MATHS

BOOKS - MODERN PUBLICATION

SAMPLE PAPER 2013

Exercise

1. Write the derivation of $e^{3\log x}$ with respect to x^2.

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2. Write the maximum value of the function $y = x^5$ in the interval [1, 5].

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3. Write the value of $\int_{\frac{\pi}{4}}^{\frac{\pi}{2}} \sin^5 x \cos x dx.$

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4. Write the degree of the differential equation $In\left(\frac{d^2y}{dx^2}\right) = y.$

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5. If the vectors $\overrightarrow{a} = 2\hat{i} + 3\hat{j} \pm 6\hat{k}$ and $\overrightarrow{b} = \alpha\hat{i} - \hat{j} + 2\hat{k}$ are parallel, then α = _____

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6. Write theequationofthelinepassing through the point (4, —6,1) and parallel to the line $x - \frac{1}{1} = y + \frac{2}{3} = z - \frac{1}{-1}$.

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7. What is the image of the point (—2, 3, —5) respect to the zx-plane ?

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8. Write the matrix which when added to the matrix $\begin{bmatrix} 2 & -3 \\ -4 & 7 \end{bmatrix}$ give the matrix $\begin{bmatrix} 4 & 1 \\ 3 & 2 \end{bmatrix}$

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9. write the value of $c_1^8 + c_2^8 + \ldots\ldots + c_8^8$.

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10. If $P(A) = 0.6$, $P(B) = 0.4$ and $P(A \cap B) = 0.2$, then fimd the value of $P\left(\frac{B}{A}\right)$?

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11. Find the derivative of $x^{\sin x}$ w.r.t.x.

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12. Differentiate $\sin^{-1}\left(\frac{2X}{1+X^2}\right)$ with respect to $\cos^{-1}\left(\frac{1-X^2}{1+X^2}\right)$.

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13. Find the slope of the tangent to the curve

x=2(t-sin t) and y = 2(1-cost) at t=$\frac{\pi}{4}$

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14. If cos y = x cos(a+y) then prove that

$$\frac{dy}{dx} = \frac{\cos^2(a+y)}{\sin a}$$

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15. Find the extreme values of the function $y = X + \frac{1}{x}$.

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16. Find the intervals where the following functions are (a) increasing and (b) decreasing.

$$y = \begin{cases} x^2 + 1 & x \leq -3 \\ x^3 - 8x + 13 & x > -3 \end{cases}$$

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17. Integrate : $\int \frac{\sin 6x + \sin 4x}{\cos 6x + \cos 4x} dx.$

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18. Evaluate the following integrals :

$$\int \frac{dx}{x\left[(\log x)^2 + 25\right]}$$

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19. Integrate : $\int \sin^{-1} x dx.$

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20. Evaluate $\int_0^{\frac{\pi}{2}} \frac{\sqrt{\sin x}}{\sqrt{\sin x} + \sqrt{\cos x}} dx$

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21. solve , $\frac{dy}{dt} = e^{(2t)+(3y)}$.

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22. solve , $\frac{dy}{dx} + y = e^{-x}$.

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23. Find the differential equation whose general solution is $y = a\cos x + b\sin x$.

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24. If $\vec{a} = (2, -2, 1)$, $\vec{b} = (2, 3, 6)$ and $\vec{c} = (-1, 0, 2)$,Find the magnitude and direction of $\vec{a} + \vec{b} - \vec{c}$.

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25. Prove the following by vector method. An angle inscribed in a semi-circle is a right angle.

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26. Show that the points (3,-2,4)(1,1,1) and (-1,4,-1) are collinear.

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27. Find the equation of a plane biscting the line segment joining $(-1, 4, 3)$ and $(5, -2, -1)$ at right angle.

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28. Find the value of r, if the line $\frac{x-1}{1} = \frac{y+2}{3} = \frac{z-1}{-1} = r$ rintersects the

plane $2x + y + z = 9$.

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29. Find equation of the sphere if the line segment joining the Points (4, 5,6) and (2, 3, 4) is a diameter of the sphere.

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30. Maximise $Z = 50x_1 + 60x_2$

Subject to $2x_1 + 3x_2 \leq 6, x_1, x_2 \geq 0$.

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31. Find the value of $\begin{vmatrix} 17 & 58 & 97 \\ 19 & 60 & 99 \\ 18 & 59 & 98 \end{vmatrix}$ without expanding.

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32. Prove that the following.

$$\begin{bmatrix} 1+a & 1 & 1 \\ 1 & 1+b & 1 \\ 1 & 1 & 1+c \end{bmatrix}$$

= abc(1+1/a+/b+1/c)

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33. Find the product $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 3 & 4 \end{bmatrix} \begin{bmatrix} 1 & & -2 \\ -2 & 3 & \end{bmatrix}$

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34. Prove that ${}^{2n}C_0 + {}^{2n}C_2 + \ldots. + {}^{2n}C_{2n} = 2^{2n-1}$

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35. $C_3^{2n} : C_3^n = 44 : 5$, find the value of n.

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36. In how many ways can 2 boys and 3 girls sit in a row so that no two girls sit side by side?

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37. If 8 person are to sit around a table what is the probability that X and Y don't sit together

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38. A class consists of 25 boys and 15 girls. If a committee of 6 is to be chosen at random, find the probability that are exactly 3 boys in the committee

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39. If $y = e^{ax} \cos bx$ then find $y_n(0)$.

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40. Use the function $f(x) = x^{1/x}, x > 0$ to show that $e^{\pi} > \pi^{e}$.

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41. Evaluate $\int_0^1 \frac{\ln(1+x)}{1+x^2} dx$

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42. solve , $\frac{dy}{dx} + \frac{y}{X} = xy^2.$

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43. Obtain the volume of the parallelopiped whose sides are vectors $\vec{a} = 2\hat{i} - 3\hat{j} + 4\hat{k}$, $\vec{b} = \hat{i} + 2\hat{j} - \hat{k}$, $\vec{c} = 3\hat{i} - \hat{j} + 2\hat{k}$. Also find the vector $\left(\vec{a} \times \vec{b}\right) \times \vec{c}$.

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44. Solve the matrix inversion method

$x + 2y + 3z = 8, 2x + y + z = 8$ and $x + y + 2z = 6$

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45. If $P(A) = 0.4$, $P(B/A) = 0.3$ and $P\left(\frac{B^c}{A^c}\right) = 0.2$. Find $P(B)$.

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