J.K. SHAH CLASSES

MATHEMATICS & STATISTICS

FYJC FINAL EXAM - 01

DURATION - 2 1/2 HR MARKS - 80

SECTION - I

Q1. Attempt ANY **SIX OF** THE FOLLOWING (12)

01. Using determinants show that the following set of points are collinear

A(3,1) ; B(4,2) ; C(5, 3)

02. **Evaluate :** $\lim_{x \to 0} \frac{\log (1 + 6x)}{2x}$

03. find the range of the given function : $f(x) = 9 - 2x^2 \; ; \; -5 \leq x \leq 3$

04. Find $\frac{dy}{dx}$ if $y = (x^2 + 4).(6x - 2)$

05. Find centre and radius of the circle : $2x^2 + 2y^2 - 2x - 8y - 13 = 0$

06. Evaluate $\lim_{x \to -2} \frac{x^7 + 128}{x^3 + 8}$

07. Find the length of latus rectum and equation of directrices of the ellipse

$9x^2 + 8y^2 = 72$

08. Prove : $\sin^2\left(\frac{\pi}{4} - x\right) + \sin^2\left(\frac{\pi}{4} + x\right) = 1$

Q2. **(A)** Attempt ANY **TWO OF** THE FOLLOWING (06)

01. Prove : $\sqrt{2 + \sqrt{2 + \sqrt{2 + 2\cos 8\theta}}} = 2 \cos \theta$

02. Prove $\frac{\sin A + \sin 5A + \sin 9A}{\cos A + \cos 5A + \cos 9A} = \tan 5A$

03. Prove $\cot^{-1}\left[8\right] + \cot^{-1}\left(\frac{9}{7}\right) = \frac{\pi}{4}$

Q2. (B) Attempt ANY **TWO OF** THE FOLLOWING (08)

01. Find the coordinates of focus , equation of directrix , length of latus rectum and coordinates of ends of latus rectum of the parabola : $7x^2 + 16y = 0$

02. Find equation of circle having center at (1,4) and which cuts off a chord of length 6 units on the line $3x + 4y + 1 = 0$

03. Find equation of hyperbola passing through the point $(-5,3)$ and having eccentricity $\sqrt{2}$

Q3. (A) Attempt ANY **TWO OF** THE FOLLOWING (06)

01. $2x - y + 3z = 9$, $x + y + z = 6$, $x - y + z = 2$

Solve Using Cramer's Rule

02. $f(x) = 7x - 5$. find x satisfying $f(4x + 1) = f(3x - 2)$

03. $y = \dfrac{x^2 + 3}{x\log x}$. Find $\dfrac{dy}{dx}$

Q3. (B) Attempt ANY **TWO OF** THE FOLLOWING (08)

01. Evaluate : $\lim\limits_{x \to 0} \dfrac{(2^{\sin x} - 1)^3}{x.\tan x.\log(1+x)}$

02. the total cost of 't' toy cars is given by $C = 5(2^t) + 17$. Find the marginal cost and average cost at $t = 3$

03. $y = \dfrac{\sec^3 x}{e^{4x}.(1+x)^5}$. Find dy/dx

SECTION - II

Q4. Attempt ANY **SIX OF** THE FOLLOWING (12)

01. 500 students appeared for an examination of whom 275 were boys . Out of 350 successful students , 150 were boys . Find number of unsuccessful girls

02. The cost of living Index number for the years 1996 and 1999 are 140 and 200 respectively . A person earns Rs 11,200 per month in the year 1996 . What should be his earnings per month in the year 1999 , so as to maintain his former (i.e. of the year 1996) standard of living

03.

Commodity	P	Q	R	S	T
Base year price	12	28	x	26	24
Current year price	38	41	25	36	40

Find x if the Price Index Number by Simple Aggregate Method is 180

04. ${}^{n}P_3 : {}^{n-1}P_3 = 5 : 4$. Find n

05. A bag contains 10 white balls and 15 black balls . two balls are drawn in succession with replacement . What is the probability that first is white and second is black

06. Compute 5 yearly moving average values for the following data

Year	1997	1998	1999	2000	2001	2002	2003	2004
Sales(lacs)	2	4	6	8	13	12	14	11

07. Find number of diagonals that can be formed in a 12 sided polygon

08. mean of 10 items is 50 and standard deviation is 14 . Find sum of squares of all the items

Q5. (A) Attempt ANY **TWO OF** THE FOLLOWING (06)

01. a bag contains 3 red & 2 white balls . A second bag contains 2 red & 4 white balls . One ball is selected at random from the first bag and transferred to the second bag . Then a ball is drawn at random from the second bag . Find probability that it is red ball

02. Find the number of ways in which the letters of the word 'FATHER' can be arranged . How many of these arrangements

a) begin with A and end with R b) consonants occupy even places

03. if $\Sigma p_0q_0 = 700$, $\Sigma p_0q_1 = 900$, $\Sigma p_1q_0 = 1070$ & P01(M-E) = 140 . Find P01(P)

Q5. (B) Attempt ANY **TWO OF** THE FOLLOWING (08)

01. Find cost of living index number

Commodity	Weight	Price	
		Base Year	Current Year
A	20	200	320
B	14	400	420
C	15	100	120
D	18	40	60
E	10	20	28

02.

	Not attacked	Attacked	
Inoculated	431	5	(Use Yules Coefficient of Association)
Not inoculated	291	9	

Examine the effect of inoculation in controlling hepatitis

03. The probability that a person stopping at a petrol pump will ask for petrol is 0.80 , the probability that he will ask for water is 0.70 and the probability that he will ask for both is 0.65. Find the probability that he will ask for

a) only water b) neither petrol nor water

Q6. (A) Attempt ANY **TWO OF** THE FOLLOWING (06)

01. The staff of a bank consists of Manager , the deputy manager and 10 other officers . A committee of 4 is to formed amongst them . Find the number of ways this can be done so as to include a) manager b) manager but not the deputy manager
c) neither the manager nor the deputy manager

02. Find number of straight lines obtained by joining 10 points on a plane if 4 of which are collinear . Also find the number of triangles formed if 3 of them are collinear

03. Find the value of : $^{47}C_4 + \sum_{r=1}^{5} {}^{(52-r)}C_3$

Q5. (B) Attempt ANY **TWO OF** THE FOLLOWING (08)

01. Obtain trend line by method of least squares

Year	1977	1978	1979	1980	1981
No. of boxes (000)	20	19	21	24	25

02. Calculate Dorbish Bowley's Price Index number

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
A	8	20	11	5
B	7	10	12	10
C	3	30	5	20
D	2	50	4	15

03. 2 integers are selected at random from integers 1 to 11 . if the sum of the integers is even , find the probability that both the numbers are odd