Practice paper -3 Board 2016

Instructions:

1. **All questions are compusary**
2. **Question number 1 to 6 carry 1 mark each,Question number 7 to 19 carry 4 marks each,Question number 20 to 26 carry 6 marks each.**
3. **There is no overall choice however internal choice is provided in some questions.You have to attempt only one out of the choice.**

Section A

1. Write weather the function $f : R \to R$, given by $f(x) = |x|$, is onto or not, where $|x|$ is x, if x is positive or 0 and $|x|$ is - x, if x is negative

2. Find the value of the expression: $\tan\left[\sin^{-1}\frac{3}{5} + \cot^{-1}\frac{3}{2}\right]$.

3. If $X_{m\times 3} \cdot Y_{P\times 4} = Z_{2\times n}$, for three matrices X,Y,Z then find the value of m ,n and p.

4. Find the value of k if the are of triangle is 4 sq. units and vertices are (k, 0). (4, 0), (0, 2)

5. Find λ and μ if $(2\hat{i} + 6\hat{j} + 27\hat{k}) \times (\hat{i} + \lambda\hat{j} + \mu\hat{k}) = \vec{0}$.

6. If a line makes angles 90°, l35°, 45° with the x, y and z-axes respectively, find its direction cosines.

SECTION B

7. If $f(x) = \frac{(4x+3)}{(6x-4)}, x \neq \frac{2}{3}$ show that *fof (x) = x*, for all $x \neq \frac{2}{3}$ .What is the inverse of f ?

8. Write the function: $\tan^{-1}\frac{\sqrt{1+x^2}-1}{x}, x \neq 0$ in the simplest form .

9. By using properties of determinants, show that $\begin{vmatrix} 1 & x & x^2 \\ x^2 & 1 & x \\ x & x^2 & 1 \end{vmatrix} = (1 + x^3)^2$

10. Find the value of k so that the function f given by

$f(x)\begin{cases} \dfrac{k\cos x}{\pi\text{-}2x}, \text{if } x \neq \dfrac{\pi}{2} \\ 3, \qquad \text{if } x = \dfrac{\pi}{2} \end{cases}$ is contineous at $x = \dfrac{\pi}{2}$.

11. If $x = \sqrt{a^{\sin^{-1}t}}, y = \sqrt{a^{\cos^{-1}t}}$, show that $\dfrac{dy}{dx} = \dfrac{y}{x}$.

12. Find the equation of the tangent to the curve $y=\sqrt{3x-2}$ which is parallel to the line 4x - 2y + 5 = 0.

OR

A water tank has the shape of an inverted right circular cone with its vertex vertical and vertex lowermost.Its semiverticle angle is $\tan^{-1}(.5)$ .water is poured into it at a constant rate of 5 cubic meter per minute. Find the rate at which the level of water is rising at n instant when when the depth of water in the tank is 10m.

13. Evaluate $\int x\sin^{-1}xdx$.

OR

Evaluate $\int\left\{\dfrac{1}{\log x}-\dfrac{1}{(\log x)^2}\right\}dx$.

14. Solve the differential equation: $x\,dy-y\,dx=\sqrt{x^2+y^2}\,dx$.

OR

Form the D.E. Of all the circles which touches coordinate axis in the first quadrant.

15. If a unit vector $\vec{a}$ makes angles $\dfrac{\pi}{3}$ with $\hat{i}$, $\dfrac{\pi}{4}$ with $\hat{j}$ and an acute angle θ with $\hat{k}$, then find θ and hence, the components of $\vec{a}$.

16. For the differential equations $\dfrac{dy}{dx}-3y\cot x=\sin 2x$ find a particular solution satisfying the when $y=2$ $x=\dfrac{\pi}{2}$.

17. Find the coordinates of the point where the line through (3, -4, -5) and (2, -3, 1) crosses the plane 2x + y + z =7.

18. Evaluate $\int_0^1 \tan^{-1}\left(\dfrac{2x-1}{1+x-x^2}\right)dx$

19. An instructor has a question bank consisting of 300 easy True/ False questions, 200 difficult True / False questions, 500 easy multiple choice questions and 400 difficult multiple choice questions. If a question is selected at random from the question bank, what is the probability that it will be an easy question given that it is a multiple choice question?

OR

A pair of dice is thrown 4 times. If getting a doublet is considered a success, find the probability of (i)Exactly two successes (ii) At least one success.

Section C

20. A store in a mall has three dozen shirts with 'SAVE ENVIRONMENT' printed ,two dozen shirts 'SAVE TIGER' printed and five dozen shirts with 'GROW PLANTS' printed.The cost of each shirt is Rs. 595, Rs. 610 and Rs. 795 respectively.All the items were sold in a day.Find the total collection of the store by using matrix method. Which shirt would you like to buy and why?

21. A wire of length 28 m is to be cut into two pieces. One of the pieces is to be made into a square and the other into a circle. What should be the length of the two pieces so that the combined area of the square and the circle is minimum?

OR

A tank with rectangular base and rectangular sides, open at the top is constructed so that its depth is 2 m and volume is $8m^3$. If building of tank Rs 70 per sq meters for the base and Rs 45 per square meter for sides the cost of least expensive tank?

22. By using the properties of definite integrals, evaluate the integral: $\int_0^\pi \log(1+\cos x)\, dx$.

23. Find the area of the circle $x^2 + y^2 = 16$ exterior to the parabola $y^2 = 6x$.

OR

Using integration find the area of region bounded by the triangle whose vertices are (- 1, 0), (1, 3) and (3, 2).

24. Find the vector equation of the plane passing through the points (2,1,-1) and (-1,3,4) and perpendicular to the plane x-2y+4z=10.Also show that the plane thus obtained contains the line $\vec{r} = -i + 3j + 4k + \lambda(3i - 2j - 5k)$.

25. A dietician wishes to mix together two kinds of food X and Y in such a way that the mixture contains at least 10 units of vitamin A, 12 units of vitamin B and 8 units of vitamin C. The vitamin contents of one kg food are given below:

Food	VitaminA	VitaminB	VitaminC
X	1	2	3
Y	2	2	1

One kg of food X costs Rs 16 and one kg of food Y costs Rs 20. Find the cost of the mixture which will produce the required diet?

26. A card from a pack of 52 cards is lost. From the remaining cards of the pack, two cards are drawn and are found to be both diamonds. Find the probability of the lost card being a diamond.

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