MATHS

BOOKS - NAVBODH MATHS (HINGLISH)

MODEL QUESTION PAPER FOR PRACTICE

Section A Select And Write The Correct Answer From The Given Alternatives In Each Of The Following Questions

1. The negation of contrapositive of $p \rightarrow \sim q$ is

A. $P \wedge q$

B. $q \rightarrow p$

C. $P \vee q$

D. $\sim q \rightarrow \sim p$

Answer:

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2. The polar coordinates of the point whose cartesian coodinates are $\left(-\frac{1}{\sqrt{2}}, -\frac{1}{\sqrt{2}}\right)$ are

A. $\left(1, \frac{\pi}{4}\right)$

B. $\left(1, \frac{5\pi}{4}\right)$

C. $\left(\sqrt{2}\frac{\pi}{4}\right)$

D. $(\sqrt{2}, 200^\circ)$

Answer:

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3. If $\bar{a}, \bar{b}$ and $\bar{c}$ are unit coplanar vetors then

$\left[2\bar{a} - \bar{b} \quad 2\bar{b} - \bar{c} \quad 2\bar{c} - \bar{a}\right] = \ldots.$

A. $\sqrt{3}$

B. 1

C. $-\sqrt{3}$

D. 0

Answer:

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4. If a line makes angles α, β, γ with coordinate axes , then

$\sin^2\alpha + \sin^2\beta + \sin^2\gamma$ .....

A. 1

B. -1

C. 2

D. -2

Answer:

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5. The function f(x) is condtions at the point x=0 where

$$f(x) = \frac{\log(1+kx)}{\sin x}, \text{for} x \neq 0$$

= 5 for x=0 then value of k is

A. -5

B. 5

C. 2

D. -2

Answer:

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6. If $y = \sqrt{\log x + \sqrt{\log x + \sqrt{\log x} + ...\infty}}$, then $\frac{dy}{dx}$ is

A. $\frac{1}{y} - 1$

B. $\frac{1}{x(2y-1)}$

C. $\frac{1}{2\log y}$

D. $\frac{1}{y}$

Answer:

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7. $\int \frac{x+3}{(x+4)^2} e^x$ dx is equal to

A. $\frac{1}{(x+4)^2} + c$

B. $\frac{e^x}{(x+4)^2} + c$

C. $\frac{e^x}{x+4} + c$

D. $\frac{e^x}{x+3} + c$

Answer:

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8. The differential equation whose general solution is $y = \log x + c$ is

A. $x.\ \frac{dy}{dx} = 0$

B. $x.\ \frac{dy}{dx} + 1$

C. $\frac{dy}{dx} + x = 0$

D. $\frac{1}{x}.\ \frac{dy}{dx} = 0$

Answer:

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9. If $f(x) = \sec^{-1} x,$ then write the range of f .

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10. Find the joint equation of the lines x+y-3 =0 and 2x+y-1 =0

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11. If $y = \sec^{-1}\left(\frac{\sqrt{x}-1}{x+\sqrt{3}}\right) + \sin^{-1}\left(\frac{x+\sqrt{3}}{\sqrt{x}-1}\right)$ then find $\frac{dy}{dx}$

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12. Test whether the following funtions are increasing or decreasing :

$f(x) = x - \frac{1}{x}, x \in R, x \neq 0.$

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Section B Attempt Any Eight Of The Following

1. Write the truth values of the following statements :

(i) Two is the only even prime number

(ii) $\cos 2\theta = \cos^2\theta - \sin^2\theta$ for all $\theta \in R$

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2. If $A = \begin{bmatrix} 2 & 3 \\ 1 & 2 \end{bmatrix}, B = \begin{bmatrix} 1 & 0 \\ 3 & 1 \end{bmatrix}$ then what is determinant of AB

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3. If the acute angle between the lines $ax^2 + 2hxy + by^2 = 0$ is 60° then show that $(a + 3b)(3a + b) = 4h^2$

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4. If the vector are collinear , then find the vlaue of q .

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5. Find the vector equation of the line passing through the points A(3,4, -7) and B (6,-1, 1)

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6. Find the angle between the plane $\hat{r}.\left(\hat{i}-2\hat{j}+3\hat{k}\right)=5$ and the line $\hat{r}=\left(\hat{i}+\hat{j}-\hat{k}\right)+\lambda\left(\hat{i}-\hat{j}+\hat{k}\right)$

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7. Differentiate $\log\left(1+x^2\right)$ with respect to $\tan^{-1}x$.

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8. Show that $\int_0^{\pi} cos^{99}x dx=0$

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9. Find the area of the region bounded by $y^2=24x$ and line x = 1

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10. By eliminating arbitary constant of equation $y = c^2 + \frac{c}{x}$ find differential equation .

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11. Detemine k such that the following funciton is a p.d.f $P(X = x) = k\left(\frac{2^x}{x!}\right), x = 0, 1, 2, 3$ =0 otherwise .

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12. Given X ~ B (n,p)If p =0 .6 E (X) =6, find n and Var (X)

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Section C Attempt Any Eight Of The Following

1. Show that a homogeneous equations of degree two in x and y , i.e., $ax^2 + 2hxy + by^2 = 0$ represents a pair of lines passing through the origin if $h^2 - 2ab \geq 0$.

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2. If $\bar{a}$ and $\bar{b}$ any two non-collinear vectors lying in the same plane, then prove that any vector $\bar{r}$ coplanar with them can be uniquely expressed as $\bar{r} = t_1\bar{a} + t_2\bar{b}$, where t_1 and t_2 are scalars.

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3. If M is the foot of pependicular drawn from the origin on the line joining the points A(3,5 -1) and B(4,3 -1) find the coordinates of M.

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4. A line passes through (3, -1, 2) and perpendicualr to thelines $\bar{r} = \left(\hat{i} + \hat{j} - \hat{k}\right) + \lambda\left(2\hat{i} - 2\hat{j} + \hat{k}\right)$ and $\bar{r} = \left(2\hat{i} + \hat{j} - 3\hat{k}\right) + \mu\left(\hat{i} - 2\hat{j}\right.$ find its equation .

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5. Find the value of μ if the points with position vectors $\hat{i} - \hat{j} + 3\hat{k}$ and $3\hat{i} + 4\hat{j} + \mu\hat{k}$ are equidistant form the plane $\hat{r}.\left(5\hat{i} + 2\hat{j} - 7\hat{k}\right) + 8 = 0$

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6. If y = f(x) is a derivable function of x such that the inverse function $x = f^{-1}(y)$ is defined, then show that $\frac{dx}{dy} = \frac{1}{(dy/dx)}$, where $\frac{dy}{dx} \neq 0.$

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7. The displacement 's ' of a particle at time 't' is given by $s = t^3 - 4t^2 - 5t$. Find its velocity and acceleration at ime t= 2 seconds .Also, find t when its acceleration is zero .

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8. Elvalue : $\int \frac{2\sin x + 3\cos x}{3\sin x + 4\cos x} dx.$

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9. Solve the differential equation :

$$xy\frac{dy}{dx} = x^2 + 2y^2$$

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10. The p.d.f of continuous random variable X is given by $f(x) = \frac{x}{8}, 0 < x < 4 = 0$ otherwise. Find (i)

$P(X < 2)(ii)P(2 < X \leq 3)(iii)P(X > 3.)$

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11. Supose that 80 % of all families own a elevision set. If 10 families are interviewed at random, find the probability that seven famileis own a television set .

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Section D Atempt Any Five Of The Following

1. Using truth table ,prove that $p \leftrightarrow q \equiv (p \wedge q) v (\sim p \wedge \sim q)$.

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2. If $f(\theta) = \begin{bmatrix} \cos\theta & -\sin\theta & 0 \\ \sin\theta & \cos\theta & 0 \\ 0 & 0 & 1 \end{bmatrix}$ then $\left\{ f(\theta)^{-1} \right\}$ is equal to

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3. Show that $\sin^{-1}, \frac{5}{13} + \cos^{-1}, \frac{3}{5} = \tan^{-1}, \frac{63}{16}$.

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4. Solve the following LPP using graphical method : Minimiz $z = 8x + 10y,$ subject to $2x + y \geq , 2x + 3y \geq 15, y \geq 2, x \geq 0, y \geq 0$

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5. If $f(x) = \frac{\sin \pi x}{x - 1} + a, \quad \text{for} \quad x < 1$

$= 2\pi, \quad \text{for} \quad x = 1$

$= \frac{1 + \cos \pi x}{\pi(1 - x)^2} + b, \quad \text{for} x > 1$ is continuous at x =1 , find a and b

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6. The surface area of a spherical balloon is increasing at the rate of $2 \ \mathrm{cm}^2/\mathrm{sec}$. At what rate is the volume of the ballon is increasing, when the radius of the ballon is 6 cm ?

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7. Evaluate: $\int \sec^3(2x)dx$.

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8. Prove that :

$$\int_{-a}^{a} f(x)dx = 2\int_{a}^{0} f(x)dx, \quad \text{if} \quad f(x) \text{ is even funtion}$$

=0 , if f(x) is off fuction.

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