J.K. SHAH CLASSES

MATHEMATICS & STATISTICS

FYJC FINAL EXAM - 02

DURATION - 3 HR MARKS - 80

SECTION - I

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

01. Differentiate the following function with respect to x

$$9x^2 - 2\sqrt{x} + 4\log x - 7^x + 25$$

02. Find k if the area of the triangle whose vertices are A (4 , k) ; B (–5 , –7); C(–4 , 1) is 38 sq. units

03. find equation of circle with radius 5 and concentric with circle $x^2 + y^2 + 4x - 6y = 0$

04. **Evaluate** $\lim_{x \to -4} \dfrac{x^2 + 3x - 4}{x^2 + 9x + 20}$

05. $\tan^{-1}\left(\dfrac{3}{5}\right) + \tan^{-1}\left(\dfrac{1}{4}\right) = \dfrac{\pi}{4}$

06. Find equation of parabola having focus at (3,0) and directrix $x + 3 = 0$

07. Find $\dfrac{dy}{dx}$ if $y = (4x^2 - 7x + 5) \cdot \sec x$

08. Evaluate : $\tan(-495^\circ)$

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

01. Prove $\sqrt{\dfrac{1 + \sin\theta}{1 - \sin\theta}} = \tan\left(\dfrac{\pi}{4} + \dfrac{\theta}{2}\right)$

02. Prove : $\tan^{-1}\left(\dfrac{1}{2}\right) + \tan^{-1}\left(\dfrac{1}{5}\right) + \tan^{-1}\left(\dfrac{1}{8}\right) = \dfrac{\pi}{4}$

03. Prove : $\sin(\theta - {}^{\pi}/_{6}) + \cos(\theta - {}^{\pi}/_{3}) = \sqrt{3} \cdot \sin\theta$

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

01. Find equation of hyperbola in the standard form whose eccentricity = $\sqrt{2}$ & distance between foci = $8\sqrt{2}$

02. Find eccentricity , coordinates of foci , equation of directrices , length of major and minor axes and length of latus rectum for $\mathbf{3x^2 + 4y^2 = 1}$

03. find equ. of circle concentric with $x^2 + y^2 - 2x - 6y - 7 = 0$ and area 616 sq. units

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

01. if $f(x) = \frac{x + 1}{x - 1}$ and $g(x) = \frac{2x + 3}{3x - 2}$, find fog

02. Solve using Cramer's Rule : $x - y + z = 4$, $2x + y - 3z = 0$, $x + y + z = 2$

03. $y = \frac{2 + 3.\cos x}{3 + 2.\cos x}$. Find dy/dx

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

01. Evaluate : $\lim_{x \to 0} \frac{e^x + e^{-x} - 2}{\cos 3x - \cos 5x}$

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

03. $y = \log(\sin e^x) + \sqrt{5 + x^6} \cdot \sec x$. Find dy/dx

SECTION - II

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

01. Find 'x' if Price Index Numbers by Simple Aggregate method is 180

Base year price	12	28	x	26	24
Current year price	38	41	25	36	40

02. 300 students appeared for oral and written test . 180 passed both the test . 90 students failed in both the test . 60 passed in oral but failed in written . Is the data consitent

03. Find n if ${}^{n}P_5 = 42\,{}^{n}P_3$

04. Check the type of association between attributes A and B where
N = 500 ; (A) = 325 ; (B) = 310 ; (AB) = 160

05. Obtain the 3 yearly moving averages for the following data relating to the production of tea in India

Year	:	1941	1942	1943	1944	1945	1946	1947	1948
Production	:	464	515	518	467	502	540	557	571

06. a card is drawn from a pack of 52 cards . What is the probability that it is a face card , given that it is a red card

07. In how many ways letters of the word "STORY" be arranged so that
a) T and Y are always together b) T is always next to Y

08. 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

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

01. a problem is given to three students A ,B , C whose chances of solving it are 1/2 , 1/3 & 1/4 respectively . Find the probability that the problem will be solved

02. if $P(A) = 1/4$; $P(B) = 2/5$; $P(A \cup B) = 1/2$, then find
a) $P(A \cap B)$ b) $P(A \cap B')$ c) $P(A' \cap B)$

03. Two adults and three children are sitting on a sofa and watching TV . Find the probability that the adults are sitting together

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

01. Find the cost of Living Index number taking 2001 as base year

Group	Price (2001)	Price (2006)	Weight
A	15	36	60
B	48	96	5
C	30	90	10
D	60	180	15
E	45	90	10

02. Find Yule's coefficient of association between literacy and unemployment from the following observation . " total adult males 200 , literate males 40 , employed males 188 , literate employed males 36"

03. 100 students appeared for two examinations , 60 passed in first examination , 50 passed the second and 30 passed in both. Find the probability that a student selected at random

a) passed in at least one examination b) passed in exactly one examination

c) failed in both the examination

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

01. There are 4 professors and 6 students . In how many ways a committee of 4 can be formed so as to include at least 2 professors

02. Out of 4 officers and 10 clerks in an office , a committee consisting of 2 officers and 3 clerks is to be formed . In how many ways can this be done if one particular clerk must be on the committee

03. ${}^{n}C_{6} : {}^{n-3}C_{3} = 33 : 4$ *, find n*

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

01. Calculate Fisher'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 Obtain trend line by method of least squares

Year	1959	1960	1961	1962	1963
% insured	11.3	13	9.7	10.6	10.7

03. Without repetition of digits , 4 digit numbers are formed using digits 5 , 6 , 7 , 8 , 9 , 0 . Find the probability that the number formed is ODD and greater than 6000