

**Semester: Level 3, Sem I**  
**Branch: DVOC (Ref. & Air Cond., Auto. Servicing, ITM, PT, SD, AMT, FP, EMS)**  
**Subject Name: Applied Mathematics-I**

Time Allowed : 2 Hrs.

MM:50

**Section A****Note: Very short answer type questions. Attempt all ten questions.****10X2=20**Q.1. The roster form of the set  $\{x : x \text{ is an integer and } -2 \leq x < 4\}$  is

(a)  $\{-2, -1, 0, 1, 2, 3, 4\}$

(b)  $\{-2, -1, 0, 1, 2, 3\}$

(c)  $\{-1, 0, 1, 2, 3\}$

(d) None of these

Q.2. If  $A = \{a, b\}$ , then the set  $A \times A$  is equal to \_\_\_\_\_.

(a)  $\{a^2, b^2\}$

(b)  $\{a^2 + b^2 + 2ab\}$

(c)  $\{a^2 + b^2 - 2ab\}$

(d) None of these

Q.3. What is the arithmetic mean of 7 and 9 ?

(a) 8

(b) 16

(c) 7

(d) None of these

Q.4. The missing term in the G.P. 2, 6, 18, \_\_\_\_, 162 is \_\_\_\_\_.

(a) 54

(b) 36

(c) 9

(d) None of these

Q.5.  $i^6 =$  \_\_\_\_\_.

(a) 1

(b) -1

(c)  $i$

(d)  $-i$

Q.6.  ${}^8C_1 =$  \_\_\_\_\_.

(a) 1

(b) 7

(c) 8

(d) 0

Q.7. The slope of the straight line which passes through the two points  $(x_1, y_1)$  and  $(x_2, y_2)$  is \_\_\_\_\_.

(a) 0

(b) 1

(c)  $\frac{y_2 + y_1}{x_2 + x_1}$

(d)  $\frac{y_2 - y_1}{x_2 - x_1}$

Q.8. If the centre of a circle is  $(h, k)$  and radius is  $r$ , then the equation of the circle is \_\_\_\_\_.

(a)  $(x - h)^2 + (y - k)^2 = r^2$

(b)  $(x + h)^2 + (y + k)^2 = r^2$

(c)  $(x - h)^2 + (y - k)^2 + r^2 = 0$

(d) none of these

Q.9. If  $M$  is the maximum value and  $m$  is the minimum value of a given data, then range of the given data is \_\_\_\_\_.

(a)  $M + m$

(b)  $M - m$

(c) Both of these

(d) None of these

Q.10. If a coin is tossed two times, then the sample space  $S$  associated with this experiment is \_\_\_\_\_. ( $H$  represents Head and  $T$  represents Tail)

(a)  $\{H, T\}$

(b)  $\{H, H\}$

(c)  $\{H, H\}$

(d)  $\{HH, HT, TH, TT\}$

### Section B

**Note: Short answer type questions. Attempt any four questions out of eight questions.**  
**4X5=20**

Q.11. In a committee, 50 people speak French, 20 speak Spanish and 10 speak both Spanish and French. How many speak at least one of these two languages?

Q.12. Let  $f(x) = x^2$  and  $g(x) = 2x + 1$  be two real functions. Find

$$(f + g)(x), (f - g)(x), (fg)(x) \text{ and } \left(\frac{f}{g}\right)(x).$$

Q.13. In a G.P., the 3<sup>rd</sup> term is 24 and the 6<sup>th</sup> term is 192. Find its 9<sup>th</sup> term.

Q.14. Find the sum of the  $n$  terms of the series whose  $n^{\text{th}}$  term is  $(n + 1)^2$ .

Q.15. Using Binomial theorem to evaluate  $(96)^3$ .

Q.16. (i) Find the equation of the straight line which passes through the point  $(3, -1)$  with slope  $-6$ .

(ii) A coin is tossed and then a die is rolled only in case a head is shown on the coin. Describe the Sample Space of this experiment.

Q.17. Find the mean deviation about the mean for the following data:

4, 7, 8, 9, 10, 12, 13, 17

Q.18.  $A$  and  $B$  are events such that  $P(A) = 0.42$ ,  $P(B) = 0.48$  and  $P(A \text{ and } B) = 0.16$ . Determine the following: (i)  $P(\text{not } A)$ , (ii)  $P(\text{not } B)$  and (iii)  $P(A \text{ or } B)$ .

### Section C

**Note: Long answer type questions. Attempt any one question out of two questions.**  
**1X10=10**

Q.19. Use the principle of mathematical induction to prove that

$$1^2 + 2^2 + \dots + n^2 > \frac{n^3}{3} \text{ for all natural numbers } n, \text{ i.e. } n \in N.$$

Q.20. Find the equation of the parabola whose vertex is  $(0, 0)$ , passing through  $(5, 2)$  and symmetric with respect to  $y$ -axis.