MATHS

BOOKS - FULL MARKS MATHS (TAMIL ENGLISH)

SAMPLE PAPER-09 (UNSOLVED)

Part I I Choose The Correct Answer Answer All The Questions

1. If $A = \begin{bmatrix} 2 & 3 \\ 5 & -2 \end{bmatrix}$ be such that $\lambda A^{-1} = A$, then λ is

A. 17

B. 14

C. 19

D. 21

Answer: A

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2. If $\omega \neq 1$ is a cubic root of unit and $(1+\omega)^7$ = A + Bω, then (A, B) equals

A. (1,0)

B. (-1, 1)

C. (0, 1)

D. (1, 1)

Answer: A

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3. The value of $z\bar{z}$ is.....

A. 2 Im(z)

B. 2i Im (z)

C. Im (z)

D. i Im (z)

Answer: B

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4. If $x^3 + 12x^2 + 10ax + 1999$ definitely has positive zero , if and only if .....

A. $a \geq 0$

B. $a > 0$

C. $a < 0$

D. $a \leq 0$

Answer: A

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5. $\sin\left(\tan^{-1} x\right) |x| < 1$ is equal to

A. $\frac{x}{\sqrt{1-x^2}}$

B. $\frac{1}{\sqrt{1-x^2}}$

C. $\frac{1}{\sqrt{1-x^2}}$

D. $\frac{x}{\sqrt{1-x^2}}$

Answer: A::B

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6. The centre of the circle inscribed in a square formed by the lines $x^2 - 8x + 12 = 0$ and $y^2 - 14 + 45 = 0$ is

A. (4,7)

B. (7,4)

C. (9,4)

D. (4,9)

Answer: D

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7. The axis of the parabola $x^2 = -4y$ is ..... .

A. y =1

B. x=0

C. y=0

D. x=1

Answer:

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8. The coordinates of the point where the line $\vec{r} = (6i - j - 3k) + t(-i + 4k)$ meets the plane $\vec{r} \cdot \left(\hat{i} + \hat{j} - \hat{k}\right) = 3$ are

A. (2, 1,0)

B. (7,-1, -7)

C. (1,2,-6)

D. (5,-1, 1)

Answer: A

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9. If the vectors $\bar{a} = 3\hat{i} + 2\hat{j} + 9\hat{k}$ and $\hat{b} = \hat{i} + m\hat{j} + 3\hat{k}$ are parallel then m is..... .

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10. The minimum value of the function $|3 - x| + 9$ is

A. 0

B. 3

C. 6

D. 9

Answer:

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11. The curve $y^2(x - 2) = x^2(1 + x)$ has .....

A. an asymptote x=-1

B. an asymptote x=1

C. two asymptotes x=1 and =-1

D. no asymptote

Answer: A

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12. If f(x,y,z) =xy + yz + zx, then $f_x - f_z$ is equal to

A. z-x

B. y-z

C. x-z

D. y-x

Answer:

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13. A circular template has a radius of 10 cm. The measurnment of the radius has an approximate error of 0.02 cm. Then the percentage error in calculating area of this template is

A. 0.002

B. 0.004

C. 0.0004

D. 0.0008

Answer: D

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14. The value of $\int_0^{\pi} \sin^4 x dx$ is

A. $\frac{3\pi}{10}$

B. $\frac{3\pi}{8}$

C. $\frac{3\pi}{4}$

D. $\frac{3\pi}{2}$

Answer: C

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15. $\int_a^b f(x)dx =$

A. $2\int_0^a f(x)dx$

B. $2\int_a^b f(a-x)dx$

C. $2\int_a^b f(b-x)dx$

D. $2\int_a^b f(a+b-x)dx$

Answer: A::B::D

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16. The degree of the differential equation $y(x) = 1 + \frac{dy}{dx} + \frac{1}{1.2}\left(\frac{dy}{dx}\right)^2 + \frac{1}{1.2.3}\left(\frac{dy}{dx}\right)^3 + \ldots$ is

A. 2

B. 3

C. 1

D. 4

Answer: A

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17. On finding the differential equation corresponding to $y = e^{mx}$ where m is the arbitrary constant, then m is _____.

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

B. $\frac{y'}{y}$

C. y'

D. y

Answer:

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18. Let X be random variable with probability density function

$$f(x) = \begin{cases} \frac{2}{x^3} & x \geq 1 \\ 0 & x < 1 \end{cases}$$

Which of the following statement is correct

A. both mean and variance exist

B. mean exists but variance does not exist

C. both mean and vanance do not exist

D. variance exists but mean does not exist

Answer: A::B::C::D

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19. The random variable X has the probability density function $f(x) = \begin{cases} ax + b & 0 < x < 1 \\ 0 & \text{otherwise} \end{cases}$ and $E(X) = \frac{7}{12}$, then a and b are respectively

A. 1 and $\frac{1}{2}$

B. $\frac{1}{2}$ and 1

C. 2 and 1

D. 1 and 2

Answer: A::B::D

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20. A binary operation on a set S is a function from

A. $S \to S$

B. $(S \times S) \to S$

C. $S \to (S \times S)$

D. $(S \times S) \to (S \times S)$

Answer: A

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Part Ii Ii Answer Any Seven Questions Question No 30 Is Compulsory

1. Solve the following system of homogeneous equations.

3x+2y+7z=0,4x-3y-2z=0, 5x+9y+23z=0

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2. Show that $|3z - 5 + i| = 4$ represent a circle, and, find its centre and radius .

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3. find the equation of the circle with centre (2,3) and passing through the intersection of the lines 3x -2y -1=0 and 4x + y -27 =0 ..

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4. Find the intercept cut off by the plane $\vec{r} = \left(6\hat{i} + 4\hat{j} - 3\hat{k}\right) = 12$ on the coordinate axes.

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5. Find the values in the interval (1,2) of the mean value theorem satisfied by the function $f(x) = x - x^2 \text{for} 1 \leq x \leq 2.$

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6. Show that the percentage error in the nth root of a number is approximately $\frac{1}{n}$ times the percentage error in the number.

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7. Solve the differential equations :

$\tan y. \frac{dy}{dx} = \cos(x + y) + \cos(x - y)$

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8. The probability density function of X is given by

$$f(x) = \begin{cases} ke^{-\frac{x}{3}} & \text{for } x > 0 \\ 0 & \text{for } x \leq 0 \end{cases}$$

Find

the value of k

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9. Construct the truth table for the following statements $p \wedge q$

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10. Find the approximate value of $\int_1^{1.5} x^2 dx$ by applying the right-end rule with the parition $\{1.1, 1.2, 1.3, 1.4, 1.5\}$

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Part Iii Iii Answer Any Seven Questions Question No 40 Is Compulsory

1. Find a matrix A if $adj(A) = \begin{bmatrix} 7 & 7 & -7 \\ -1 & 11 & 7 \\ 11 & 5 & 7 \end{bmatrix}$

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2. Obtain the Cartesian form of the locus of z = x + iy in each of cases:

Im[1 - i) z + 1] = 0

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3. If

$\vec{a} = \hat{i} - \hat{k}, \vec{b} = x\hat{i} + \hat{j} + (1-x)\hat{k}, \vec{c} = y\hat{i} + x\hat{j} + (1+x-y)\hat{k}$

show that $\left[\vec{a}, \vec{b}, \vec{c}\right]$ depends on neither .x nor y.

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4. The Taylor's series expension of $f(x) = \sin x \text{about} x = \frac{\pi}{2}$ is obtained by the following way .

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5. The edge of a cube was found to be 30 cm with a possible error in measurement of 0.1 cm .Use differentials to estimate the maximum possible error in computing (i) the volume of the cube and (ii) the surface area of cube .

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6. Evaluate the following :

$$\int_0^1 \frac{\sin\left(3\tan^{-1}x\right)\tan^{-1}x}{1+x^2}dx$$

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7. Find tha particular solution of $\left(1+x^2\right)dy - x^2ydx = 0$ satisfying the condition y(1) =2

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8. If X is the random variable with distribution function F(x) given by , F(x) = $\begin{cases} 0 & x < 0 \\ x^2 & 0 \leq x < 1 \\ 1 & x > 1 \end{cases}$ then find (i) the Probability density function f(x)

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9. Show that $[\neg q \wedge p] \wedge q$ is a contradiction.

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Part Iv Iv Answer All The Questions

1. show that the absolute value of the focal distances of any point P on the hyperbola in the length of its transverse axis.

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2. By using Gaussian elimination method, balance the chemical reaction equation:

$C_2H_6 + O_2 \rightarrow H_2O + CO_2.$

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3. $\frac{dy}{dx} + \frac{3y}{x} = \frac{1}{x^2}$, given that y = 2 when x = 1.

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4. Find x and y for which of the following is satisfied.

$$\frac{(1+i)x - 2i}{3+i} + \frac{(2-3i)y + i}{3-i} = i$$

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5. Find the area between the line $y = x + 1$ and the curve $y = x^2 - 1$

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6. Determine k and solve the equation $2x^3 - 6x^2 + 3x + k = 0$ if one of its roots is twice the sum of the other two roots.

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7. Evaluate the following :

$$\int_0^{\frac{\pi}{2}} \frac{dx}{5 + 4\sin^2 x}$$

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8. A tunnel through a mountain for a four lane highway is to have a elliptical opening. The total width of the highway (not the opening) is to be 16m , and the height at the edge of the road must be sufficient for a truck 4m high to clear if the highest point of the opening is to be 5m approximately. How wide must the opening be ?

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9. Using truth table check whether the statements $\sim(p \vee q) \vee (\sim p \wedge q)$ and $\sim p$ are logically equivalent.

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10. Solve

$$\cot^{-1} x - \cot^{-1}(x+2) = \frac{\pi}{2}, x > 0$$

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11. Verify Euler's theorem for f(x,y) = $\frac{1}{\sqrt{x^2+y^2}}$

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12. Find the point where the straight line passes through $(6, 7, 4)$ and $(8, 4, 9)$ cut the xz and yz planes.

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13. If X is the random variable with probability density function f(x) is given by

$$f(x) = \begin{cases} x+1 & -1 \leq x < 0 \\ -x+1 & 0 \leq x < 1 \\ 0 & \text{otherwise} \end{cases}$$

then find (i) the distribution function F(x) (ii) $P(-0.5 \leq X \leq 0.5)$

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14. Sketch the graph of the function :$y = x\sqrt{4-x}$

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15. The velocity v, of a parachute falling vertically satisfies the equation $v\frac{dv}{dx} = g\left(1 - \frac{v^2}{k^2}\right)$, where g and k are constants. If v and x are both initially zero, find v in terms of x.

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