



JAIN COLLEGE

463/465, 18th Main Road, SS Royal, 80 Feet Road
Rajarajeshwari Nagar, Bangalore - 560 098

SUBJECT: Basic Maths

**II P U C
MOCK I**

Timings Allowed: 3 Hrs 15 Minutes

Total Marks: 100

Instructions: i) The question paper has 5 parts. A,B,C,D,E. Answer all the parts.

ii) Part A carries 10 marks. Part B carries 20 marks, Part C and Part D carries 30 marks and Part E carries 10 marks.

iii) Write the question number properly as indicated in the question paper.

I Answer All

1X10=10

1. If $A = \begin{pmatrix} 3 & 1 \\ 2 & 4 \end{pmatrix}$, $B = \begin{pmatrix} -1 \\ 3 \end{pmatrix}$, Find AB
2. Find 'r' if $15C_{r+3} = 15C_{2r-3}$
3. Negate : " If a number is multiple of 9 , then it is multiple of 3"
4. Write third proportion to 8 and 32
5. Write formula for index of learning
6. Find $\cos 75^\circ$
7. Find the radius of circle $x^2 + y^2 - 2x - 6 = 0$
8. Evaluate $\lim_{x \rightarrow -1} \frac{x^3 + 1}{2x^2 + 5x + 3}$
9. If $y = 2\bar{x} - \cos 2x + 2$. Find $\frac{dy}{dx}$
10. Evaluate $\int \frac{1+x^3}{x} dx$

II Answer any TEN

2x10=20

11. If $A = \begin{pmatrix} 2 & -1 \\ -1 & 2 \end{pmatrix}$, Show that $A^2 - 4A + 3I = 0$
12. In how many ways can 6 red and 4 white marbles be chosen from a bag containing 10 red and 6 white marbles
13. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{3}$, $P(A \cup B) = \frac{7}{12}$. Find $P(A \cap B)$
14. Write converse, Contra positive of " If a triangle is equilateral, then it is an Isosceles triangle"
15. If $a:b=3:5$, $b:c=15:23$, Find $a:c$
16. The banker's gain on certain bill due six months hence is Rs. 10 , the rate of interest being 10% p.a., .Find the face value of the bill
17. If $\cos x = \frac{4}{5}$, x is acute , Find $\cos 3x$
18. Transform $2\sin 40^\circ \cdot \cos 20^\circ$ into sum
19. Find equation of circle whose end points of its diameter are (3,4) and (1,-2)
20. Find 'k' if $f(x) = \begin{cases} \frac{e^{2x}-1}{5x}, & x \neq 0 \\ k/2, & x = 0 \end{cases}$ is continuous at $x=0$
21. If $S = \overline{t-1}$ (t =time, s =distance). Find velocity
22. If total cost $c(x) = x^2 + 2x + 1$, Find (i) Marginal cost (ii) Average cost

23. Evaluate $\frac{1}{x \log x} dx$

24. Evaluate $x e^x dx$

III Answer any TEN

3x10=30

25. If $A = \begin{pmatrix} -1 & 2 \\ 3 & 4 \end{pmatrix}$, Verify $A \cdot (\text{adj}A) = (\text{adj}A) \cdot A = |A| \cdot I$

26. Find inverse of $\begin{pmatrix} 1 & 3 \\ 2 & 4 \end{pmatrix}$

27. Find the number of permutation of letters of the word "COMMISSION", If the word (i) Start with M and end with N (ii) 2S's are together (iii) 2 o's are not together

28. A team of 11 players has to be selected from 14 players of which only 2 can play as wicket keeper? Given each team must have exactly one wicket keeper, how many different teams can be made?

29. A sum of Rs. 2415 has to be divided among three persons A, B, C in such proportion that A's share to B's share as 4:5, B's share to C's share as 9:16. How much does each get?

30. A bill of Rs. 50000 was drawn on 10-04-2014 at 3 months and was discounted on 1-05-2014 @ 12% p.a., For what sum was the bill discounted and also find the Banker's gain

31. Find the interest earned on Rs. 4897.50 cash invested in 15% stock at 81.5 brokerage given is 0.125

32. The owner of departmental store purchased an article of Rs. 1500 at 4% VAT and sell it at Rs. 1700 to the customer at 4% VAT. How much amount did the shopkeeper deposit to the Government as VAT?

33. Find the equation of the parabola given that the ends of latus rectum are $L(3,6)$ and $L'(-3,6)$

34. If $x = a \cos^4 t$, $y = b \sin^4 t$. Find $\frac{dy}{dx}$ at $t = \frac{\pi}{4}$

35. The height of a cone is 30cm and it is constant, the radius of the base is increasing at the rate 0.25cm/sec. Find the rate of increase of volume of the cone when the radius is 10cm.

36. The cost function $C(x) = 500x - 20x^2 + \frac{x^3}{3}$ where 'x' is the number of output. Calculate the output when marginal cost is equal to average cost

37. Evaluate $\frac{1}{e^x + e^{-x}} dx$

38. Evaluate $\frac{1}{x+x} dx$

PART D

IV ANSWER ANY SIX

5X6=30

39. Find the coefficient of x^{-11} in the expansion of $\bar{x} - \frac{2}{x}^{17}$

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

41. Prove that $\sim(p \leftrightarrow q) \equiv (p \wedge \sim q) \vee (q \wedge \sim p)$

42. If 15 men working 12 hrs per day perform job in 16 days. How long will it take for 21 men working 10 hrs daily to do the same job

43. A company requires 1000 hrs to produce the first 30 engines. If the learning effect is 90%, then Find the total labour cost to produce a total of 120 engines @ Rs. 20 per hr.

44. Using Graphical method, Solve LPP Minimize $Z = 1.5X + 2.5Y$, subjected to constraints $X + 3Y \geq 3$, $X + Y \geq 2$ and $X, Y \geq 0$

45. Show that $\frac{\sin^3 \theta + \sin 3\theta}{\sin \theta} + \frac{\cos^3 \theta - \cos 3\theta}{\cos \theta} = 3$

46. Find equation of circle passing through (1,1), (2,-1) and (3,2)

47. IF $e^y = \sin(x+y)$, Prove that $\frac{dy}{dx} = \frac{\cos x+y}{e^y - \cos x+y}$

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

PART E

V ANSWER ANY ONE

1X10=10

49. (a) Evaluate $\lim_{x \rightarrow a} \frac{x^n - a^n}{x - a} = na^{n-1}$ for all rationals (n is +ve, -ve, rationals)
(b) Find the value of $(0.98)^3$ using Binomial theorem upto 5 decimals

50. (a) Salesman Venki has the following record of sales during 3 months of July, August, September for three products A,B,C which have different rates of commission

Month	Sales in units			Total
	A	B	C	Commission(Rs)
July	100	100	100	700
August	200	300	200	1700
September	400	900	100	3700

Using Matrix method , Find out the sales of commission on items A,B,C received by Venki

- (b) A person standing on bank of a river observes that the angle subtended by a tree on the opposite bank is 60° . When he returns 40 mts from the bank he finds the angle to be 30° . Find the height of the tree and breadth of the river
