JAIN COLLEGE

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

Date: 2019-2020 ***SUBJECT: BASIC MATHEMATICS***

II PUC
MOCK II

Timings Allowed: 3Hrs 15Mins ***Total Marks:100***

PART-A

I. Answer ALL the questions. **1 X10=10**

1. If $A = \begin{bmatrix} 3 & 1 \\ 2 & 4 \end{bmatrix}$ and $B = \begin{bmatrix} -1 \\ 2 \end{bmatrix}$ $find\ AB$
2. In how many ways can 10 people be seated around a table.
3. Negate : 4 is an even integer or 7 is a prime number.
4. Find the mean proportional to 1 and 9.
5. Define Yeild.
6. Find the value of $3Sin10^0 - 4Sin^3 10^0$
7. Find other end of diameter if one end of the diameter of circle $x^2 + y^2 = 25$.
8. Evaluate $\lim_{x\to 0}\left(\frac{2^x-1}{3x}\right)$
9. Differentiate $[\log(Cosx)]^2$
10. Evaluate $\int\left(\frac{1+x^2}{x}\right)dx$

PART-B

II. Answer any TEN questions. **2X10=20**

11. Prove that value of the determinant remains same if the rows and columns are interchanged.
12. Find the number of ways in which a committee of 2 lecturer and 4 students can be formed out of 10 students and 8 lecturers.
13. Two dice are thrown once what is the probability of getting face upwards with sum equal to 4 or 5.
14. Construct truth table. $\sim p \leftrightarrow (p \wedge \sim q)$.
15. A certain number is subtracted from each of the two terms of ratio 21:35 to give a new ratio 3:10. Find the number which is to be subtracted.
16. Find the legally due date for a bill date 22-04-2014 due 6 months hence.
17. Prove that $Sin105^0 + Cos105^0 = \frac{1}{\sqrt{2}}$
18. Prove that $\frac{Cos2A-Cos12A}{Sin12A-Sin2A} = tan7A$
19. Find the focus and equation of directrix of the parabola $x^2 - 16y = 0$
20. Evaluate $\lim_{x\to 0}\left(\frac{Sin3x.tan4x}{x^2}\right)$
21. If $S = 5t^2 + 4t - 8$ find initial velocity and acceleration.
22. Differentiate $3^{x^2} logx$
23. Evaluate $\int \frac{4x+3}{2x^2+3x+5}\,dx$
24. Evaluate $\int_0^{\frac{\pi}{4}} Sec^2 3x\,dx$

PART- C

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

25. If each element of any row (or column) of a determinant is the sum of two terms, then the determinant can be expressed as the sum of two determinants.
26. There are 15 points in a plane of which 5 are collinear find the
    a) Number of straight lines
    b) Number of triangle that can be formed using these points.
27. Solve by using Cramer's rule 5x – y – 4z=4 , x+4y+2z=12, 3x - y – z=3.
28. The ratio of the age of father to that of his son is 5:3 after 10 years the ratio of their ages becomes 3:2. Find their present ages.
29. From 8 gentlemen and 7 ladies a committee of 5 is to be formed. What is the probability that committee consists of
    a). exactly 2 ladies b). at least 3 gentlemen
30. The difference between B.D and T.D on a bill due after 6 months at 4% interest p.a. is Rs.20 . Find the True discount, Banker's discount and face value of the bill.
31. How much money has to be invested in 11.5% stock at 73 (including brokerage) to obtain an income of Rs. 150.
32. If $y = (Sinx)^{tanx}\ find\ \frac{dy}{dx}$
33. Find the equation of the parabola with vertex (0,0) axis is y-axis and passing through the point (-1,-3)
34. If $y = e^{ax} + e^{-ax}\ \ show\ that\ y_2 - a^2y = 0$
35. Find the interval for which the function is increasing or decreasing $f(x) = 2x^3 - 15x^2 - 84x + 7$
36. The edge of a variable cube is increasing at the rate of 6cm/min. How fast is the volume and its surface area increasing when the edge is 10 cm long.
37. $Evaluate\ \int \sqrt{1 + Sin2x}dx$
38. $Evaluate\ \int_0^3 \frac{x+3}{x+2}$ dx.

PART- D

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

39. Find the coefficient of $x^8\ \ in\ \left(3x^2 - \frac{1}{2x}\right)^{10}$
40. Resolve into partial fractions $\frac{3x+5}{(x+2)^2(x+3)}$
41. Define tautology and show that $(\sim pvq)v(p\text{^}\sim q)\ is\ a\ tautology$
42. A can do piece of work in 20 days, B can do it in 30 days and C in 60 days. All of them began to work together. However A left the job after 6 days before the completion of the work. How many days did the work last.
43. A company requires 100 hours to produce the first 10 units at Rs. 15 per hour. The learning curve effect is 80%. Find the total labour cost to produce a total of 160 units.
44. Minimize : $Z = x - 7y + 190, subject\ to\ \ x + y \leq 8, x \leq 5, y \leq 5,$
    $x + y \geq 4, x \geq 0, y \geq 0.$
45. The angle of elevation of the top of a tower from two points at a distance a and b (a< b) from its foot and on the same straight line from it are $30^0\ and\ 60^0\ show\ that\ height\ of\ the\ tower\ is\ \sqrt{ab}$
46. Find the equation of the circle passing through the points (0,-3), (0,5) $and\ centre\ lies\ on\ the\ line$ x-2y+5=0
47. If $e^y(x + 1) = 1\ show\ that\ \frac{d^2y}{dx^2} = \left(\frac{dy}{dx}\right)^2$
48. Find the area bounded by the curve $y^2 = 4x\ and\ line\ y = 2x - 4$

PART-E

V. Answer ONE question. **1 X 10 =10**

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

(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,Sepetember 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 60^0. When he returns 40 mts from the bank he finds the angle to be 30^0. Find the height of the tree and breadth of the river

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