

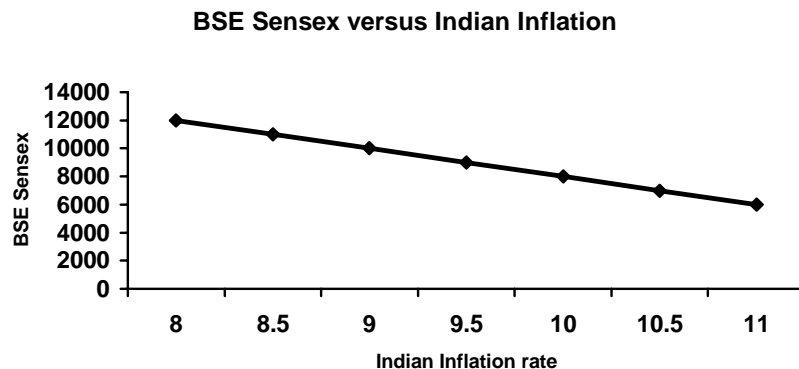
JMET – 2008

Question Paper Code – C

SECTION – 3
QUANTITATIVE ABILITY (Questions 61 – 90)

Direction: Question 61 is based on the following graph:

An investment consultant has plotted the graph between BSE Sensex and Indian inflation rate as below to better understand their relationship.



61. What is the coefficient of correlation between BSE Sensex and the Indian inflation rate?
 (A) – 1000 (B) – 0.05 **(C) – 1** (D) – 2000

Direction: Question 62 and 63 are based on the following information:

The marketing team of a FMCG firm can sell Y units of shampoo packets at a price of Rs. $\left(10 - \frac{Y}{100}\right)$ each.

The total cost of producing Y shampoo packets is Rs $\frac{Y}{10}$. The firm incurs an additional fixed costs.

62. Find the number of shampoo packets that the firm should sell to maximize its profits?
(A) 495 (B) 595 (C) 450 (D) 550
63. If the fixed cost of production and distribution increases from Rs. 100 to Rs. 200, the optimal number of the shampoo packets to be sold will
 (A) increase (B) decrease **(C) not change** (D) cannot say
64. An artist has completed one fourth of a rectangular oil painting. When he will paint another 100 square centimeters of the painting, he would complete three quarters of the painting. If the height of the oil painting is 10 centimeters, determine the length (in centimeters) of the oil painting.
 (A) 15 **(B) 20** (C) 10 (D) 25
65. The number of shoppers entering in a retail store in an hour is a good example of the random variable that follows:
 (A) Normal distribution (B) Binomial distribution **(C) Poisson distribution** (D) None of the above

66. An investment firm wants to invest Rs. 30,000 into two different bonds. The first bond pays 5 percent interest per year and the second bond pays 7 percent interest per year. The firm wants to earn an annual interest of Rs. 1800. Which of following equations in linear form is the correct representation of the firm's decision problem? Assume that x_1 and x_2 are the amounts to be invested in first and second bond respectively.
- (A) $\begin{pmatrix} 0.07 & 0.05 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1800 \\ 30000 \end{pmatrix}$ (B) $\begin{pmatrix} 0.05 & 1 \\ 1 & 0.07 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1800 \\ 30000 \end{pmatrix}$
- (C) $\begin{pmatrix} 0.05 & 0.07 \\ 1 & 1 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1800 \\ 30000 \end{pmatrix}$ (D) $\begin{pmatrix} 1 & 1 \\ 0.07 & 0.05 \end{pmatrix} \begin{pmatrix} x_1 \\ x_2 \end{pmatrix} = \begin{pmatrix} 1800 \\ 30000 \end{pmatrix}$
67. If 1 Japanese Yen = 0.01 US Dollars, 100 US Dollars = 5000 Indian Rupees (INR), how many Japanese Yens are 100 INR?
 (A) 20 (B) 2000 (C) 200 (D) 500
68. The annual depreciation of a vehicle using straight line depreciation method is Rs. 2000. The salvage value of the vehicle at the end of 5 years is Rs. 1000. Determine the original value of the vehicle.
 (A) Rs. 10,000 (B) Rs. 5,000 (C) Rs. 11,000 (D) Rs. 12,000
69. The firm uses the following function to calculate the production output (PO) : $PO = 5.3C^2L^{15}$, where C = capital invested and L= labor employed.
 If the capital invested (C) increases by 20 percent, the change in PO will be:
 (A) 20% decrease (B) 32% increase (C) 56% increase (D) 44% increase
70. The third term of a finite series in Arithmetic Progression is 28. The sum of the first three terms is 54. The first term of the series is:
 (A) 8 (B) 10 (C) 18 (D) 2
71. A manual process requires 10 hours for an initial set up after which it takes 1 hour/unit to product a product. To produce the same product, an automated process will take 25 hours for an initial set up after which it takes 0.5 hours/unit. If we want to produce a batch of 25 units, how many units should be produced by each process to minimize the total set up and production time?
 (A) 25 units by automated process, 0 units by manual process
 (B) 10 units by automated process, 15 units by manual process
 (C) 15 units by automated process, 10 units by manual process
 (D) 0 units by automated process, 25 units by manual process
72. Aman, Baman, and Raman jointly invested Rs. 60,000 in a small services firm. They decided to share the profits from this investment in the ratio of their investments. The firm had a very successful first year and recorded profits of Rs. 1,00,000. Aman and Baman received Rs. 40,000 and Rs. 25,000 as their respective share of the profit. The respective investments of Aman, Baman, and Raman were.
 (A) 30,000; 10,000; 20,000 (B) 21,000; 15,000; 24,000
 (C) 24,000; 15,000; 21,000 (D) 25,000; 12,000; 23,000

Directions: Questions 73 and 74 are based on the following information:

After a successful T20 cricket tournament, Indian Premier League (IPL) is interested in launching a new variant of One Day International cricket called T40 (forty overs a side game). Indian Cricket League (ICL, a rival league of IPL) also has similar thoughts. An independent agency conducted a survey of 1000 respondents to determine the consumer preference of IPL versus ICL, and preference of T20 versus T40. Unfortunately, some of the survey information is lost. Following information is available.

- (i) 70 percent of the respondents prefer T20 over T40.
 (ii) 80 percent of the respondents prefer IPL and ICL

- (iii) 80 percent of those who preferred IPL preferred T20 over T40.
73. Determine the number of respondents who prefer both T20 and ICL.
 (A) 640 (B) 60 (C) 50 (D) 140
74. Determine the number of respondents who prefer both T40 and IPL.
 (A) 160 (B) 60 (C) 640 (D) 140
75. Determine $\frac{d}{dx} (\log \sin x)$
 (A) $\tan x$ (B) $\cot x$ (C) $\sec x$ (D) $\cos x$

Direction: Question 76 is based on the following information:

The human resources department of a BPO firm encourages its employees to put in extra effort in order to improve the productivity. The department collected data on extra effort (E) put in by the employees in a particular month and the corresponding percentage increase in the productivity (O) of the employees. The data is shown below.

E	2	5	9	14	24	42	60	100	150
O	0.69	1.60	2.19	2.63	3.17	3.73	4.09	4.60	5.01

76. Suggest a mathematical function that will best fit the given data.
 (A) $O = a + bE$ $a, b \geq 0$ (B) $O = a \log E$ $a \geq 0$
 (C) $O = ae^E$ $a \geq 0$ (D) $O = \frac{a}{bE}$ $a, b \geq 0$

Direction: Questions 77 and 78 are based on the following information:

An automobile car assembly system consists of two independent subsystems: chassis assembly (C) and engine assembly (E). Based on the prior maintenance data, the following probabilities are available. The probability that C fails is 0.2. The probability that both C and E fail together is 0.15. The probability that E fails alone is 0.15. The event "C fails alone" implies that C fails when E is working and vice versa.

77. The probability that C fails when E has failed is
 (A) 0.5 (B) 0.2 (C) 0.3 (D) 1.0
78. The probability that the C fails alone is
 (A) 0.3 (B) 0.2 (C) 0.15 (D) 0.05
79. An oil refinery produces 200 barrels of crude oil per day. The price (Rs/barrel) of the crude oil 't' days from now can be written as $P(t) = 20 + 0.2(t)^{0.5}$. If the crude oil is sold as soon as it is produced, the total revenue R(t) earned by the refinery up to 't' days from now can be written as:
 (A) $R(t) = 4000t + (80/3)t^{1.5} + \text{constant}$ (B) $R(t) = (20 + 0.2t^{0.5})200 + \text{constant}$
 (C) $R(t) = (20 + 0.2t^{0.5})200t + \text{constant}$ (D) $R(t) = (20t^2 + 0.2t^{0.5}) 200t + \text{constant}$
80. Calculate the values of x in the following equation:

$$\frac{y^7 y^5}{y^6} = y^{\sqrt{x^2 - 5x}}$$
 (A) -4, 9 (B) 4, 9 (C) 4, 8 (D) 7, 6

81. The following probability distribution can be used to represent the waiting time of the customer in a bank (w):

$$f(w) = \frac{1}{b-a} \quad \text{for } a \leq w \leq b$$

$$= 0 \quad \text{otherwise}$$

The expected waiting time of the customer in the bank E (w) is:

- (A) $\frac{a+b}{2}$ (B) $\frac{b-a}{2}$ (C) $b-a$ (D) $\frac{w}{4}$

82. The mean monthly salary paid to graduating MBA class of 2008 of a management institute is Rs. 16,000. The mean monthly salary paid to students with work experience is Rs. 18,000. The corresponding figure for the students without any work experience is Rs. 12,000. Determine the percentage of students with work experience and percentage of students without any work experience in the class of 2008.

(A) 66.67% with work experience, 33.33% without work experience

(B) 33.33% with work experience, 66.67% without work experience

(C) 75% with work experience, 25% without work experience

(D) 25% with work experience, 75% without work experience

83. A large private airline increased the price of their air tickets by 20 percent to compensate for the increase in airport charges. Due to increasing cost of Aviation Turbine Fuel, the airline had to increase further the price of the ticket by 30 percent. By approximately what percentage the ticket prices have gone up as a result of two price hikes by the airline.

(A) 50%

(B) 56%

(C) 54%

(D) 60%

84. Determine the sum of the infinite series in Geometric Progression:

$$\frac{1}{3} - \frac{1}{9} + \frac{1}{27} - \frac{1}{81} + \dots$$

(A) 1/4

(B) infinite

(C) 2

(D) 4/3

85. In the data set {2, 5, 7, 8, X}, the arithmetic mean is same as the median Determine the value of X. Assume $X \geq 8$.

(A) 8

(B) 10

(C) 13

(D) 15

86. Historical sales data of a retail store indicate that 40 percent of all customers that enter the store make a purchase. Determine the probability that exactly two of the next three customers will make a purchase.

(A) 0.388

(B) 0.667

(C) 0.400

(D) 0.288

Directions: Questions 87 – 89 are based on the following information:

A bank is in the process of formulating a lone polity for its customers. The maximum budget available for the policy is Rs. 10,00,000. The bank earns interest on the loan amount. However, some portion of the loan amount cannot be recovered and is classified as bad debt. The type of loan, interest rates, and percentage of bad debts are provided below:

Type of Loan	Interest Rate (%)	Bad Debt (%)
Personal	15	10
Car	30	5
Home	20	8

Let x_1 , x_2 , and x_3 be the amount of loan allocated by the bank to personal, car and home loans respectively.

87. If the objective of the bank is to maximize the net return, the objective function of the bank can be written as:
- (A) Maximize $0.15(0.90)x_1 + 0.30(0.95)x_2 + 0.20(0.92)x_3 - 0.10x_1 - 0.05x_2 - 0.08x_3$
- (B) Maximize $0.15x_1 + 0.30x_2 + 0.20x_3 + 0.20x_3 - 0.10x_1 - 0.05x_2 - 0.08x_3$
- (C) Maximize $0.15(0.90)x_1 + 0.30(0.95)x_2 + 0.20(0.92)x_3$
- (D) None of the above
88. The following is one of the constraints of the bank:
- (A) $x_2 + x_2 + x_3 = 10,00,000$ (B) $x_2 + x_2 + x_3 \geq 10,00,000$
- (C) $x_2 + x_2 + x_3 \leq 10,00,000$ (D) $x_2 + x_2 + x_3 < 10,00,000$
89. Based on the data, the bank would wish to maximize the loan amount allocation to:
- (A) personal loan (B) car loan (C) home loan (D) none of the above
90. The area of a circle whose centre is at (2, 0) is π . The circle does not pass through the following point:
- (A) (2, -1) (B) (2, 1) (C) (3, 0) (D) (2, 2)