KARNATAKA SANGHA'S JUNIOR COLLEGE, Thakurli (East)
IIND TERM EXAM 2019-20
Sub: Mathematics

Class - FYJC **Marks - 80**
Date -21.03.2020 **Time: 01.00 to 04.00pm**

Q.1 A) **Select and write the most appropriate answers from the given alternative for each sub question.-** **6**

i) The value of the determinant $\begin{vmatrix} -1 & 1 & 1 \\ 1 & -1 & 1 \\ 1 & 1 & -1 \end{vmatrix}$ is equal to _____

a) -4 b) 0 c) 1 d) 4

ii) Conjugate of 1 + i is _____

a) i b) 1 c) 1 – i d) 1 + i

iii) Derivative of $x^6 + 6^x$ with respect to x is _____

a) 12x b) x + 4 c) $6x^5 + 6^x \log 6$ d) $6x^5 + x6^{x-1}$

iv) The sum of first n natural numbers is _____.

a) n (n -1) b) $\frac{n(n-1)}{2}$ c) n (n + 1) d) $\frac{n(n+1)}{2}$

v) If $f(x) = x^2 - 6x + 9$, $0 \le x \le 4$ then f(3) = _____

a) 4 b) 1 c) 0 d) does not exist

vi) A function f is continuous at a point x = a in the domain of f if _____

a) a) $\lim_{x \to a} f(x)$ exists

b) $\lim_{x \to a} f(x)$ = f(a)

c) $\lim_{x \to a} f(x) \neq$ f(a)

d) both a & b

B) **State whether following statements are True or False :** **3**

i) If a set A has n elements then the total number of subset of A is 2^n.

ii) The lines 2x + 5y = 7 & 2x – 5y = 9 are parallel to each other.

iii) If $y = \frac{u}{v}$ where u , v & y are function of x then $\frac{dy}{dx} = \frac{u\frac{du}{dx} - v\frac{dv}{dx}}{v^2}$

C) **Fill in the blanks** **3**

i) If $i = \sqrt{-1}$ then $1 + i^2 + i^3 - i^6 + i^8$ is equal to _____.

ii) The total cost function is given by $C = 2x^2 + 5x + 200$. Then average cost function is _____.

iii) The set R of real numbers is a subset of the set of _____ numbers

Q.2 A) **Attempt any Two of the following :** **6**

i) Evaluate

$$\lim_{x \to 0} \frac{5^x + 3^x - 2^x - 1}{x}$$

ii) In a G.P. if $t_2 = 7$, $t_4 = 1575$.Find r.

iii) Find k, if the equations x + 3y + 2 = 0 & 2x + 4y – k = 0
Are consistent

B) Attempt any Two of the following : **8**

i) In a hostel, 25 students take tea, 20 students take coffee, 15 students take milk, 10 students take both tea and coffee, 8 students take both milk and coffee. None of them take tea and milk both and everyone takes atleast one beverage , find the number of students in the hostel.

ii) If f(x) = 3x+ 5 , g(x) = 6x – 1 then find

a) (f + g) (x) b) (f – g) (2) c) (f.g) (3) d) $\left(\frac{f}{g}\right)(x)$

iii) Find the equation of the line passing through the point of intersection of lines x + y – 2 = 0 and 2x – 3y + 4 = 0 and making intercept 3 on X-axis.

Q.3 A) Attempt any Two of the following : **6**

i) Solve the quadratic equation $8x^2 + 2x + 1 = 0$

ii) A(1, 6) and B(3,5), Find the equation of the locus of point P such that segment AB subtends right angle at P. (<APB = 90^o)

iii) If for a commodity, the price – demand relation is given as $D = \frac{P+5}{P-1}$

Find the marginal demand when price is 2.

B) Attempt any one of the following : **4**

i) Find a and b if the following functions is continuous at point x = 3,

$f(x) = \frac{x^2-9}{x-3} + a$ for x > 3

= 5 for x = 3

$= 2x^2 + 3x + b$ for x < 3

ii) Evaluate

$\lim_{x\to 2} \frac{\sqrt{2+x}-\sqrt{6-x}}{\sqrt{x}-\sqrt{2}}$

C) Attempt any one of the following activity: 4

i) Find equation of line joining the points P(2,-3) and Q (-4 , 1) using determinants.

Solution : P(2, -3) and Q (-4 , 1)

R(☐ , ☐)

∴ Area of Δ PQR = 0

$$\square \begin{vmatrix} \square & \square & 1 \\ \square & \square & 1 \\ \square & \square & 1 \end{vmatrix} = 0$$

☐ = 0 is the equation of line.

ii) 10 people visited an exhibition on the first day. The number of visitors was doubled on the next day and so on. Find

a) number of visitors on 9^{th} day

b) total number of visitors after 12 days

solution:

on 1^{st} day number of visitor was ☐

Number of visitors doubles on next day.

On 2^{nd} day number of visitors = ☐

On 3^{rd} day number of visitors = ☐

So on

Number of visitors are 10,20,40,80,_____

These numbers form a G.P.

With a = ☐

r = ☐

No. of visitors on 9th day $t_9 = ar^{n-1}$

$\therefore t_9 =$ ☐

No. of visitors after 12 days

$S_{12} =$ a☐

$= 10\left(\frac{2^{12}-1}{2-1}\right)$

$S_{12} =$ ☐

SECTION - II

Q.4 A) Select and write the most appropriate answers from the given alternatives: 7

i) Which of the following is not partition value

a) Quartile b) Percentile c) Mean d) Median

ii) Which of the following measures of dispersion considers middle 50% of the observation?

a) Range b) standard deviation c) Quartile deviation d) None of these

iii) What is the range of correlation coefficient ?

a) $\emptyset$ b) {-1 , 1} c) [0 , 1] d) [-1 , 1]

iv) The common region represented by $0 \le x \le 8$, $0 \le y \le 8$ is _____.

a) triangle b) square c) rectangle d) pentagon

v) If two variables x & y , the cov(X ,Y) is 40, $\sigma_x^2 = 16$ and $\sigma_y^2 = 256$ .Then correlation coefficient is _____.

a)0.01 b) 0.625 c) 0.4 d) 0.5

vi) χ^2 - statistic is given by _____

a) $\sum\left(\frac{O-E}{E}\right)^2$ b) $\sum\frac{(O-E)^2}{E}$ c) $\sum\left[\frac{(O-E)}{E^2}\right]$ d) $\sum\frac{(O-E)}{E}$

B) State whether the following statements are True or False : **3**

i) 1st Percentile is greater than 1st Decile

ii) The value of standard deviation is always positive

iii) If Mean > Mode then distribution is equal skewness.

C) Fill in the blanks with appropriate words.

i) If $P_{70} = D_X$ then value of x is _____.

ii) Positive correlation implies that as one variable is increasing the other variable is _____.

iii) Simple interest on an amount of Rs.9600 at the rate of 6% per annum after 3 years is _____.

Q.5 A) Attempt Any Two : **6**

i) The following is the frequency distribution of heights of 200 male adults in a factory

Height in cm	No. of male adults
145 – 150	4
150 – 155	6
155 – 160	25
160 – 165	57
165 – 170	64
170 – 175	30
175 – 180	8
180 – 185	6

Find the central height.

ii) A group of 65 students of class XI have their average height is 150.4 cm with coefficient of variation 2.5%. What is the standard deviation of their height?

iii) Determine the number of arrangements of letters of the word ALGORITHM if
a) Vowels are always together
b) O is the first and T is the last letter.

B) Attempt Any Two : 8

i) Find graphical solution of the following system of linear in equations

$3x + 2y \leq 24$

$3x + y \geq 15$

$x \geq 14$

ii) A problem in statistics is given to three students A,B and C .Their chances of solving the problem are $1/3$, $1/4$ and $1/5$ respectively. If all of them try independently, what is the probability that
a) problem is solved?
b) problem is not solved?

iii) Heena Enterprise sold cosmetics worth Rs.25000 to Leena traders, a retailer. Leena Trader sold it further to Meena Beauty products for Rs.30000. Meena beauty product sold it further to the customers for Rs.40000. Rate of GST is 18%.
Find a) GST payable by each party b) CGST and SGST

Q.6 A) Attempt Any Two : **6**

i) Two cards are drawn from a pack of 52 cards. Find probability that
a) Both are black b) Both are ace cards

ii) Mr.Rajesh has Rs.1800/- to spend on fruits for a meeting. Grapes cost Rs.150/- per kg and peaches cost Rs.200/- per kg. Formulate and solve it. graphically .

iii) A batsman scored 92 runs which includes 4 boundaries 5 sixes. He scored other runs buy running between the wickets. What percent of his total score did he make by running between the wicket?

B) Attempt Any One : **8**

i) For a distribution, Bowley's coefficient of skewness is 0.6.Find upper and lower quartiles, if sum of upper and lower quartiles is 100 and Median is 38.

ii) Find r if $^{11}C_4 + {}^{11}C_5 + {}^{12}C_6 + {}^{12}C_6 + {}^{13}C_7 = {}^{14}C_r$

C) Attempt Any One of the following activity : **4**

i) A sample of boys and girls were asked to choose one colour from three options – pink , blue and orange to paint their room, calculate χ^2 statistic.

	Pink	Blue	Orange	Total
Boys	27	63	10	---
Girls	41	45	14	---
Total	---	---	---	---

Expected frequencies

$E_{11} = \frac{100 \times 68}{200} = \square$, $E_{12} = \frac{100 \times \square}{\square} = 54$

$E_{13} = \frac{\square \times \square}{200} = 12$, $E_{21} = \frac{100 \times 68}{200} = \square$

$E_{22} = \frac{\square \times \square}{200} = \square$, $E_{23} = \frac{\square \times \square}{200} = \square$

$$\chi^2 = \sum \left[\frac{(Oij - Eij)^2}{Eij} \right]$$

$$= \frac{(27-34)^2}{34} + \square + \square + \frac{(41-34)^2}{34} + \square + \square$$

$$= \square$$

ii) A sample of 5 items is taken from the production of a firm. Length and weight of 5 items are given below: Calculate correlation coefficient ($\sqrt{6} = 2.45$, $\sqrt{6.8} = 2.61$)

Solution:

Length in cm	Weight in gm	x^2	y^2	xy
3	9			
4	11			
6	14			
7	15			
10	16			
Total				

$n =$ _____ $\sum xy =$ _____

$\sum x =$ _____ $\sum y =$ _____

$\sum x^2 =$ _____ $\sum y^2 =$ _____

$\bar{x} =$ _____ $\bar{y} =$ _____

∴ Karl Pearson's coefficient of correlation

$$= \frac{\frac{1}{n}\sum xy - \bar{x}\,\bar{y}}{\sqrt{\frac{1}{n}\sum x^2 - \bar{X}^2}\ \sqrt{\frac{1}{n}\sum y^2 - \bar{Y}^2}}$$

= _____

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