** (d)	**24.** (d)	**25.** (d)					