



## MATHS

# **BOOKS - MODERN PUBLICATION**

## **SAMPLE PAPER 2019**



**1.** A R is a relation on set A such that  $R = R^{-1}$ , then

write the type of the relation R.

**2.** Write the value of  $\cos^{-1} \cos\left(\frac{3\pi}{2}\right)$ .

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then write the value of a.

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4. Let A and B be two mutually exclusive events, such that  $P(A) = \frac{1}{2}$  and  $P(B) = \frac{1}{3}$ . Write the value of  $P(A \cup B)$ .



5. If 
$$f'(2^+)=0$$
 and  $f'(2^-)=0$ , then is  $f(x)$ 

continuous at x = 2 ?

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6. If f is an odd function, then write the value of  $\int_{-a}^{a} \frac{f(\sin x)}{f(\cos x) + f(\sin^{2} x)} dx$ 

7. Write the order of the differential equation whose solution is given by

 $y = (c_1 + c_2) {
m cos}(x + c_3) + c_4 e^{x + c_5}$ 

where  $c_1, c_2, c_3, c_4$  and  $c_5$  are arbitrary constants



9. Write the value of k such that the line  $\frac{x-4}{1} = \frac{y-2}{1} = \frac{z-k}{2}$  lies on the plane



**11.** Let R be the relation on the set R of real numbers such that aRb iff a-b is and integer. Test whether R is an equivalence relation. If so find the equivalence class of  $1 \text{ and } \frac{1}{2}$  wrt. This equivalence relation.

12. Solve: 
$$2 an^{-1}(\sin x) = an^{-1}(2\sec x), x 
eq rac{\pi}{2}$$



then

that

show

**14.** If 
$$A = \begin{bmatrix} 1 & 2 & 3 \\ 3 & -2 & 1 \\ 4 & 2 & 1 \end{bmatrix}$$

$$A^3 - 23A - 40I = O$$

**15.** Solve the following :  $\begin{bmatrix} x+1 & \omega & \omega^2 \\ \omega & x+\omega^2 & 1 \\ \omega^2 & 1 & x+\omega \end{bmatrix} = 0$ 

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**16.** A person takes 4 tests in succession. The probability of his passing the first test is p, that of his passing each succeeding test is p or  $\frac{p}{2}$  depending on his passing or failing the preceding test, Find the probability of his passing

just three tests.



17. Find the probability distribution of

number of heads in three tosses of a coin.





23. Integrate the following 
$$\int \left[ rac{2x+1}{\sqrt{x^2+10x+29}} 
ight] dx$$

24. Evaluate : 
$$\int_0^{\pi/2} rac{\cos x dx}{(2-\sin x)(3+\sin x)}$$

25. Find the area of the region bounded by the curve

 $y = 6x - x^2$  and the x-axis.

26. Find differential equation of the curve
$$y = ae^{3x} + be^{5x}.$$

**27.** Obtain the general solution of the following differential equations.

$$ig(x^2+7x+12ig) dy + ig(y^2-6y+5ig) dx = 0$$

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**28.** Find a unit vector perpendicular to both of the vectors  $\overrightarrow{a} + \overrightarrow{b}$  and  $\overrightarrow{a} - \overrightarrow{b}$  where  $\overrightarrow{a} = \hat{i} + \hat{j} + \hat{k}$  and  $b = \hat{i} + 2\hat{j} + 3\hat{k}$ .



**29.** Show that 
$$\left(\overrightarrow{a}\times\overrightarrow{b}
ight)^2=a^2b^2-\left(\overrightarrow{a}.\overrightarrow{b}
ight)^2$$

**30.** Find the vector equation of a plane which is at a distance of 3 units from the origin ,  $2\hat{i} + 3\hat{j} - 6\hat{k}$  being a normal to the plane . Also get its cartesian equation



**31.** Find the point where the line  $\frac{x-2}{1} = \frac{y}{-1} = \frac{z-1}{2}$ 

meets the plane 2x + y + z = 2.

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 32. Prove that  $f: X \to Y$  is injective iff for all subsets A, B

of  $X, f(A \cap B) = f(A) \cap f(B).$ 

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33. If 
$$\sin^{-1}\left(\frac{x}{a}\right) + \sin^{-1}\left(\frac{y}{b}\right) = \sin^{-1}\left(\frac{c^2}{ab}\right)$$
, then prove that  $b^2x^2 + 2xy\sqrt{a^2b^2 - c^4} + a^2y^2 = c^4$ 

34. Find the inverse of the following matrices using

elementary transformation:

 $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 1 & 4 \\ 1 & 0 & 2 \end{bmatrix}$ 

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**35.** Examining consistency and solvability, solve the following equation by matrix method.

x-2y=3

3x+4y-z=-2

5x-3z=-1



**36.** Out of the adult population in a village 50% are farmers, 30% do business and 20% are service holders. It is known that 10% of the farmers, 20% of the business holders and 50% of service holders are above poverty line. What is the probability that a member chosen from any one of the adult population, selected at random, is above poverty line?

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**37.** If 
$$(a+bx)e^{rac{y}{x}}=x$$
, then show that

$$x^3rac{d}{dx}igg(rac{dy}{dx}igg) = igg(xrac{dy}{dx}-yigg)^2$$



**40.** Determine the area common to the parabola  $y^2 = x$ 

and the circle  $x^2 + y^2 = 2x$ .

41. Solve 
$$y^2 + x^2 \frac{dy}{dx} = xy \frac{dy}{dx}$$
.  
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42. Show by vector method that the four points (6, 2, -1),

(2, -1, 3), (-1, 2, -4) and (-12, -1, -3) are coplanar.

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**43.** Find the distance of the point (1, -1, -10) from the line  $\frac{x-4}{1} = \frac{y+3}{-4} = \frac{z+1}{7}$  measured parallelto the line  $\frac{x+2}{2} = \frac{y-3}{-3} = \frac{z-4}{8}$