SRI BHAGAWAN MAHAVEER JAIN COLLEGE

Vishweshwarapuram, Bangalore 560004

Mock Examination Question Paper-1(January 2019)

Course:	II PUC	**Subject:**	Basic Maths
Max. Marks:	100	**Duration:**	3:15 hrs.

Instructions:-

(i) The question paper has 5 parts A, B, C, D and E. Answer all the parts.
(ii) Part A carries 10 marks, part B carries 20 marks, part c carries 30 marks, part D carries 30 marks and part E carries 10 marks.
(iii) Write the question number properly as indicated in the question paper.

PART-A

I. Answer all the questions. **10x1=10**

1. If A= $\begin{bmatrix} 3 & 1 & 2 \\ 0 & -1 & 2 \\ -4 & 1 & -3 \end{bmatrix}$ and B = $\begin{bmatrix} 2 \\ -1 \\ 3 \end{bmatrix}$ find A B.
2. If A and B are independent events then find $P\left(B/A\right)$.
3. Negate: 14 is a divisor of 48 and 28 is not divisible by 82.
4. If a: 3:15 = 5: b: 5 find the values of a and b.
5. Define Feasible region.
6. Prove that $\sec 15^\circ + \operatorname{cosec} 15^\circ = 2\sqrt{6}$.
7. If the length of the latus rectum of $y^2=8kx$ is 4 find k.
8. Evaluate: $\lim_{x \to 3} \left(\frac{x^2-9}{x-3} \right)$
9. Differentiate w.r.t ' x' $y = a^2 + \sin 45^0 - \sec 5x$
10. Evaluate: $\int_{-\pi/4}^{\pi/4} \tan^2 x dx$

PART-B

II. Answer any ten questions. **10x2=20**

11. If A = $\begin{bmatrix} 1 & 3 \\ 4 & 5 \end{bmatrix}$ Prove that A. adj A = |A| I
12. There are 12 points in a plane of which 5 are collinear. Find the number of straight lines.
13. Two cards are drawn from a pack of 52 cards. What is the probability that both are face cards?
14. Write the verbal form of compound proposition $(p \wedge r) \rightarrow (\sim q \vee r)$
    Where p: x is prime number
    q: y is irrational number.
    r: z is real number.
15. If ₹150 maintains a family of 4 members for 30 days. How long ₹600 maintain a family of 6 members?
16. A Banker discounts a bill for a certain amount having 73 days to run before it matures at 15% p a. The discounted value of the bill is ₹970. What is the face value of the bill?
17. What is the quoted value of 12% stock if it earns an interest of 8% after deducting the income tax of 8%.

18. Prove that $\frac{\cos^3 A-\sin^3 A}{cosA-\sin A}=1+\frac{1}{2}\sin 2A$

19. Find the equation of the circle with two of whose diameters x + y = 6 and x + 2y = 4 having radius being $2\sqrt{5}$ units.

20. Evaluate: $\lim_{n\to\infty}\left(\frac{\sum n^3}{n^2\sum n}\right)$

21. If y =tan5x tan(x^8) find $\frac{dy}{dx}$

22. The product of two natural numbers is 64. Find the numbers if their sum is minimum.

23. Evaluate: $\int e^x\sqrt{e^x+5}dx$

24. If the marginal revenue is given by $f'(x)=\frac{30-x^2}{30}$. Find the revenue obtained from an output of 50 units.

PART-C

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

25. Solve by Cramer's rule:
$5y+2x+z=-1$
$x+7y-6z=-18$
$3y+6z=9$

26. Show that $\begin{vmatrix} a+b+2c & a & b \\ c & b+c+2a & b \\ c & a & c+a+2b \end{vmatrix}=2(a+b+c)^3$

27. A man has 10 relatives, 4 of them are ladies, 3 gentleman and 3 children. In how many ways can he invite 7 relatives to a dinner party so that
(i) There are exactly 2 ladies, 3 gentleman and 2 children.
(ii) There and exactly 2 gentleman and atleast 3 ladies.

28. A committee of 12 with atleast 5 women has to be formed from 9 women and 8 men. What is the probability that (a) Women are in majority (b) Men are in majority.

29. A bill for ₹2725.25 was drawn on 03-06-2010 and made payable 3 months after due date. It was discounted on 15-6-2010 at 16% per annum. What is the discounted value of the bill and how much did the banker gain?

30. Mr. Ravi sold ₹2,250 stock at 75 and bought stock at 88.5 with the proceeds. How much stock does he buy if the brokerage is 2% for selling and 1.5% for buying.

31. When the rate of sales tax is decreased from 9% to 7% for a Radio, Rahul has to pay ₹632 less for it. What is the listed price of the radio?

32. Prove that $\tan 3A=\frac{3\tan A-\tan^3 A}{1-3\tan^2 A}$.

33. Find the equation of the circle whose centre is (-2, 3) and passing through the centre of the circle $x^2+y^2-6x+4y+9=0$.

34. Prove that

$$f(x)=\begin{cases} x^2+1 & \text{When } x<2 \\ 5 & \text{When } x=2 \text{ is continous at } x=2 \\ 4x-3 & \text{When } x>2 \end{cases}$$

35. Differentiate $\log x$ w.r.t first principles.

36. If x = a $\left[\cos t + \log \tan \frac{t}{2}\right]$, y = a sint. then show that $\frac{dy}{dx} = \tan t$.

37. Find the value of x (interval) for which the function is increasing or decreasing
f(x) = $2x^3 + 9x^2 + 12x + 20$.

38. Evaluate $\int \frac{5^x \log 5}{\left(5^x + 1\right)} dx$

PART-D

IV. Answer any six questions. **6x5=30**

39. Solve the equations by matrix method:
$x - y + 2z = 3$
$2x + z = 1$
$3x + 2y + z = 4$

40. Find the Co-efficient of $x^{-2} in \left(x + \frac{1}{x^2}\right)^{17}$.

41. Resolve into partial fractions $\frac{2x^2 + 3x + 2}{x^2 - x - 2}$.

42. Examine whether the proposition is logically equivalent ~(p↔q)∨r and (q∧~p) ∧(q∧~r).

43. ₹ 5625 is divided among A, B and C so that A receives one half as much as B and C together receive and B receives one fourth of what A and C together receive. Find the share of A, B and C.

44. The production manager of a company obtained the following equation for the leaning effect $y = 1400\ x^{-0.3}$. This function is based on the company's experience for assembling the first 50 units of the product. The company was asked to bid a new order of 100 additional units and the labour cost for producing an additional 100 units at the rate of ₹20 per hour.

45. Prove that $\frac{\sin 2A + \sin 2B + \sin 2C}{\sin 2A + \sin 2B - \sin 2C} = \tan A . \tan B$.

46. If $x^2 + 2xy + 3y^2 = 1$, show that $y_2 = \frac{-2}{\left(x + 3y\right)^3}$.

47. (a) A man 6ft tall is moving directly away from a lamp post of height 10 ft above the ground. If he is moving at a rate of 3ft/sec. Find the rate at which the length of his shadow is increasing and also the tip of his shadow is moving?
(b) If $R = 250x + 45x^2 - x^3$, (R=total Revenue, x=no.of units) what will be the Marginal revenue if x=25 units.

48. Find the area of the region included between the curve $4y = 3x^2$ and the line $3x - 2y + 12 = 0$.

PART-E

V. Answer any one question. **1x10=10**

49. (a) Prove that $\lim_{\theta \to 0} \left(\frac{\sin \theta}{\theta}\right) = 1$, θ is in radians. and hence deduce $\lim_{\theta \to 0} \left(\frac{\tan \theta}{\theta}\right) = 1$

(6)

(b) The company owned by vishwa Narayana concentrates on two grades of paper A and B, produced on a paper machine. Because of raw material restrictions, not more than 400 tonnes of grade A and 300 tonnes of grade B can be produced a week. There are 160 production hours in a week. It requires 0.2 hr and 0.4 hr to produce one tonne of products A and B respectively with corresponding profits of ₹20 and ₹50 per tonne. Formulate the LPP. **(4)**

50. (a) Show that the points (2, 0) (-1, 3) (-2, 0) and (1, -1) are concyclic. **(6)**

(b) The angles of depression of 2 boats as observed from the mast head of a ship 50m high are 45° and 30°. What is the distance between the boats if they are on the same side of the mast head in line with it?

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