SRI BHAGAWAN MAHAVEER JAIN COLLEGE Vishweshwarapuram, Bangalore. **Mock Exam -2 Feb. 2016**	**Course:**	II PUC
	Subject:	**Basic Mathematics**
	Max. Marks:	100
	Duration:	3:15 Hrs.

Instructions: DO NOT write or mark anything on the question paper

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

ii) Part –A carries 10 marks, part -B carries 20 marks, part –C carries 30 marks and part- E carries 10 marks

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

PART – A

I. Answer all the questions: **10 x 1 = 10**

1. If $A=\begin{bmatrix}2 & 4\\ 3 & -1\\ 4 & 0\end{bmatrix}$ show that $(A^1)^1 = A$

2. In how many ways can 9 flowers of different colours be strung together to form a garland.

3. Negate $p \rightarrow (q \wedge \sim r)$

4. Find the compound ratio of 3:5 and 4:7

5. Define Feasible region.

6. If $\text{Cot } A = \frac{12}{5}$ and A is acute, Find sin 3A

7. Find the length of the chord of the circle $x^2 + y^2 + 3x - 2$ intercepted by y axis.

8. Evaluate $\underset{x \to o}{lt}\left(\frac{e^{-3x}-1}{x}\right)$

9. Differentiate w.r.t x, $x^e + \frac{1}{e^x} - a^\pi$

10. Integrate w.r.t x, $\int 7.5^x + \frac{1}{\sqrt[3]{x^5}}\,dx$

PART – B

II. Answer any TEN questions. **2 x 10 = 20**

11. If A = $\begin{pmatrix}1 & 3\\ 1 & 0\end{pmatrix}$, Prove That $A^2 - A - 3I = 0$

12. Find the number of straight lines and triangles that can be formed out of 20 points of which 8 are collinear.

13. Two cards are drawn at random from a well shuffled pack of 52 cards. What is the probability that either both queen or both are king cards.

14. Write the converse and contrapositive of the implication: If $x(x-2) = 0$ then $x = 2$.

15. If a+b : a -b = 4:3, Find the value of a and b.

16. The Banker's discount and true discount on the sum of money due 3 months hence are ₹ 154.50 and ₹ 150 respectively. Find the sum of money and the rate of interest.

17. Abhishek purchased a bicycle costing ₹ 12,000. If the rate of sales tax is 9%, calculate the total amount payable by him.

18. Find the value of $\cos 105^0$

19. Find the equation of the parabola given that its focus is (0,-3) and directrix is y=3.

20. If $f(x)=\begin{cases}\dfrac{x^4-256}{x-4} & x\neq 4\\ a & x=4\end{cases}$ is continuous at x = 4, find a

21. If $x=at^2, y=2at$ find $\dfrac{dy}{dx}$

22. The total cost of the production of a firm is given by the following function $C=0.7x+18$

    Find (i) Average cost for an output 9 unit

    (ii) Marginal cost for an output of 6 unit.

23. Integrate $\dfrac{\cos\sqrt{x}}{\sqrt{x}}$

24. Integrate $\int_0^{\Pi/2} \sin 2x.\, dx$

Section - C

III. Answer any TEN questions. **3 x 10 = 30**

25. Prove that $\begin{vmatrix}1 & b+c & b^2+c^2\\ 1 & c+a & c^2+a^2\\ 1 & a+b & a^2+b^2\end{vmatrix}=(a-b)(b-c)(c-a)$

26. A Team of 8 players has to be selected from 14 players. In how many ways the selections can be made if (i) 2 particular players are always included

    (ii) 2 particular players are always excluded.

27. A couple has two children. Find the probability that both are boys, if it is known that

    a) One of the children is a boy

    b) Elder child is a boy.

28. Find the middle terms in the expansion of $\left(\sqrt{x}-\dfrac{3}{x^2}\right)^{13}$

29. 5 men each working 9 hours a day can finish a work in 30 days. How many men are required to finish eight times the work in 25 days each working 8 hours a day?

30. A bill for ₹ 14,600 drawn at 3 months after date was discounted on 11-11-1999 for ₹ 14,320. If the discount rate is 20% p.a, on what date was the bill drawn.

31. A man owns 50 SBI shares which are now selling at the rate of 1800. He needs 50,000 for his daughter's education. He decides to sells 25 SBI shares. The brokerage charged is 0.25% . How much more money does he need to arrange after selling the share.

32. Evaluate $\frac{Cos75^o + Cos15^o}{\sin 75^o - \sin 15^o} = \sqrt{3}$

33. Find the value of k for which the line $x + ky - 5 = 0$ may touch the circle $x^2 + y^2 - 2x - 6y - 6 = 0$

34. $\lim_{x \to \infty} \frac{1^3 + 2^3 + 3^3 + ... + n^3}{\left(\sum n\right)\left(2x^2 + 3n + 1\right)}$

35. Differentiate $\log_e x$ from the first principles.

36. A man 6 ft tall is moving directly away from the lamp post of height 10 ft above the ground. If he is moving at the rate of 3 ft / sec. Find the rate at which the length of his shadow is increasing and also the tip of his shadow is moving.

37. Evaluate $\int e^x \log x$

38. Evaluate $\int_0^{\Pi/2} \sin 3x \cos x \ .dx$

Part - D

IV. Answer any SIX questions. **5 x 6 = 30**

39. Solve by matrix method $x - y - 2z = 3,\ 2x + y + z = 5,\ 4x - y - 2z = 11$

40. Find the coefficient of y^3 in $\left(7y^2 - \frac{2}{y}\right)^{12}$

41. Resolve into partial fraction $\frac{4x^2 - 3x + 5}{(2 - x)(1 + x)}$

42. Verify whether given propositions is $\left[(\sim p \wedge q) \wedge (q \wedge r) \wedge (\sim q)\right]$, is Tautology or contradiction.

43. Divide ₹ 3262 among x, y and z such that if ₹ 35, ₹ 15 and ₹ 12 are deducted from their respective shares, the remainders are in the ratio 3:5:8.

44. xyz company supplies water tankers to the Government. The first water tanker takes 20000 labour hours. The government auditors suggest that there should be 90% learning effect rate.
The management expects an order of 8 water tankers in the next year. What will be the labour cost the company will incur at the rate of ₹ 20 per hour?

45. Maximize $\begin{matrix} z = 3x_1 + 4x_2 \\ x_1 + x_2 \le 450,\ 2x_1 + x_2 \le 600 \end{matrix}$, $x_1 \& x_2 \ge 0$, solve the above LPP graphically and present the optimum solution.

46. Verify $\tan 2A + \tan 2B + \tan 2C = \tan 2A \tan 2B \tan 2C$

47. If $x^m . y^n = (x + y)^{m+n}$. show that $\frac{dy}{dx} = \frac{y}{x}$

48. a) Prove that $\frac{\cos^3 A - \sin^3 A}{\cos A - \sin A} = 1 + \frac{1}{2}\sin A$

b) Find the area bounded by the curve $3x^2 = 4y$, y axis and the lines $y = 1,\ y = 2$

PART – E

V. Answer any ONE question: **1 x 10 = 10**

49. a) Prove that $\lim_{\theta \to 0} \frac{\sin\theta}{\theta} = 1$ and hence deduce that $\lim_{\theta \to 0} \frac{\tan\theta}{\theta} = 1$

b) The angles of elevation of the top of the a tower from two points distant a and b (a<b) from its foot and the same straight line from it are 30^o and 60^o. Show that the height of the tower is $\sqrt{ab}$

50. a) Show that the points are concyclic (2,0) (-1,3) (-2,0) & (1,-1)

b) If the marginal cost function is $3x^2 - x + 5$ where x is the output, then find the average cost total variable cost.

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