

Karnataka Sangha's
MANJUNATHA COLLEGE OF COMMERCE &
JUNIOR COLLEGE OF COMMERCE, THAKURLI-(E)-421 201
1st Prelim Exam-2018-19
SUB.: Mathematics

Class: S.Y.J.C
Date: 18 / 12 /2018

Time : : 2.30pm to 5.30pm
Marks : 80

SECTION- 1

Q.1 Attempt Any Six: 12

1. Let p : Tanmay is a student
 q : Tanmay likes to watch cricket match
 What is verbal statement to describe each of the following :
 a) $p \wedge \sim q$ b) $\sim p \rightarrow q$
2. Find the values of x & y if

$$2 \begin{bmatrix} 1 & 3 \\ 0 & x \end{bmatrix} + \begin{bmatrix} y & 0 \\ 1 & 2 \end{bmatrix} = \begin{bmatrix} 5 & 6 \\ 1 & 8 \end{bmatrix}$$
3. If $A = \begin{bmatrix} 0 & 4 & 3 \\ 1 & -3 & -3 \\ -1 & 4 & 4 \end{bmatrix}$ show that $A^2 = I$
4. Discuss the continuity of following

$$h(x) = \frac{\log(1+2x)}{x} \quad x \neq 0$$

$$= 2 \quad x = 0$$
 At $x = 0$
5. If $x = \tan^{-1} t$ and $y = t^3$, find $\frac{dy}{dx}$.
6. Find the value of x for which the function $f(x) = x^3 - 3x^2 - 9x + 25$ is increasing.
7. Evaluate $\int e^x \left[\frac{x+3}{(x+y)^2} \right] dx$
8. Evaluate $\int \frac{dx}{4-9x^2}$

Q.2 Attempt Any Two : 6

1. Examine whether the following statement patterns is tautology, contradiction or contingency
 $(\sim p \vee \sim q) \leftrightarrow \sim (p \wedge q)$
2. Write converse, inverse and contra positive of following statements:
 "If Santosh passes in accountancy, then Kusum passes in logic."
3. If $f(x)$ is continuous at $x = 0$
 then find value of k if

$$f(x) = \frac{\log(1+3x)}{5x} \quad \text{for } x \neq 0$$

$$= k \quad \text{for } x = 0$$

Q.2 B Attempt Any Two : 8

1. Find MPC, MPS, APC and APS if the expenditure E_c of a person with income I is given as
 $E_c = (0.0003) I^2 + (0.075) I$ when $I = 1000$
2. A manufacturer can sell x items at a price of Rs.(280- x) each. The cost of producing x items is Rs. ($x^2 + 40x + 35$). Find the number of items to be sold so that the manufacture can make maximum profit.
3. Evaluate $\int \frac{\sin x}{1+\sin x} dx$

Q.3 A) Attempt Any Two: 6

1. Find $\frac{dy}{dx}$ if $y = 5^x + X^x$
2. If $y = \sin^{-1} \left(\frac{8x}{1+16x^2} \right)$ find $\frac{dy}{dx}$
3. Check whether following function is continuous at $x = 4$

$$f(x) = \frac{3-\sqrt{5+x}}{1-\sqrt{5-x}} \quad \text{for } x \neq 4$$

$$= \frac{1}{8} \quad \text{for } x = 4$$
 At $x = 4$

B) Attempt Any Two :

1. Find the inverse of

$$A = \begin{bmatrix} 1 & 2 & 3 \\ -1 & 1 & 2 \\ 1 & 2 & 4 \end{bmatrix} \text{ using elementary row transformation.}$$

2. Evaluate
- $\int_0^{\pi/2} \frac{dx}{1 + \sqrt{\tan x}}$

3. Find the volume of solid generated by rotating the area bounded by
- $x^2 + y^2 = 36$
- and the lines
- $x = 0$
- ,
- $x = 3$
- about X – axis

SECTION – II

Q.4 Attempt Any SIX:

12

1. Obtain Crude Death Rate (C.D.R.) for city A & city B.

Age Groups in years	City A		City B	
	Population	No. of Deaths	Population	No. of Death
Below 15	800	32	900	12
15-25	3000	12	1500	8
25-65	4800	48	4500	38
65 & above	1400	42	600	30

2. What must be subtracted from each of the number 5, 7 and 10, so that the resulting numbers are in continued proportion?

3. Find the age standard death rate (S.D.R) for the following data:

Age groups (in years)	Population (in '000)	No. Of deaths
0 – 10	11	240
10 -20	12	150
20-60	9	125
60 & above	2	90

4. Coefficient of rank correlation between x & y is 0.5 and
- $\sum di^2 = 42$
- . Assuming that no ranks are repeated, find the number of pairs of observations.

5. An agent charges 8% commission plus 2 % delcredere. If he sells goods worth Rs.12,400, find his total earnings.

6. For binomial distribution mean is 6 and variance is 2. Find n & p.

7. The following data gives the marks of 20 students in Mathematics (x) and statistics (y) out of 10, construct ungrouped frequency distribution considering single number as a class. Also prepare marginal distribution for x.

(2,7), (3,8), (4,9), (2,8), (2,8), (5,6), (5,7), (4,9), (3,8), (4,8), (2,9), (3,8), (4,8), (5,6), (4,7), (4,7), (4,6), (5,6), (5,7), (4,6).

8. The present worth of the sum of Rs.5,830, due 9 months hence is Rs.5,500. Find the rate of interest.

Q.5 A) Attempt Any Two:

6

1. For the following problems, find sequence that minimizes total elapsed time (in hrs) required to complete jobs on two machines A & B. Also find minimum elapsed time T.

Jobs	J ₁	J ₂	J ₃	J ₄	J ₅	J ₆
Machine A	1	3	8	5	6	3
Machine B	5	6	3	2	2	10

2. Three persons X, Y and Z started a business in partnership by investing Rs.24,000, Rs.52,000 and Rs.80,000 respectively. At the end of the year, they earned a profit of Rs.7,800 in the business.

Find the share of each in the profit.

3. A lot of 100 pens contains 10 defective pens. 5 pens are selected at random from the lot and sent to the retail store. What is the probability that the store will receive at least one defective pen?

B) Attempt Any Two:

8

1. Complete the life table for the following data:

x	0	1	2	3	4
lx	80	50	40	10	0

2. The following results were obtained from records of age (X) and blood pressure (Y) of a group of 10 men.

	X	Y
Mean	50	140
Variance	130	155

$$\text{And } \sum (x_i - \bar{x})(y_i - \bar{y}) = 1220.$$

Find the prediction of blood pressure of a man of age 40 years.

3. Divij wants to buy some filing cabinet for her office. The cost of cabinet X is Rs.1000/- per unit requires six square feet of floor space, and holds eight cubic feet of files. Cabinet Y cost Rs.2,000 per unit, requires eight square feet of floor space, and holds twelve cubic feet of files. She has Rs.8,000 for this purchase, though she does not have to spend that much. The office has room for no more than 72 square feet of cabinets.

Formulate this problem as a L.P.P in order to maximize storage volume.

Q.6 A) Attempt Any Two:

6

1. Find graphical solution for the following system of linear in equations

$$3x_1 + 2x_2 \leq 1800$$

$$2x_1 + 7x_2 \leq 1400$$

$$0 \leq x_1 \leq 350$$

$$0 \leq x_2 \leq 150$$

2. The equations given of two regression lines are : $2x + 3y - 6 = 0$

And $5x + 7y - 12 = 0$.

Find : a) Coefficient of correlation

b) $\frac{\sigma_x}{\sigma_y}$

3. The defect on a plywood sheet occurs at random with an average of one defect per 50 sq.ft. What is the probability that such sheet will have i) no defects

ii) at least one defect

(Use $e^{-1} = 0.3678$)

Q.6 B) Attempt Any Two:

8

1. The cost of locating various machines in various vacant places is given in the following cost matrix (in Rs.). Find the optimal assignment schedule.

Machines	Places				
	A	B	C	D	E
M ₁	9	11	15	10	11
M ₂	12	9	-	10	9
M ₃	-	11	14	11	7
M ₄	14	8	12	7	8

2. A car valued at Rs.4,00,000 is insured for Rs.2,50,000. The rate of premium is 5% less 20%. How much loss does the owner bear including the premium, if the value of car is reduced to 60% of its original value?
3. Calculate Karl person's coefficient of correlation for following data:

Length (in cm)	3	4	6	7	10
Weight (in gm)	9	11	14	15	16
