



11. If among 200 students, 105 like pizza and 134 like burger, then the number of students who like only burger can possibly be  
 a. 26                      b. 23                      c. 96                      d. 93
12. If 10% of 'a' is b% of 200, a/b=?  
 a. 20      b. 1/20      c. 10      d. 1/10
13. The population of a colony of ants increases by 20% every day. If one Monday the population is 3000. On which day of the week is it 5184?  
 a. Wednesday      b. Tuesday      c. Thursday      d. Friday
14. There are 13 numbers having an average of 9. The largest and the smallest numbers are 26 and 8.5 respectively. Find the average of the remaining numbers  
 a. 7.5      b. 8      c. 8.5      d. 7
15. The average weight of the students of two classes A and B with 20 and 30 students are 40 kg and 50 kg, respectively. Find the average weight of the students in both the classes put together?  
 a. 50 Kg      b. 55 Kg      c. 35 Kg      d. 46 Kg

**Part B**

**Economics Stream**

1. Let the Cost function be  $C = 100q^2$ , where q is the output. Then the Average cost curve is:  
 a. U-shaped                      b. Horizontal to the output axis  
 c. Downward sloping              d. Rising
2. The Utility function of the consumer is  $U = (xy)^{0.5}$ , the prices of x and y are 2 and 2 respectively. The income of the consumer is 30. What is the optimal bundle?  
 a. (10,0)                      b. (0,15)  
 c. (0,20)                      d. (7.5, 7.5)
3. What happens to the equilibrium output in the market if the unit cost of production increases? Assume that there is only one firm in the market.  
 a. Decrease                      b. Decrease and it may be zero also  
 c. Constant                      d. Increase
4. Cross price elasticity of demand is:  
 a. negative for complementary goods                      b. unitary for inferior goods  
 c. negative for substitute goods                      d. positive for inferior goods
5. Determine the Pure strategy Nash-Equilibrium from the following game:

		Player B	
		U	V
Player A	X	1, 2	5, 0
	Y	3, 4	6, 8



**Part B**

**Mathematics-Statistics Stream**

1. Which of the following polynomials leaves a remainder when divided by  $x+2$ ?
  - a.  $r(x) = (x+2)^{12}$
  - b.  $p(x) = x^2 - 4$
  - c.  $s(x) = x^4 + 3x^2 + 1$
  - d.  $q(x) = -x^3 + 8x^2 + 3x - 34$
  
2. The characteristic roots of the matrix  $A = \begin{pmatrix} 6 & 6 \\ 6 & -3 \end{pmatrix}$  are:
  - a. Both positive
  - b. Both negative
  - c. One positive and one negative
  - d. None of the above
  
3. At compound interest if a certain sum of money doubles in  $n$  years then the amount will be four fold in
  - a.  $2n^2$  years
  - b.  $n^2$  years
  - c.  $4n$  years
  - d.  $2n$  years
  
4. If  $f(x) = x^3 - x + 3$  and  $g(x) = 3$ , then  $f(g(x)) - g(f(x))$  is equal to:
  - a. 24
  - b. 0
  - c. -24
  - d. 3
  
5. Let  $f(x) = 2x^6 - x^4$ . If  $n$  is the number of stationary points and  $m$  is the number of inflection points, then:
  - a.  $n+m = 6$
  - b.  $n+m = 5$
  - c.  $n+m = 2$
  - d.  $n+m = 4$
  
6. The function,  $y = -2x_1^2 + 4x_1x_2 - 5x_2^2 + 2x_2x_3 - 3x_3^2 + 2x_1x_3$  is:
  - a. Positive definite
  - b. Negative semi-definite
  - c. Negative definite
  - d. Positive semi-definite
  
7. If  $f(x, y) = x^2 + y^2 - 4$ . What are the level curves  $f(x, y) = k$ ?
  - a. Hyperbolas for  $k < -4$
  - b. Parabolas
  - c. Straight lines
  - d. Circles for  $k > -4$
  
8. The integral  $\int \frac{dx}{x\sqrt{1-x^3}}$  is equal to
  - a.  $\frac{1}{3} \log \left| \frac{\sqrt{1-x^2} + 1}{\sqrt{1-x^2} - 1} \right| + C$
  - b.  $\frac{1}{3} \log \left| \frac{\sqrt{1-x^3} - 1}{\sqrt{1-x^3} + 1} \right| + C$
  - c.  $\frac{2}{3} \log \left| \frac{1}{\sqrt{1-x^3}} \right| + C$
  - d.  $\frac{1}{3} \log |1-x^3| + C$
  
9. Suppose that  $X$  is a random variable for which the MGF is as follows:  
 $\psi(t) = e^{b^2t^2/2+at}$  for  $-\infty < t < \infty$ . Find the mean and the variance of  $X$ .
  - a.  $a$  and  $b^2$
  - b.  $a$  and  $b$
  - c.  $2a$  and  $b$
  - d.  $a^2$  and  $b$
  
10. If 2 balls are drawn one after another from a bag containing 3 whites and 5 black balls, what is the probability that
  - (i) The first ball is white and 2<sup>nd</sup> is black?

(ii) One ball is white and the other is black?

- a. 15/56; 30/56      b. 8/56; 15/56      c. 15/56; 15/56      d. none of these

11. Let  $X$  be a continuous random variable with PDF:  $f(x) = ax, 0 \leq x \leq 1$   
 $= a, 1 \leq x \leq 2$   
 $= -ax + 3a, 2 \leq x \leq 3$   
 $= 0, \text{ o.w.}$

(a) Find  $a$ . (b) Compute  $P(X \leq 1.5)$

- a.  $\frac{1}{2}; \frac{1}{2}$       b.  $1; \frac{1}{2}$       c.  $\frac{1}{2}, \frac{1}{3}$       d. none of these

12.  $X$  is a continuous random variable with pdf  $f(x) = 6x(1-x), 0 \leq x \leq 1$   
Find  $b$  such that  $P(X) < b = P(X) > b$

- a.  $\frac{1}{2}$       b. 1.2      c.  $\frac{2}{3}$       d. 1

13. Which of the following statements about hypothesis testing is true?

- a. If the  $p$ -value is greater than the significance level, we fail to reject  $H_0$   
b. A Type II error is rejecting the null when it is actually true.  
c. If the alternative hypothesis is that the population mean is greater than a specified value, then the test is a two-tailed test.  
d. The significance level equals one minus the probability of a Type I error.

14. A multiple-choice test has 30 questions. There are 4 choices for each question. A student who has not studied for the test decides to answer all the questions randomly by guessing the answer to each question. Which of the following probability distributions can be used to calculate the student's chance of getting at least 20 questions right?

- a. Binomial distribution      b. Poisson distribution  
c. Exponential distribution      d. Uniform distribution

15. The mean and standard deviation of a normal distribution are 66 and 6 respectively. The approximate range within which the middle 50% of the values would lie is

- a. (62, 70)      b. (60, 72)      c. (63, 69)      d. (64, 68)

**Answers**

**Part – A**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
d	a	a	a	b	a	c	a	b	d	d	a	c	a	d

**Part – B (Economics Stream)**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
d	d	b	a	d	b	c	b	b	a	d	c	b	a	b

**Part – B (Mathematics/Statistics Stream)**

Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Q11	Q12	Q13	Q14	Q15
c	c	d	a	b	c	d	b	a	a	a	a	a	a	a