

# 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**  $\lim_{x \rightarrow -4} \frac{x^2 + 3x - 4}{x^2 + 9x + 20}$

05.  $\tan^{-1} \left[ \frac{3}{5} \right] + \tan^{-1} \left[ \frac{1}{4} \right] = \frac{\pi}{4}$

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

07. Find  $\frac{dy}{dx}$  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  $\sqrt{\frac{1 + \sin \theta}{1 - \sin \theta}} = \tan \left( \frac{\pi}{4} + \frac{\theta}{2} \right)$

02. Prove :  $\tan^{-1} \left[ \frac{1}{2} \right] + \tan^{-1} \left[ \frac{1}{5} \right] + \tan^{-1} \left[ \frac{1}{8} \right] = \frac{\pi}{4}$

03. Prove :  $\sin \left( \theta - \frac{\pi}{6} \right) + \cos \left( \theta - \frac{\pi}{3} \right) = \sqrt{3} \cdot \sin \theta$

**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  $3x^2 + 4y^2 = 1$
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 :  $\lim_{x \rightarrow 0} \frac{e^x + e^{-x} - 2}{\cos 3x - \cos 5x}$
02. the demand function is given as  $P = 175 + 9D + 25D^2$   
Find the total revenue and marginal revenue when demand is 10
03.  $y = \log (\sin^x) + \sqrt{5 + x^6} . \sec x$  . 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 consistent

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