II PUC MOCK -2
(FOR THE YEAR 2020-21)

Time: 3 Hours 15 Minutes Subject.: Basic Mathematics Max. Marks: 100

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. $\mathbf{10 \times 1 = 10}$

1. Find x, if $\begin{vmatrix} 4 & x \\ x & 16 \end{vmatrix} = 0$
2. If ${}^{n}P_4 = 360$, find n.
3. If $P(A) = \frac{3}{4}$, $P(B) = \frac{1}{2}$, $P(A \cap B) = \frac{1}{4}$ then find $P(A|B)$
4. Symbolise the proposition: "2+5=6 or integers are rational"
5. If $5 : 20 = 3 : x$, find the value of x.
6. Find the bankers discount on a bill of ₹415 due 9 months hence at 15% p.a.
7. What rate of interest is obtained by investing in 9% stock at 180?
8. Find the index of learning for 70% learning effect.
9. Express $\sin 4A \cos 2A$ as sum or difference of two trigonometric functions.
10. Find the centre of the circle $x^2 + y^2 - 4x - y - 5 = 0$.

PART-B

II. Answer any TEN questions. $\mathbf{10 \times 2 = 20}$

11. If $A = \begin{bmatrix} -4 & -3 \\ -2 & -1 \end{bmatrix}$ find A^{-1}.
12. Solve by Cramer's rule: $3x + 4y = 7 \ \ and \ \ 7x - y = 6$.
13. In how many ways the letters of the word CARROM be arranged such that 2 R's are always together?
14. If ${}^{n}C_8 = {}^{n}C_{12}$ find the value of ${}^{n}C_5$.
15. One ticket is drawn at random from a bag containing 20 tickets numbered from 1 to 20. Find the probability that it is a multiple of 2 or 5.
16. If the truth values of the propositions p, q, r are T, T, F respectively. Then find the truth value of $p \rightarrow (q \wedge r)$.
17. What must be added to each term in the ratio 5:6 so that it becomes 8:9?

18. A bill drawn for 3 months was legally due on 06/07/2018. Find the date of drawing of the bill.

19. How much money will a man get by selling ₹6000 stock at 5% at 20 premiums?

20. Refrigerator is marked for sale for ₹17000 which include sales tax at 10%. Calculate the sales tax in ₹.

21. Find the angle of elevation of the sun when the shadow of a tower 75 meters high is $25\sqrt{3}$ meters long.

22. If $\tan A = \frac{3}{4}$, $\tan B = \frac{1}{7}$ Show that $\tan(A + B) = 1$.

23. If $\cot A = \frac{12}{5}$ and A is acute find $\sin 3A$ & $\cos 3A$.

24. Find the centre and radius of the circle: $3x^2 + 3y^2 - 6x + 4y + 1 = 0$.

PART-C

III. Answer any TEN questions. $\mathbf{10 \times 3 = 30}$

25. If $A = \begin{bmatrix} 2 & 3 \\ -4 & 1 \end{bmatrix}$, $B = \begin{bmatrix} -1 & 5 \\ 6 & 2 \end{bmatrix}$ Show that $(AB)' = B'A'$.

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

27. Find the number of permutations of the letters of the word ENGINEERING, how many of these

a) Begin with E and end with E

b) Have all the 3 E's together

28. Two cards are drawn from a pack of playing cards one after the other. Find the probability of getting queen in 1st and 2nd draw, if the cards are drawn

i) with replacement ii) without replacement.

29. A box contains 8 white and 9 red balls. Two balls are taken at random from the box. Find the probability that both of them are red, if

i) The two balls are taken together

ii) The balls are taken one after the other without replacement

iii) The balls are taken one after the other with replacement.

30. Find the 8th term in the expansion of $\left(2x^2 - \frac{3}{x}\right)^{12}$.

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

32. Write the converse, inverse and contrapositive of the statement, "If $x(x-2) = 0$ then $x = 2$"

33. The angles of a triangle are in the ratio 3:4:5. Find the angles.

34. A mixture contains milk and water in the ratio 6:1. On adding 5 litres of water, the ratio of milk and water becomes 7:2. Find the quantity of milk in the original mixture.

35. Rakshith decides to invest in TCS shares which are selling at ₹2020 per share. How much money is required to purchase 10 shares, if the brokerage is 0.5%?

36. A shopkeeper announces a discount of 10% on a washing machine set. The marked price of washing machine is ₹12000. How much will a customer have to pay for buying the washing machine set if the rate of sales tax is 8%?

37. Prove that $\frac{1-\cos 2A+\sin 2A}{1+\cos 2A+\sin 2A} = \tan A$

38. Prove that the length of the chord $x + 2y = 5$ of the circle $x^2 + y^2 = 9$ is 4 units.

PART-D

IV. Answer any SIX questions. $\mathbf{6 \times 5 = 30}$

39. A candidate is required to answer 6 out of 12 questions which are divided into 2 groups containing 6 questions in each group. Find the number of choices he has if he cannot attempt more than 5 questions from any group.

40. Find the middle term in the expansion of $\left(\frac{2x^2}{3} - \frac{3}{2x}\right)^{11}$

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

42. Verify whether the proposition $[\sim p \wedge (p \vee q)] \rightarrow q$ is a tautology or a contradiction or neither.

43. Distribute ₹632 among A, B and C in such a way that B gets 20% more than A and C gets 20% less than B.

44. The banker's gain on a bill is $\frac{1}{9}^{\text{th}}$ of the banker's discount, rate of interest being 10% p.a. Find the unexpired period of the bill.

45. A company has 80% learning effect and spends 500 hours for the prototype. Estimate the labour cost of producing 7 engines of new order if the labour cost is ₹40 per hour.

46. Solve the following LPP graphically.

Maximize: $Z = 5x + 3y$

Subjected to $3x + 5y \leq 15$

$5x + 2y \leq 10$

$x \geq 0, y \geq 0$

47. The shadow of a tower standing on a level plane is found to be 50m longer when sun's altitude is 30° than when it is 60°. Find the height of the tower.

48. If $A + B + C = 180°$. Prove that $\sin 2A + \sin 2B + \sin 2C = 4 \sin A \sin B \sin C$

PART-E

V. Answer any ONE question. $\mathbf{1 \times 10 = 10}$

49. a) Solve by matrix method **6M**

$$x - y + 2z = 3$$
$$2x + z = 1$$
$$3x + 2y + z = 4$$

b) Find the value of $(1.01)^5$ using binomial theorem, up to 4 decimal places. **4M**

50. a) Show that the points $(0,0), (1,1), (5,-5), (6,-4)$ are concyclic **6M**

b) A company owned by Swathi can produce two types of high-quality shoes. Each shoe of the 1st kind requires thrice as much as the second kind. If all shoes are of the 2nd kind only, the company can produce a total of 600 pairs per day. Only a maximum of 150 pairs of the 1st kind and 400 of the 2nd kind can be sold in a day. If the profit per pair of the 1st kind is ₹400 and per pair of the 2nd kind is ₹150. Then formulate the L.P.P. **4M**