***SECOND PUC PREPARATORY - 3 2023-2024 – BRIKS ACADEMY PADMANABHANAGARA***

**SUBJECT : MATHEMATICS ( 35 )**

**TIME : 3 Hours 15 Minutes [Total questions : 52 ] Max. Marks : 80**

**Instructions :**

**1. The question paper has five parts namely A, B, C, D and E. Answer all the Parts.**

**2. Part A has 15 multiple choice questions, 5 fill in the blank questions.**

**3. Use the graph sheet for question on linear programming problem in Part E.**

**PART – A**

**I. Answer ALL the Multiple Choice Questions: 5 x 1 = 5**

1. Both the empty relation & the universal relation are

1) empty relation 2) universal relation

3) trivial relation 4) equivalence relation

1. Let f: R R be defined as f(x)=x2. Choose the correct answer

1) f is one-one, onto 2) f is many-one, onto

3) f is one-one but not onto 4) f is neither one-one nor onto

1. The principal value of is

1) 2) 3) 4)

1. For any square matrix , then A is

1) unit matrix 2) scalar matrix 3) diagonal matrix 4) zero matrix

1. If A be a non singular matrix of order 3, then |adjA| is equal to

1) |A| 2) |A|2 3) |A|3 4) 3|A|

1. f(x) = [x] is continuous for

1) R 2) Z 3) R–Z 4) Z+

1. A function f is said to be continuous for x ∈ R if f is

1) continuous at x = 0 2) differentiable at x = 0

3) continuous at two points 4) differentiable for x ∈ R

1. The interval in which f(x) = 7x – 3 is increasing is

1) R 2) (7, ) 3) (, 7) 4) (3,7)

1) 2) 3) 4)

1) tanx + cotx + c 2) tanx + cosecx + c 3) –tanx + cotx + c 4) tanx + secx + c

1. & are equal. Then x, y, z are respectively

1) 2,1,2 2) 1,1,2 3) 2,2,1 4) 1,2,1

1. Two or more vectors having the same initial points are called as \_\_\_\_\_\_ vectors

1) collinear 2) coinitial 3) zero 4) equal

1. A line makes equal angles with co-ordinate axes then direction cosines of the lines are

1) 2) 3) 4)

1. Corner points of Z=200x+500y are (0,5) (4,3) & (0,6) then minimum value of Z is

1) 2400 2) 3000 3) 2000 4) 2300

1. If

1) 2) 3) 4)

**II. Fill in the blanks by choosing the appropriate answer from those given in the bracket 3 x 1 = 3**

1. Principal value of is \_\_\_\_
2. If |A|=8, then |AA–1|= \_\_\_\_.
3. Degree of is \_\_\_\_.
4. If are direction cosines of a line, the
5. If F is event of same space S of an experiment, then P(S/F) = \_\_\_\_\_.

**PART – B**

**Answer any SIX of the following questions:**  **6 x 2 = 12**

1. Find the value of .
2. Find the value of if area of triangle is 4 sq. units and vertices are , , .
3. Find , if 2 + 3 = .
4. Find the rate of change of the area of a circle with respect to its radius = 5cm.
5. Find the maximum and minimum values, if any, of the function given by =
6. Evaluate .
7. Evaluate .
8. Find if for a unit vector ,
9. The Cartesian equation of a line is = = . Write its vector form.
10. If = , = , = , find .
11. Two cards are drawn at random and without replacement from a pack of 52 playing cards. Find the probability that both the cards are black.

**PART - C**

**Answer any SIX of the following questions: 6 x 3 = 18**

1. Show that the relation R in the set Z of integers given by R={(x,y): 2 divides x – y} is an equivalence relation.
2. Write the following in the simplest form , .
3. Express the matrix as the sum of a symmetric & skew symmetric matrices.
4. Differentiate w.r.t x.
5. If , prove that .
6. Find the intervals in which the function = is

strictly increasing (b) strictly decreasing:

1. Evaluate ∫
2. Find the equation of curve passing through the point (-2,3) given that the slope of the tangent to the curve at any point (x,y) is .
3. Find a unit vector perpendicular to each of the vectors , where .
4. If , are such that is perpendicular to then find the value of λ.
5. A bag contains 4 red & 4 black balls, another bag contains 2 red & 6 black balls. One of the two bags is selected at random & a ball is drawn at random from the bag & it is found to be red. Find the probability that the ball is drawn from first bag?

**PART – D**

**Answer any FOUR the following questions: 4 x 5 = 20**

1. Let f:N Y be a function defined as f(x)=4x+3, where Y={y N: y=4x+3 for some xN}. Show that f is invertible. Find the inverse of f.
2. If , and , then calculate and Also, verify that .
3. Solve the system of linear equations by matrix method 2x–3y+5z = 11, 3x+2y–4z = –5, x+y–2z = –3.
4. If , show that
5. Find the integral of with respect to x & hence evaluate .
6. Find the area of the region bounded by the ellipse + = 1 using integration.
7. Find the general solution of the differential equation .
8. Derive the equation of a line in space through a given point and parallel to a given vector , both in vector form and Cartesian form.

**PART – E**

**Answer the following.**

1. P T and hence evaluate .

(OR)

Solve the following linear programming problem graphically, Minimise Z=200x+500y subject to the constraints: x+2y≥10, 3x+4y≤24, x,y≥0. **6**

1. Show that the matrix satisfies the equation A2 – 4A + I = O, where I is 2X2 identity matrix & O is 2X2 zero matrix. Using this equation, find A–1. **4**

(OR)

Find the value of k so that the function is continuous at .

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