J.K. SHAH CLASSES

MATHEMATICS & STATISTICS

FYJC FINAL EXAM - 03

DURATION - 2 1/2 HR MARKS - 80

SECTION - I

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

01. Differentiate $\left(\sqrt{x} + \frac{1}{\sqrt{x}}\right)^2$ wrt x

02. find equation of directrix and the end points of the latus rectum of parabola

$$x^2 + 12y = 0$$

03. find the equation of the hyperbola whose vertices are (±2,0) and the foci are (±3,0)

04. $\lim_{x \to 0} \left(\frac{7 + 4x}{7 - 5x}\right)^{\frac{1}{x}}$

06. Evaluate $\lim_{x \to 0} \frac{\log(2 + x) - \log 2}{x}$

06. find $\frac{dy}{dx}$ if $y = \sqrt{x} \cdot \cot x$

07. **Evaluate :** $\lim_{x \to 3} (x - 2)^{\frac{1}{x-3}}$

08. **Prove :** $\sin^2\left(\frac{\pi}{8}\right) + \sin^2\left(\frac{3\pi}{8}\right) = 1$

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

01. Prove : $\frac{\sin 5A.\sin 11A - \sin 7A \sin 9A}{\sin 5A.\cos 11A - \sin 7A.\cos 9A} = \tan 4A$

02. Prove : $\cos^{-1}(4x^3 - 3x) = 3\cos^{-1}x$

03. Prove : $\sin A \cdot \tan\frac{A}{2} + 2\cos A = \frac{2}{1 + \tan^2\frac{A}{2}}$

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

01. Find equation of circle with center (3 ,–2) and which cuts off a chord of length 6 on line $4x - 3y + 2 = 0$

02. Find the eccentricity , co-ordinates of foci , Equation of directrices and the length of latus rectum of the ellipse $2x^2 + 5y^2 = 10$

03. Find the inverse and the range of the function : $g(x) = 3 - 5x \; ; \; -1 \leq x \leq 3$

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

01. if $f(x) = \frac{x - 4}{4x - 1}$; then show that $fof(x) = x$

02. Solve the following equations using Cramer's Rule : $x + y = 3$, $y + z = 5$, $x + z = 4$

03. $y = \frac{x^3 - \sin x}{\cos x}$. Find $\frac{dy}{dx}$

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

01. Evaluate : $\lim_{x \to 0} \frac{2 \sin x^o - \sin 2x^o}{x^3}$

02. the demand function is given as $P = 175 + 9D + 25D^2$
Find the total revenue , average revenue and marginal revenue when demand is 10

03. $y = \frac{\sin \sqrt{x^2 + 2} + \log (xe^x)}{5^{x \tan x}}$. Find dy/dx

SECTION - II

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

01. Check the consistency of the following data
(AB) = 200 , N = 1000 , (A) = 150 , (B) = 300

02. how many four digits numbers greater than 4000 can be formed using the digits 2 , 3, 4 , 5 , 6 , 7 if no repetitions of digits are allowed

03. Find the missing frequencies . Given $(\alpha B) = 500$, $(B) = 600$, $(\alpha) = 800$, $(\beta) = 1000$

04. find the no of sides of a polygon which has 54 diagonals

05. For the following data calculate the Price Index Number using Simple Aggregate method

Commodity	P	Q	R	S	T
p_0(1995)	10	25	14	20	30
p_1(2000)	32	40	20	45	70

06. Find Cost of Living index number

	Food	Rent	Clothing	Fuel &Light	Misc
I	410	150	343	248	285
W	45	15	12	8	20

07. two unbiased dice are rolled . Find the probability that the sum of numbers on the upper most faces is a perfect square or a number less than 5

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

Year	1989	1990	1991	1992	1993	1994	1995	1996
Profit(000's)	53	79	76	66	69	94	88	98

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

01. If A and B are independent events such that P(A) = 2/5 and P(B) = 1/3 , find

(i) $P(A \cap B)$ **(ii)** $P(A \cup B)$ **(iii)** $P(A' \cap B')$

02. 10 identical components four of which are defective , 2 components are drawn in succession without replacement Find the probability of

a) both the components are defective b) atleast one of them is non defective

03. Obtain the trend value using 4 – yearly moving average

Year	2004	2005	2006	2007	2008	2009	2010
IMR	114	97	80	74	68	58	49

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

01. Calculate Dorbish & Bowley's Price Index number

Commodity	Base Year		Current Year	
	Price	Quantity	Price	Quantity
P	22	10	25	30
Q	34	12	35	40
R	28	15	25	25
S	26	14	25	10
T	30	11	35	10

02. How many 5 digit numbers can be formed with digits 0 , 2 , 3 , 4 , 6 , 7 , 8 , 9 if repetitions of the digit is not allowed . How many of these are odd . How many of these are even

03. In an anti – typhoid campaign in a certain area , chloromycin was administered to 900 person out of a total population of 4500 . The number of typhoid cases is given below

	Typhoid	No typhoid	
Chloromycin	35	850	
No Chloromycin	365	3250	Is Chloromycin effective in preventing typhoid

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

01. Compute the standard deviation for the following data

marks more than	0	10	20	30	40	50
no of students	50	46	40	20	10	3

02. a boy has 3 library tickets and 6 books of his interest in the library . Of these 6 books , he does not want to borrow Math II , unless Math I is borrowed . In how many ways can he choose three books to be borrowed .

03. ${}^{2n}C_3 : {}^{n}C_2 = 52 : 3$. Find n

Q6. (B) Attempt ANY **TWO OF** THE FOLLOWING (08)

01. two fair dice are thrown . Find the probability that sum of points is 9 given that its exceeds 8

02. Fit a trend line by least square method for the following data which represents production in thousand units of a small scale industry

Year :	1980	1981	1982	1983	1984
Prod^n :	12	15	18	17	16

03. Find Laspeyre's & Paasche's weighted Price Index numbers

Commodity	Base Year		Current Year	
	Price p_o	Quantity q_o	Price p_1	Quantity q_1 .
I	10	12	40	3
II	20	2	25	8
III	30	3	50	27
IV	60	9	90	36