



# JAIN COLLEGE

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

Date:

**SUBJECT: BASIC MATHS**

**II PUC  
MOCK -II**

**Timings Allowed: 3 Hrs 15 Minutes.**

**Total Marks: 100**

Instructions:

1. The question paper has 5 parts A,B,C,D,E. Answer All parts
2. Part-A carries 10 marks , Part-B carries 20 marks, Part-C and Part-D carries 30 marks and Part-E carries 10 marks
3. Write question number properly as indicated in question paper

## PART-A

**I. Answer ALL the questions.**

**1 X10 =10**

1. Evaluate  $\begin{vmatrix} 3200 & 3201 \\ 3202 & 3203 \end{vmatrix}$
2. Find the value of n if  $nC_{10} = nC_{15}$
3. Negate : If two triangles are similar then their areas are equal.
4. Find the value of x if  $5:20 = 3:x$
5. Define learning curve.
6. Find the value of  $\cos 75^\circ$
7. If the length of latus rectum of  $y^2 = 8kx$  is 4 find value of k
8. Evaluate  $\lim_{x \rightarrow 2} \frac{x-2}{\frac{1}{x^3-2^3}}$
9.  $x^3 + y^3 = 3axy$  find  $\frac{dy}{dx}$
10. Evaluate  $\int \left( \frac{1}{x} - \sin x + 3 \right) dx$

## PART-B

**II. Answer any TEN questions.**

**10X2=20**

11. In how many ways can 7 gentlemen and 2 5 ladies be arranged in a circle if no two ladies are together.
12. Solve for x and y  $\begin{bmatrix} 1 & 3 \\ -2 & 4 \end{bmatrix} \begin{bmatrix} x \\ y \end{bmatrix} = \begin{bmatrix} -1 \\ 0 \end{bmatrix}$
13. Two cards are drawn at random from a well shuffled pack of 52 cards. What is the probability that either both are queen or both are king cards.
14. Negate : 'if x is divisible by y then it is divisible by a and b'.
15. If  $a:b=2:3$ ,  $b:c=3:5$  and  $c:d=5:7$  find a:d
16. Find banker's discount on Rs. 1000 due 6 months hence at 10% p.a
17. Prove that  $\frac{\cos 2A}{1+\sin 2A} = \frac{\cos A - \sin A}{\cos A + \sin A}$
18. If  $A + B + C = 180^\circ$  prove that  
$$\cot B \cdot \cot C + \cot C \cdot \cot A + \cot A \cdot \cot B = 1$$
19. Write the focus, equation of the directrix of the parabola  $y^2 = -8x$
20. Evaluate  $\lim_{x \rightarrow 0} \left( \frac{2^x - 1}{3x} \right)$
21. Differentiate w.r.t x  $x^{\sin x}$

22. Find the average cost and marginal cost if the total cost function of an article given by

$$C(x) = 5x^2 + 2x + 3$$

23. Evaluate  $\int \cos^2 x \sin x \, dx$

24. Find the area bounded by the curve  $y = x^2$ ,  $x$  axis and ordinate  $x = 0, x = 1$

### PART-C

#### III. Answer any TEN questions

3 X 10 = 30

25. 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?

26. 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?

27. 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

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

29. Find the equation of the parabola given that the ends of latus rectum are L(3,6) and L'(-5,6)

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

31. 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.

32. 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

33. Differentiate  $x^{(\sin x - \cos x)}$  with respect to x.

34. The sides of an equilateral triangle increasing at the rate of 2cm/sec. How fast its area increases when the sides are 10cm.

35. Find the equation of the parabola if the vertex is (0,0), axis y-axis and passes through the point  $(\frac{1}{2}, 2)$

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

37. Evaluate  $\int \frac{1}{\sqrt{x+x}} dx$

**PART D**

**IV ANSWER ANY SIX**

**6 X 5 =30**

38. Find the term independent of x in  $\left(\frac{\sqrt{x}}{2} - \frac{2}{x^2}\right)^{10}$

39. Resolve into partial fractions  $\frac{x^2-2}{x^2+x-12}$

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

41. 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

42. 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.

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

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

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

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

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

**PART-E**

**V. Answer any ONE question.**

**1 X 10 =10**

48. a ). The price of 4 accounting books, 2 commerce books, 3 economics books is Rs.134, the cost of one accountancy book, 3 commerce books and 2 economics books is Rs.81. The cost of 2 accounting books, one commerce book and 5 economics book is Rs.130. Find the rate per each book.

b) Find the value of  $(1.01)^5$  correct to 4 decimal places

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

b). A company produces two types of leather belts A and B. A is of superior quality an B is of inferior quality. The respective profits are Rs.10 and Rs.5 per belt. The supply of raw materials is sufficient for making 850 bets per day. For belt A, a special type of buckle is required and 500 are available per day. There are 700 buckles available for belt B per day. Belt A needs twice as much time as that required for belt B and the company can produce 500 belts if all of them were of type A. Formulate LPP model for the problem.

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