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MATHS

BOOKS - SHARAM PUBLICATION

QUESTION PAPER 2014

Exercise

1. What do you mean by integration ? Write your answer in one sentence.

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2. Write the differential equation of the family of straight lines parallel to the y-axis.

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3. Is $\overrightarrow{0}$ unique

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4. Under which conditions the straight line $\frac{x-a}{l}=\frac{y-b}{m}=\frac{z-c}{n}$ intersects the plane $Ax+By+Cz=0$ at a point other than (a,b,c)?

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5. How many straight lines in space through the origin are equally inclined to the coordinate axes?

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6. If a_{ij} is an element in ith row and jth column of a 3rd order determinant and c_{ij} be the cofactor of a_{ij}, then what is the value of $a_{12}c_{12} - a_{21}c_{21} + a_{13}c_{13} - a_{31}c_{31}$?

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7. What is the value of : $C_3^{20} + C_4^{20} + C_5^{20} + \ldots\ldots\ldots + C_{17}^{20}$?

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8. If an event A is independent of it self, then what is $P(A)$?

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9. If $y = \cos ec^{-1}x$, then find $\frac{dy}{dx}$ and determine its value at $x = -2$.

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10. Examine the differentiability of ln x^2 for all real values of x.

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11. Interpret Lagrange's mean value theorem geometrically.

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12. Evaluate: $\lim_{x \to 0} \left(\frac{\sin x}{x} \right)^{\frac{1}{x}}$

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13. Evaluate the following integrals :

$$\int \frac{dx}{x^{\frac{1}{2}} + x^{\frac{1}{3}}}$$

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14. $\int \frac{xe^x}{1+x^2} dx$

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15. Evaluate: $\int_0^{\frac{3}{2}} \left[x^2\right] dx.$

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16. Find the area of the region bounded by the curve $y = \sin x$ and the straight lines $x = -\frac{\pi}{4}, x = \frac{\pi}{4}$ and $y = 0.$

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17. Solve the following differential equations

$$\left(1+y^2\right)dx+\left(x-e^{-\tan^{-1}y}\right)dy=0$$

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18. Solve : $(x+y)dy+(x-y)dx=0.$

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19. Find the differential equation whose general solution is $ax^2+by=1$, where a and

b are arbitrary constants.

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20. If the sum of two unit vectors is a unit vectors find the magnitude of their difference.

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21. Find the value of λ such that the following vectors are coplanar:

$$-\hat{i}+\lambda\hat{j}-\lambda\hat{k}, 2\hat{i}+4\hat{j}+5\hat{k}, \ -2\hat{i}+4\hat{j}-4\hat{k}$$

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22. Find the co-ordinates of the foot of the perpendicular from the point $(1, 1, 1)$ on the line joining $(1, 4, 6)$ and $(54, 4)$.

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23. Find the equation of the plane Paralel to the plane $2x - y + 3z + 1 = 0$ and at a distance 3 units away from it.

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24. Using the method of elemination find the symmetrical form of equation of the line $6x + 8y + 3z = 10$ and $x + 2y + z = 3$.

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25. Solve the following LPP graphically

Maximize, $Z = 20x + 30y$

Subject to $3x + 5y \leq 15$

$x, y \geq 0.$

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26. If A and B are square matrices of same order, then show by means of an example that $AB \neq BA$ in general.

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27. If $A = \begin{bmatrix} 0 & -\tan\left(\frac{\alpha}{2}\right) \\ \tan\left(\frac{\alpha}{2}\right) & 0 \end{bmatrix}$ show that $(I + A) = (I - A)\begin{bmatrix} \cos\alpha & -\sin\alpha \\ \sin\alpha & \cos\alpha \end{bmatrix}$ where

$$I = \begin{bmatrix} 1 & 0 \\ 0 & 1 \end{bmatrix}$$

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28. Five cities A,B,C,D,E are connected to each other by straight roads. What is the total number of such roads?

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29. Two balls are drawn from a bag containing 6 red and 4 yellow balls. Find the probability

that atleast one of the ball is yellow?

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30. A person draws three cards at random one after another from a pack of 52 cards. Find the probability that all these cards are spades.

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31. Evaluate: $\int_0^{\pi} \frac{x}{1+\sin x} dx$

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32. Solve the following differential equations

$(x + \tan y)dy = \sin 2ydx$

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33. Prove that by vector methord, in any $\Delta ABC, \frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}.$

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34. Find the equation of the sphere inscribed in a tetrahedron whose faces are $x = 0, y = 0$, $z = 0$ and $2x + 2y + z = 1$.

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35. Solve the following LPP

Maximise $Z = 20x + 10y$

Subject to $x + 2y \leq 40$,

$3x + y \geq 30$,

$4x + 3y \geq 60$,

$x, y \geq 0$.

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36. Solve the following system of equations by the matrix inversion method.

$x + y + z = 4$

$2x - y + 3z = 1$

and $3x + 2y - z = 1$

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37. prove that :-

$C_1 - \frac{1}{2}C_2 + \frac{1}{3}C_3 + \ldots + (-1)^{n+1}\frac{1}{n}C_n$ =

1+1/2 + ... +1/n

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38. The probability of a shooter hitting a target is $\frac{3}{4}$ Find the minimum number of times he must fire, so that the probability of hitting the target atleast once is greater than 0.999.

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