

J.K. SHAH CLASSES

MATHEMATICS & STATISTICS

FYJC FINAL EXAM - 04

DURATION - 2 1/2 HR

MARKS - 80

SECTION - I

Q1. Attempt ANY SIX OF THE FOLLOWING

(12)

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

02. Evaluate : $\lim_{x \rightarrow 0} \frac{\cos x - \cos^2 x}{x^2}$

03. find centre and the radius of the circle $3x^2 + 3y^2 - 18x + 6y + 7 = 0$

04. Evaluate : $\lim_{x \rightarrow 1/4} \frac{4x - 1}{2\sqrt{x} - 1}$

05. Find the length of latus rectum and equation of directrices of the ellipse $3x^2 + 4y^2 = 1$

06. Find equation of ellipse referred to its principal axes , foci $(\pm 4, 0)$ and eccentricity = $1/3$

07. find $\frac{dy}{dx}$ if $y = x^5 \cdot 5^x$

08. Prove : $\cot^{-1}(3) + \cot^{-1}\left(\frac{3}{4}\right) = \cot^{-1}\left(\frac{1}{3}\right)$

Q2. (A) Attempt ANY TWO OF THE FOLLOWING

(06)

01. Prove : $\tan 100 - \tan 65 - \tan 35 = \tan 100 \cdot \tan 65 \cdot \tan 35$

02. Prove : $\tan^{-1} \sqrt{\frac{1-x}{1+x}} = \frac{1}{2} \cos^{-1} x$

03. Prove : $\frac{\cos 3A - 2\cos 5A + \cos 7A}{\cos A - 2\cos 3A + \cos 5A} = \cos 2A - \sin 2A \cdot \tan 3A$

Q2. (B) Attempt ANY TWO OF THE FOLLOWING

(08)

01. find circle concentric with $x^2 + y^2 - 6x + 60 = 0$ and having circumference 4π

02. find focal distance of point P on the parabola $5y^2 = 12x$ if the abscissa of P is 7

03. find the equation of the ellipse referred to its principal axis given that $e = \sqrt{3}/2$ and passing through $(6,-4)$

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

01. $f(x) = x^2 + 3x + 1$, $g(x) = x - 2$. Find $f \circ g^{-1}$

02. Solve the following equations using Cramer's Rule

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

03. Find equation of hyperbola whose foci are $(0, \pm 12)$ and the length of latus rectum is 36

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

01. Evaluate : $\lim_{x \rightarrow 0} \frac{\log(4+x) - \log(4-x)}{\sin x}$

02. the total cost of x pencils is given by $c = 15 + 28x - x^2$. Find x when marginal cost is 20 . Find the average cost at this value of x

03. $y = \sin^3 3x \cdot e^{\sqrt{x}} + \log \frac{x+1}{\sqrt{x^2+1}}$. Find dy/dx

SECTION - II

Q4. Attempt ANY SIX OF THE FOLLOWING (12)

01. in a sociological study of 500 persons , 300 wives married . 250 were successful executives , 198 successful executives were married . Is the data consistent

02. if $\sum p_{00}q_0 = 120$, $\sum p_{01}q_1 = 200$, $\sum p_{11}q_1 = 300$ and $P_{01}(L) = 150$. Find $P_{01}(M-E)$

03. let A and B be two events such that $P(A) = 0.3$. $P(A \cup B) = 0.8$. If A and B are independent events , then find $P(B)$

04. ${}^{12}C_5 + 2 \cdot {}^{12}C_4 + {}^{12}C_3 = {}^{14}C_x$

05. the index number for the year 2004 taking 2002 as base year was found to be 120 . Find the missing details if $\sum p_0 = 320$

Commodity	A	B	C	D	E	F
$P_0(2002)$	40	60	20	x	50	110
$P_1(2004)$	50	70	30	85	y	115

06. for the following data , find the value of x if the Laspeyre's price index number is equal to Paasche's price index number

Commodity	1960		1965	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1
A	3	x	2	5
B	4	6	3	5

07. two unbiased dice are rolled . Find the probability that the sum of numbers on the upper most faces is divisible by 2 or 4

08. Obtain the trend value using 3 – yearly moving average

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

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

01. $(AB) = 128 ; (\alpha B) = 384 ; (A\beta) = 24 ; (\alpha\beta) = 72$. Examine whether attributes A and B are independent or not

02. Two students appear for an examination , their chances of passing the examination being 0.7 and 0.8 respectively . Find the probability that only one of them passes the examination

03. Obtain the trend component of the following time series of production using 4 – yearly moving average

Year	1971	1972	1973	1974	1975	1976	1977	1978	1979	1980
Production	12	15	18	17	16	20	23	22	24	25

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

- 01 . Find Walsch's Price Index number

Commodity	Base Year		Current Year	
	Price p_0	Quantity q_0	Price p_1	Quantity q_1
A	10	12	40	3
B	20	2	25	8
C	30	3	50	27
D	60	9	90	36

02. How many 5 digit numbers can be formed using digits 0,1,2,3,4,5 which are divisible by 3 without repeating the digits

03. In an anti – malarial campaign in a certain area , quinine was administered to 812 person out of a total population of 2436 . The number of fever cases is given below

	Fever	No Fever	Total	Discover the usefulness of quinine in checking malaria (Use Yule's coefficient of association)
Quinine	20	792	812	
No Quinine	220	2216	2436	

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

01. CI : 0 – 10 10 – 20 20 – 30 30 – 40 40 – 50

f : 11 15 25 12 7 Calculate SD

02. In how many ways can a committee of 3 ladies and 4 gents be chosen from 8 ladies and 7 gents . What is the number of ways if Miss X refuses if Mr Y is a member
03. If there are 12 points in a plane out of which 'p' points are collinear , find the value of 'p' for which 185 triangles can be obtained by joining these 12 points

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

01. there are two urns A and B . A contains 3 white & 5 red balls . B contains 2 white & 4 red balls . One urn is selected at random & a ball is drawn from it at random . Find the probability that the ball drawn is white

02. fit a trend line using method of least squares . Also obtain trend value for the year 2006

Year :	2000	2001	2002	2003	2004	2005
Sales(000)	105	118	125	130	150	172

03. Find the Cost of living Index number using FAMILY BUDGET METHOD
Also obtain expenditure of a person in the year 2008 if his expenditure in the year 2007 was Rs 10,000

Group	Price (2007)	Price (2008)	Weight
Food	12	60	25
Clothing	10	45	20
Fuel & Light	20	35	15
House Rent	25	20	30
Miscellaneous	16	48	10