Series : PTS/16

Code No. 13/1/1

Roll No. | 2 | 1 | 3 | 1 | 2 | | |

Candidates must write the Code on the title page of the answer-book.

PLEASURE TEST SERIES XII – 16

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Time Allowed : 180 Minutes **Max. Marks : 100**

SECTION – A

Q01. Evaluate : $\sin^{-1}\left(-\frac{1}{2}\right)+\cos^{-1}\left(-\frac{1}{2}\right)$.

Q02. Find the value of $\int \frac{\log x^2}{x}dx$.

Q03. If $A=\begin{pmatrix}\cos\alpha & -\sin\alpha\\ \sin\alpha & \cos\alpha\end{pmatrix}$, then for what value of α is A an identity matrix?

Q04. What is the cosine of the angle which the vector $\sqrt{2}\,\hat{i}+\hat{j}+\hat{k}$ makes with *y*-axis?

Q05. Find $[\vec{a}\ \vec{b}\ \vec{c}]$, if $[\vec{a}+\vec{b}\ \vec{b}+\vec{c}\ \vec{c}+\vec{a}]=72$.

Q06. Find the range of the function $f(x)=\frac{|x-1|}{(x-1)}$?

Q07. Find the minor of the element of second row and third column (a_{23}) in : $\begin{vmatrix}2 & -3 & 5\\ 6 & 0 & 4\\ 1 & 5 & -7\end{vmatrix}$.

Q08. Write the vector equation of the line : $\frac{x-5}{3}=\frac{y+4}{7}=\frac{6-z}{2}$.

Q09. What is the degree of the differential equation : $5x\left(\frac{dy}{dx}\right)^2-\frac{d^2y}{dx^2}-6y=\log x$?

Q10. If $\begin{pmatrix}1 & 2\\ 3 & 4\end{pmatrix}\begin{pmatrix}3 & 1\\ 2 & 5\end{pmatrix}=\begin{pmatrix}7 & 11\\ k & 23\end{pmatrix}$, then write the value of k.

SECTION – B

Q11. If $f(x)=\begin{cases}\frac{\sqrt{1+px}-\sqrt{1-px}}{x}; -1\le x<0\\ \frac{2x+1}{x-2}; 0\le x\le 1\end{cases}$ is continuous function at x = 0 then, find value of p.

OR Find $\frac{dy}{dx}$, if $y=\sin^{-1}[x\sqrt{1-x}-\sqrt{x}\sqrt{1-x^2}]$.

Q12. There are two bags, Bag I and Bag II. Bag I contains 4 white and 3 red balls while the other bag contains 3 white and 7 red balls. One ball is drawn at random from one of the bags and it is found to be white. Find the probability that it was drawn from Bag I.

Q13. Show that the relation S in the set R of real numbers, defined as $S=\{(a,b): a,b\in R \text{ and } a\le b^3\}$ is neither reflexive, nor symmetric nor transitive.

Q14. Find the equations of the tangent(s) and normal(s) to the curve $y=x^3+2x+6$ which are parallel to the line : $x+14y+4=0$.

Q15. Using elementary row operations, find : $\begin{pmatrix}4 & 7\\ 1 & 2\end{pmatrix}^{-1}$.

Q16. Evaluate : $\int \frac{1}{\sqrt{1+\sin x}}dx$.

Q17. Find the position vector of a point R which divides the line joining two points P and Q whose position vectors are $(2\vec{a}+\vec{b})$ and $(\vec{a}-3\vec{b})$ respectively, externally in the ratio 1 : 2. Also, show

that P is the midpoint of the line segment RQ.

Q18. Find the Cartesian equation of the plane passing through the points A(0, 0, 0) and B(3,–1, 2) and parallel to the line $\frac{x-4}{1}=\frac{y+3}{-4}=\frac{z+1}{7}$.

Q19. If $y=\cot^{-1}\sqrt{\tan\theta}-\tan^{-1}\sqrt{\tan\theta}$ then, show that $\tan\theta=\tan^2\left(\frac{\pi}{4}-\frac{y}{2}\right)=\left(\frac{1-\tan\frac{y}{2}}{1+\tan\frac{y}{2}}\right)^2$.

OR Prove that : $\tan^{-1}(1)+\tan^{-1}(2)+\tan^{-1}(3)=\pi$.

Q20. Evaluate $\int_1^3(x-e^x)\,dx$ as limit of sums. **OR** Evaluate : $\int\frac{1}{x^2}\tan^{-1}x\,dx$.

Q21. Find the particular solution of the following differential equation satisfying the given conditions :

$$x^2dy+(xy+y^2)dx=0;\ y=1 \text{ when } x=1.$$

Q22. Find the particular solution of the following differential equation satisfying the given conditions :

$$\frac{dy}{dx}=y\tan x;\ \text{given that } y=1 \text{ when } x=0.$$

OR Find the general solution of the differential equation : $x\log x\frac{dy}{dx}+y=\frac{2}{x}\log x$.

SECTION – C

Q23. Using integration, find area of the region bounded by curve $x^2=4y$ and the line $x=4y-2$.

OR Using integration, find the area of the region : $\left\{(x,y):\frac{x^2}{9}+\frac{y^2}{4}\le 1\le\frac{x}{3}+\frac{y}{2}\right\}$.

Q24. A small firm manufactures fancy plastic bags and paper bags. The total number of plastic bags and paper bags manufactured per day is at most 24. It takes 1 hour to make a plastic bag and 30 minutes to make a paper bag. Maximum number of hours available per day is 16. If the profit on a plastic bag is ₹30 and that on a paper bag is ₹19, find the number of bags of both kinds that should be manufactured per day, so as to earn the maximum profit. Make it as an L.P.P. and solve it graphically. Keeping the 'save environment' factor in mind, state which kind of bags should be promoted? Justify your answer.

Q25. In a game of gambling, a card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn at random and are found to both clubs. Find the probability of the lost card being of clubs. Is gambling a good habit? Why or, why not?

OR From a lot of 10 CFLs, which includes 3 defectives, a sample of 2 CFLs is drawn at random. Find the probability distribution of the number of defective CFLs. What is the benefit of using CFLs in present times?

Q26. Using properties of determinants, show that : $\begin{vmatrix}(b+c)^2 & ab & ca\\ ab & (a+c)^2 & bc\\ ca & bc & (a+b)^2\end{vmatrix}=2abc(a+b+c)^3$.

Q27. Find the value(s) of x for which $f(x)=[x(x-2)]^2$ is an increasing function. Also find the points on the curve, where the tangent is parallel to x-axis.

Q28. If the sum of the surface areas of a cube and a sphere is constant, what is the ratio of the edge of the cube to the diameter of the sphere, when the sum of their volumes is least?

Q29. The points A(4,5,10), B(2,3,4) and C(1,2,–1) are three vertices of a parallelogram ABCD. Find the vector equations of the sides AB and BC and also find the coordinates of point D.

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