



JAIN COLLEGE

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Bangalore - 560 098

Date: December 2017

SUBJECT: Basic Maths

**II PUC
Mock Paper I**

Timings Allowed: 3Hrs 15Mins

Total Marks: 100

PART-A

Answer ALL the following questions.

1 X 10 =10

1. Find x if $\begin{bmatrix} 4 & x \\ x & 16 \end{bmatrix} = 0$
2. Find 'n' if $nC_8 = nC_7$
3. Symbolize the proposition " $3x = 9$ and $x < 7$ ".
4. Find the triplicate ratio of 3: 5.
5. Define Banker's discount.
6. Find the value of $3\sin 10^\circ - 4\sin^3 10^\circ$.
7. Find the centre of the circle, two of the diameters are $x + y = 2$ and $x - y = 0$.
8. Evaluate the following $\lim_{x \rightarrow 0} \frac{e^{-3x} - 1}{x}$.
9. Differentiate $y^2 = 4ax$.
10. Evaluate $\int \sec x (\sec x \cdot \tan x) dx$

PART-B

Answer any TEN questions.

2 X 10 =20

11. If $A = \begin{bmatrix} -4 & -2 \\ 3 & -1 \end{bmatrix}$ find A^{-1}
12. In a party each person shakes hands with everyone else. If there are 25 members in the party calculate the number of hand shakes.
13. A boy drawn at random 3 balls from a bag containing 9 red and 5 white balls. What is the probability of getting (i) all red balls (ii) 2 red and 1 white ball.
14. If p, q, r are the three propositions with truth values T, T,F respectively. Find truth values of $p \rightarrow (\sim q \wedge r)$
15. If $a:b = 2:3$ and $b:c = 6:13$ find $a:b:c$.
16. Find the legally due date for a bill date 22/04/2014 due 6 months hence.
17. If $\tan A = \frac{3}{4}$ and $\tan B = \frac{1}{7}$ show that $\tan(A + B) = 1$
18. Tanya bought a coat for Rs. 220 inclusive of sales tax 10%. How much was the sales tax.
19. Find equation of circle with centre (2,1) and passing through (0,-1).

20. Evaluate $\lim_{\theta \rightarrow 0} \frac{\tan 5\theta \sin^2 \theta}{\theta^3}$.

21. Find $\frac{dy}{dx}$ if $\sqrt{x} + \sqrt{y} = 3$.

22. The demand function of firm is $2x - 5y = 7$ (x is output, y is price). Find marginal revenue.

23. Integrate $\int \frac{3 \sin x}{3+4 \cos x} dx$

24. Evaluate $\int_1^2 (x + e^x) dx$

PART-C

Answer any TEN questions.

3 X 10 =30

25. Show that in a determinant scalar multiple of the element of any row or column is added to any other row or column, the value of the determinant remains the same.

26. Using properties of determinants prove that $\begin{vmatrix} 1+a & b & c \\ a & 1+b & c \\ a & b & 1+c \end{vmatrix} = 1+a+b+c$

27. Prove that $nC_r + nC_{r-1} = n+1C_r$

28. In a class of 80 students 40 take Maths, 25 take statistics. If each student has taken atleast one of these subject, Find the probability that the student takes (i) both Math and Statistics (ii) only Math (iii) only Stats

29. Two quantities are in the ratio 3:4. If 10 is subtracted from each of them, the remainder are in the ratio 1:3. Find the quantities

30. Calculate the banker's discount on the face value of Rs.10000 if the period is 73 days at 5% p.a., bankers commission

31. Find the interest earned on Rs.4897.5 cash invested in 15% stock at 81.50, given brokerage is 0.125%.

32. A shopkeeper purchases an audio system for Rs 3,000 and sells it off at a gain of 15%. He also charges a sales tax of 10% on the selling price. Calculate the amount that the buyers will pay to the shopkeeper.

33. Find the focus, directrix, equation of latus rectum, length of latus rectum, axis of the parabola $y^2 = 8x$

34. Differentiate e^x from first principle.

35. If $x=a\theta$, $y=\frac{a}{\theta}$ prove that $\frac{dy}{dx} + \frac{y}{x} = 0$

36. The sides of an equilateral triangle are increasing at the rate 3cm/sec. How fast is its area increasing when the sides is 10cm.

37. Show that $x^3 - 6x^2 + 12x - 3$ has neither a maximum nor a minimum at $x=2$.

38. Evaluate $\int \sin^3 x \cdot dx$

PART-D

. Answer any six questions :-

5x6=30

39. Find the coefficient of x^{11} in expansion of $(2x-8)^{15}$

40. Resolve into partial fractions $\frac{x+1}{x(x+2)(x+4)}$

41. Prove that $[p \vee (p \wedge r)] \leftrightarrow [(p \vee q) \wedge (p \vee r)]$ is a tautology.

42. If 8 men and 16 boys can do a piece of work in 6 days and 12 men and 24 boys can do the same work in 8 days in how many days can 16 men and 20 boys do it.

43. The demand function of a firm is $p=500-0.2q$ and the total cost $c=25q+10000$. Find the output at which the profit of the firm is maximized. What is the charged price.

44. Solve LPP using graphical method.

Maximize $z=60x+15y$ subject to $x+y \leq 50$, $3x+y \leq 90$, $x, y \geq 0$.

45. Prove that $\sin 3A = 3\sin A - 4\sin^3 A$

46. A circle passes through the points $(0,0)$, $(1,1)$ and has its centre on x-axis. Find its equation.

47. If $y = x + \sqrt{x^2 - 1}$. Prove that $(x^2 - 1)y_2 + xy_1 - y = 0$

48. Find the area enclosed by $y^2 = x$ and the line $x + y = 4$

PART-E

Answer any ONE of the following.

1 X 10 = 10

b . (a) Evaluate $\lim_{\theta \rightarrow 0} \frac{\sin \theta}{\theta} = 1$. Hence deduce $\lim_{\theta \rightarrow 0} \frac{\tan \theta}{\theta} = 1$

(b) Find total revenue obtained by raising the output from 10 to 20 units where the marginal revenue function is given by $MR = 3\left(\frac{x^2}{20}\right) - 10x + 100$ (x is output)

50. (a) Show that the points are con-cyclic $(1,0)$, $(2,-7)$, $(8, 1)$, $(9,-6)$.

(b) The angle of elevation of an object from a point 100m above a lake is 30° and angle of depression of its image in the lake is 45° . Find the height of the object above the lake

.....ALL THE BEST.....