Objective Section

Inshaallah! It is challenge that you can get A+ Marks in Annual Exam

Choose the correct answer:

1. 5.333 .... is
(a) ✔Rational (b) Irrational (c) an integer (d) a prime number

2. π is
(a) Rational (b) ✔ Irrational (c) Natural number (d) None

3. Multiplicative inverse of '0' is
(a) 0 (b) any real number (c) ✔ not defined (d) 1

4. Golden rule of fraction is that for $k \neq 0, \frac{a}{b} =$
(a) ✔$\frac{ka}{kb}$ (b) $\frac{ab}{l}$ (c) $\frac{ka}{b}$ (d) $\frac{kb}{b}$

5. The set $\{1, -1\}$ possesses closure property w.r.t
(a) $'+'$ (b) ✔ $'\times'$ (c) $'\div'$ (d) $'-'$

6. If $a < b$ then
(a) $a < b$ (b) $\frac{1}{a} < \frac{1}{b}$ (c) ✔ $\frac{1}{a} > \frac{1}{b}$ (d) $a - b > 0$

7. The multiplicative identity of complex number is
(a) (0,0) (b) (0,1) (c) ✔ (1,0) (d) (1,1)

8. The multiplicative inverse of $(4, -7)$ is:
(a) $(-\frac{4}{65}, -\frac{7}{65})$ (b) $(-\frac{4}{65}, \frac{7}{65})$ (c) $(\frac{4}{65}, -\frac{7}{65})$ (d) ✔ $(\frac{4}{65}, \frac{7}{65})$

9. $(0, 3)(0, 5) =$
(a) 15 (b) ✔ -15 (c) $-8i$ (d) $8i$

10. $(-1)^{-\frac{21}{2}} =$
(a) i (b) ✔ $-i$ (c) 1 (d) -1

11. Factorization of $3x^2 + 3y^2$ is:
(a) $(3x + 3yi)(3x - 3yi)$ (b) ✔ $3(x + iy)(x - iy)$ (c) $(x - iy)(x + iy)$ (d) None of these

12. The product of any two conjugate complex numbers is
(a) ✔Real number (b) complex number (c) zero (d) 1

13. Identity element of complex number is
(0,1) (b) (0,1) (c) (0,0) (d) ✔(1,0)

14. If z1 and z2 are complex numbers then |z1+z2| is ______
(a) $<|z_1+z_2|$ (b) ✔ $\leq|z_1|+|z_2|$ (c) $\geq |z_1+z_2|$ (d) None of these

15. The figure representing one or more complex numbers on the complex plane is called:

(a) Cartesian plane (c) Z-Plane (c) Complex plane (d) ✔Argand diagram

16. $y -$ axis represents

(a) Real numbers (b) ✔ Imaginary numbers (c) natural numbers (d)Rational numbers

17. If $z = x + iy$ then $|z| =$

(a) $x^2 + y^2$ (b) $x^2 - y^2$ (c) ✔ $\sqrt{x^2 + y^2}$ (d) $\sqrt{x^2 - y^2}$

18. $z\bar{z} =$

(a) z^2 (b) z (c) $\bar{z}$ (d) ✔ $|z|^2$

19. $(z - \bar{z})^2$ is

(a) Complex number (b) ✔ Real number (c) both (a) and (b) (d) None of these

20. i^{101} =

(a) 1 (b) -1 (c) ✔ i (d) – i

21. The set of odd numbers between 1 and 9 are

(a) {1,3,5,7} (b) {3,5,7,9} (c) {1,3,5,7,9} (d) ✔ {3,5,7}

22. The sets N and O are sets.

(a) Equal (b) ✔Equivalent (c) Not equal (d) None of these

23. Which of the following is true?

(a) $N \subset R \subset Q \subset Z$ (b) $R \subset Z \subset Q \subset N$ (c) $Z \subset N \subset Q \subset R$ (d) ✔ $N \subset Z \subset Q \subset R$

24. The empty set is a subset of

(a) Empty set (b) ✔Every set (c) Natural set (d) Whole set

25. Total number of subsets that can be formed from the set $\{x, y, z\}$ is

(a) 1 (b) ✔ 8 (c) 5 (d)2

26. A set having only one element is called

(a) Empty set (b) ✔Singleton set (c) Power set (d) Subset

27. The set of odd integers between 2 and 4 is

(a) Null set (b) Power set (c) ✔ Singleton set (d) Subset

28. A diagram which represents a set is called______

(a) ✔Venn's (b) Argand (c) Plane (d) None of these

29. $A \cup \varphi =$

(a) φ (b) U (c) ✔ A (d) $U - A$

30. $A - U =$

(a) ✔φ (b) A (c) U (d) $U - A$

31. $n(AUB) =$

(a) ✔$n(A) + n(B)$ (b) $n(A) - n(B)$ (c) $n(B) - n(A)$ (d) $n(A)n(B)$

32. If $A \subseteq B$ then $A \cup B =$

(a) A (b) ✔ B (c) A^c (d) B^c

33. If A and B are disjoint sets then :

(a) ✔ $A \cap B = \varphi$ (b) $A \cap B \neq \varphi$ (c) $A \subset B$ (d) $A - B = \varphi$

34. If $U = N$ then

(a) $E' = E, O' = O$ (b) $E' = U, O' = U$ (c) ✔ $E' = O, O' = E$ (d) None of these

35. If the intersection of two sets is the empty then sets are called

(a) ✔ Disjoint sets (b) Overlapping Sets (c) Subsets (d) Power sets

36. $(A \cup B)' =$

(a) $A' \cup B'$ (b) ✔ $A' \cap B'$ (c) $A' \cap B$ (d) $A \cup B'$

37. Take any set, say $A = \{1, 2, 3, 4, 5\}$ then $A \cup \emptyset =$

(a) ✔ A (b) $\emptyset$ (c) U (d) None of these

38. $L \cup M = L \cap M$ then L is equal to

(a) ✔ M (b) L (c) φ (d) M'

39. If $x \in L \cup M$ then

(a) $x \notin L$ or $x \notin M$ (b) $x \notin L$ or $x \in M$ (c) $x \in L$ or $x \notin M$ (d) ✔ $x \in L$ or $x \in M$

40. For the propositions p and q , $p \rightarrow (p \vee q)$ is:

(a) ✔ Tautology (b) Absurdity (c) Contingency (d) None of these

41. The symbol which is used to denote negation of a proposition is

(a) ✔ $\sim$ (b) $\rightarrow$ (c) $\wedge$ (d) $\vee$

42. Truth set of a tautology is

(a) ✔ Universal set (b) φ (c) True (d) False

43. A statement which is always falls is called

(a) Tautology (b) ✔ Absurdity (c) Contingency (d) Contra positive

44. $p \rightarrow \sim p$ is

(a) Tautology (b) ✔ Absurdity (c) Contingency (d) Contra positive

45. In a proposition if $p \rightarrow q$ then $q \rightarrow p$ is called

(a) Inverse of $p \rightarrow q$ (b) ✔ converse of $p \rightarrow q$ (c) contrapositive of $p \rightarrow q$ (d) None

46. Contra positive of $\sim p \rightarrow \sim q$ is

(a) $p \rightarrow q$ (b) ✔ $q \rightarrow p$ (c) $\sim p \rightarrow q$ (d) $\sim q \rightarrow p$

47. The symbol "∃" is called

(a) Universal quantifier (b) ✔ Existential quantifier (c) Converse (d) Inverse

48. The symbol "∀" is called

(a) ✔ Universal quantifier (b) Existential quantifier (c) Converse (d) Inverse

49. Truth set of $p \wedge q$ is

(a) ✔ $P \cap Q$ (b) $P \cup Q$ (c) $P - Q$ (d) $P + Q$

50. $P = Q$ is the truth set of

(a) $p = q$ (b) $p \to q$ (c) ✔$p \leftrightarrow q$ (d) $p \Rightarrow q$

51. Truth set of a tautology is the

(a) Power set (b) Subset (c) ✔Universal set (d) Super set

52. If $y = \sqrt{x}, x \geq 0$ is a function, then its inverse is:

(a) A line (b) a parabola (c) a point (d) ✔ not a function

53. A $(1-1)$ function is also called:

(a) ✔Injective (b) Surjective (c) Bijective (d) Inverse

54. If set A has 2 elements and B has 4 elements , then number of elements in $A \times B$ is :

(a) 6 (b) ✔ 8 (c) 16 (d) None of these

55. Inverse of a line is :

(a) ✔A line (b) a parabola (c) a point (d) not defined

56. The function $f = \{(x, y), y = x\}$ is :

(a) ✔Identity function (b) Null function (c) not a function (d) similar function

57. The range of $\{(2,1),(3,2),(4,3),(5,4),(6,5)\}$

(a) {2,3,4,5,6} (b) ✔ {1,2,3,4,5} (c) {2,1,3,2,4} (d) {1,2,3,5}

58. $O + E =$

(a) ✔O (b) E (c) W (d) C

59. The set $\{1, -1, i, -i\}$ where $i = \sqrt{-1}$ is closed w.r.t

(a) $+$ (b) ✔ $\times$ (c) $*$ (d) $\div$

60. The set $\{1, \omega, \omega^2\}$ where $i = \sqrt{-1}$ is closed w.r.t

(a) $+$ (b) ✔ $\times$ (c) $*$ (d) $\div$

61. N is closed w.r.t

(a) $+$ (b) $\times$ (c) ✔ both (a) and (b) (d) $\div$

62. Inverse and identity of a set S under binary operation $*$ is

(a) ✔Unique (b) Two (c) Three (d) Four

63. The set of natural number is not closed under binary operation

(a) $+$ (b) $\times$ (c) both (a) and (b) (d) ✔ $-$

64. The set $\{1, -1, i, -i\}$ is not closed w.r.t

(a) ✔ $+$ (b) $\times$ (c) both (a) and (b) (d) None of these

65. $(Z, .)$ is

(a) Group (b) ✔Semi-group (c) closed (d) Not closed

66. Subtraction is non-commutative and non-associative on

(a) ✔N (b) R (c) Z (d) Q

67. A semi-group having an identity is called

(a) Group (b) ✔ monoid (c) Closed (d) Not closed

68. For every $a, b \in G$, $a * b = b * a$ then G is called

(a) Group (b) Monoid (c) Closed (d) ✔ Abelian group

69. In group $(Z,+)$ inverse of 1 is

(a) 1 (b) ✔ -1 (c) 0 (d) 2

70. In group $(R-\{0\},\times)$ inverse of 3 is

(a) ✔$\frac{1}{3}$ (b) -3 (d) 0 (d) 2

71. In a group the inverse is

(a) ✔Unique (b) two (d) three (d) four

72. A rectangular array of numbers enclosed by a square brackets is called:

(a) ✔Matrix (b) Row (c) Column (d) Determinant

73. The horizontal lines of numbers in a matrix are called:

(a) Columns (b) ✔ Rows (c) Column matrix (d) Row matrix

74. The vertical lines of numbers in a matrix are called:

(a) ✔Columns (b) Rows (c) Column matrix (d) Row matrix

75. If a matrix A has m rows and n columns , then order of A is :

(a) ✔$m\times n$ (b) $n\times m$ (c) $m+n$ (d) m^n

76. $[1 \quad -1 \quad 3 \quad 4]$ is an example of

(a) ✔Row vector (b) column vector (c) Rectangular matrix (d) Square matrix

77. The matrix A is said to be real if its all entries are

(a) Rational (b) ✔ real (c) natural (d) complex

78. If a matrix A has different number of rows and columns then A is called:

(a) Row vector (b) ✔ Column vector (c) square matrix (d) Rectangular matrix

79. For the square matrix $A=[a_{ij}]_{n\times n}$ then $a_{11}, a_{22}, a_{33\ldots} a_{nn}$ are:

(a) ✔Main diagonal (b) primary diagonal (c) proceding diagonal (d) secondary diagonal

80. For a square matrix $A=[a_{ij}]$ if all $a_{ij}=0, i\neq j$ and all $a_{ij}=k(\text{non}-\text{zero})$ for $i=j$ then A is called:

(a) Diagonal matrix (b) ✔ Scalar Matrix (c) Unit matrix (d) Null matrix

81. A square matrix A is singular if

(a) ✔$|A|=0$ (b) $|A|\neq 0$ (c) $A=0$ (d) $A\neq 0$

82. If order of matrix A is $m\times n$ and order of matrix B is $n\times p$ then order of matrix AB is

(a) $m\times n$ (b) $n\times m$ (c) $n\times p$ (d) ✔ $m\times p$

83. In general matrix multiplication is not

(a) ✔Commutative (b) Associative (c) Closure (d) Distributive

84. $(A^t)^t=$

(a) A^t (b) ✔ A (c) – A (d) $(A^t)^t$

85. For any matrix A , it is always true that

(a) $A = A^t$ (b) $-A = \overline{A}$ (c) ✔ $|A| = |A^t|$ (d) $A^{-1} = \frac{1}{A}$

86. If all entries of a square matrix of order 3 is multiplied by k, then value of |kA| is equal to:

(a) $k|A|$ (b) $k^2|A|$ (c) ✔ $k^3|A|$ (d) $|A|$

87. For a non-singular matrix it is true that :

(a) $(A^{-1})^{-1} = A$ (b) $(A^t)^t = A$ (c) $\overline{\overline{A}} = A$ (d) ✔ all of these

88. For any non-singular matrices A and B it is true that:

(a) $(AB)^{-1} = B^{-1}A^{-1}$ (b) $(AB)^t = B^tA^t$ (c) $AB \neq BA$ (d) ✔ all of these

89. If a square matrix A has two identical rows or two identical columns then

(a) $A = 0$ (b) ✔ $|A| = 0$ (c) $A^t = 0$ (d) $A = 1$

90. If a matrix is in triangular form, then its determinant is product of the entries of its

(a) Lower triangular matrix (b) Upper triangular matrix (c) ✔main diagonal(d) none of these

91. If A is non-singular matrix then $A^{-1} =$

(a) ✔$\frac{1}{|A|}adjA$ (b) $-\frac{1}{|A|}adjA$ (c) $\frac{|A|}{adjA}$ (d) $\frac{1}{|A|adjA}$

92. $\begin{vmatrix} r\cos\varphi & 1 & -\sin\varphi \\ 0 & 1 & 0 \\ r\sin\varphi & 1 & \cos\varphi \end{vmatrix} =$

(a) 1 (b) 2 (c) ✔ r (d) r^2

93. $\begin{vmatrix} 1 & 2 & 3 \\ 4 & 5 & 6 \\ 7 & 8 & 9 \end{vmatrix} =$

(a) 1 (b) 2 (c) ✔ 0 (d) -1

94. $(A^{-1})^t =$

95. A^{-1} (b) $(A^{-1})^t$ (c) ✔ $(A^t)^{-1}$ (d) A^t

96. A square matrix A is skew symmetric if:

(a) $A^t = A$ (b) ✔ $A^t = -A$ (c) $(\overline{A})^t = A$ (d) $(\overline{A})^t = -A$

97. A square matrix A is Hermitian if:

(a) $A^t = A$ (b) $A^t = -A$ (c) ✔ $(\overline{A})^t = A$ (d) $(\overline{A})^t = -A$

98. A square matrix A is skew- Hermitian if:

(a) $A^t = A$ (b) $A^t = -A$ (c) $(\overline{A})^t = A$ (d) ✔ $(\overline{A})^t = -A$

99. The main diagonal elements of a skew symmetric matrix must be:

(a) 1 (b) 0 (c) any non-zero number (d) any complex number

100. The main diagonal elements of a skew hermitian matrix must be:

(a) 1 (b)✔ 0 (c) any non-zero number (d) any complex number

101. In echelon form of matrix, the first non zero entry is called:

(a) ✔Leading entry (b) first entry (c) preceding entry (d) Diagonal entry

102. A square matrix $A=[a_{ij}]$ for which $a_{ij}=0, i>j$ then A is called:

(a) ✔Upper triangular (b) Lower triangular (c) Symmetric (d) Hermitian

103. A square matrix $A=[a_{ij}]$ for which $a_{ij}=0, i<j$ then A is called:

(a) Upper triangular (b) ✔ Lower triangular (c) Symmetric (d) Hermitian

104. If A is symmetric (Skew symmetric), then A^2 must be

(a) Singular (b) non singular (c) ✔ symmetric (d) non trivial solution

105. In a homogeneous system of linear equations , the solution (0,0,0) is:

(a) ✔Trivial solution (b) non trivial solution (c) exact solution (d) anti symmetric

106. If $AX=O$ then $X=$

(a) I (b)✔ O (c) A^{-1} (d) Not possible

107. If the system of linear equations have no solution at all, then it is called a/an

(a) Consistent system (b) ✔ Inconsistent system (c) Trivial System (d) Non Trivial System

108. $bx+c=0$ will be quadratic if:

(a) $a=0, b\neq 0$ (b) ✔ $a\neq 0$ (c) $a=b=0$ (d) $b=$ any real number

109. Solution set of the equation $x^2-4x+4=0$ is:

(a) $\{2,-2\}$ (b) ✔ $\{2\}$ (c) $\{-2\}$ (d) $\{4,-4\}$

110. The quadratic formula for solving the equation $ax^2+bx+c=0; a\neq 0$ is

(a) ✔$x=\frac{-b\pm\sqrt{b^2-4ac}}{2a}$ (b) $x=\frac{-b\pm\sqrt{a^2-4ac}}{2b}$ (c) $x=\frac{-a\pm\sqrt{b^2-4ac}}{2}$ (d) None of these

111. How many techniques to solve quadratic equations.

(a) 1 (b) 2 (c) ✔ 3 (d) 4

112. The solution of a quadratic equation are called

(a) ✔Roots (b) identity (c) quadratic equation (d) solution

113. To convert $ax^{2n}+bx^n+c=0 (a\neq 0)$ into quadratic form , the correct substitution is:

(a) ✔$y=x^n$ (b) $x=y^n$ (c) $y=x^{-n}$ (d) $y=\frac{1}{x}$

114. The equation in which variable occurs in exponent , called:

(a) ✔Exponential function (b) Quadratic equation
(c) Reciprocal equation (d) Exponential equation

115. To convert $4^{1+x}+4^{1-x}=10$ into quadratic , the substitution is:

(a) $y=x^{1-x}$ (b) $y=4^{1+x}$ (c) ✔ $y=4^x$ (d) $y=4^{-x}$

116. The equation $x^4-3x^3+4x^2-3x+1=0$ is example of

(a) Exponential equation (b) Quadratic equation
(c) Radical equation (d) ✔Reciprocal equation

117. The cube roots of unity are :

(a) ✔ $1, \frac{-1+\sqrt{3}i}{2}, \frac{-1-\sqrt{3}i}{2}$ (b) $1, \frac{1+\sqrt{3}i}{2}, \frac{1+\sqrt{3}i}{2}$ (c) $-1, \frac{-1+\sqrt{3}i}{2}, \frac{-1+\sqrt{3}i}{2}$ (d) $-1, \frac{1+\sqrt{3}i}{2}, \frac{1+\sqrt{3}i}{2}$

118. Sum of all cube roots of 64 is :

(a) ✔ 0 (b) 1 (c) 64 (d) -64

119. Product of cube roots of -1 is:

(a) 0 (b) -1 (c) ✔ 1 (d) None

120. $16\omega^8 + 16w^4 =$

(a) 0 (b) ✔ -16 (c) 16 (d) -1

121. The sum of all four fourth roots of unity is:

(a) Unity (b) ✔ 0 (c) -1 (d) None

122. The product of all four fourth roots of unity is:

(a) Unity (b) 0 (c) ✔ -1 (d) None

123. The sum of all four fourth roots of 16 is:

(a) 16 (b) -16 (c) ✔ 0 (d) 1

124. The complex cube roots of unity are.................. each other.

(a) ✔ Additive inverse (b) Equal to (c) Conjugate (d) None of these

125. The complex fourth roots of unity are .... of each other.

(a) ✔ Additive inverse (b) equal to (c) square of (d) None of these

126. The cube roots of -1 are

(a) $\{1, \omega, \omega^2\}$ (b) $\{1, -\omega, \omega^2\}$ (c) ✔ $\{-1, -\omega, -\omega^2\}$ (d) $\{-1, \omega, \omega^2\}$

127. The expression $x^2 + \frac{1}{x} - 3$ is polynomial of degree:

(a) 2 (b) 3 (c) 1 (d) ✔ not a polynomial

127. If $f(x)$ is divided by $-a$, then dividend = (Divisor)(.......)+ Remainder.

(a) Divisor (b) Dividend (c) ✔ Quotient (d) f(a)

128. If $f(x)$ is divided by $x - a$ by remainder theorem then remainder is:

(a) ✔ $f(a)$ (b) $f(-a)$ (c) $f(a) + R$ (d) $x - a = R$

129. The polynomial $(x - a)$ is a factor of $f(x)$ if and only if

(a) ✔ $f(a) = 0$ (b) $f(a) = R$ (c) Quotient $= R$ (d) $x = -a$

130. $x - 2$ is a factor of $x^2 - kx + 4$, if k is:

(a) 2 (b) ✔ 4 (c) 8 (d) -4

131. If $x = -2$ is the root of $kx^4 - 13x^2 + 36 = 0$, then $k =$

(a) 2 (b) -2 (c) 1 (d) ✔ -1

132. $x + a$ is a factor of $x^n + a^n$ when n is

(a) Any integer (b) any positive integer (c) ✔ any odd integer (d) any real number

133. $x - a$ is a factor of $x^n - a^n$ when n is

(a) ✔ Any integer (b) any positive integer (c) any odd integer (d) any real number

134. Sum of roots of $ax^2 - bx - c = 0$ is $(a \neq 0)$

(a) $\frac{b}{a}$ (b) $-\frac{b}{a}$ (c) $\frac{c}{a}$ (d) ✔ $-\frac{c}{a}$

134. Product of roots of $ax^2 - bx - c = 0$ is $(a \neq 0)$

(a) ✔$\frac{b}{a}$ (b) $-\frac{b}{a}$ (c) $\frac{c}{a}$ (d) $-\frac{c}{a}$

135. If 2 and -5 are roots of a quadratic equation , then equation is:

(a) $x^2 - 3x - 10 = 0$ (b) $x^2 - 3x + 10 = 0$ (c) ✔ $x^2 + 3x - 10 = 0$ (d) $x^2 + 3x + 10 = 0$

136. If α and β are the roots of $3x^2 - 2x + 4 = 0$, then the value of $\alpha + \beta$ is:

(a) ✔$\frac{2}{3}$ (b) $-\frac{2}{3}$ (c) $\frac{4}{3}$ (d) $-\frac{4}{3}$

137. The equation whose roots are given is

(a) $x^2 + Sx + P = 0$ (b) $x^2 - Sx - P = 0$ (c) $x^2 + Sx - P = 0$ (d) ✔ $x^2 - Sx + P = 0$

138. If roots of $ax^2 + bx + c = 0, (a \neq 0)$ are real , then

(a) ✔Disc≥ 0 (b) Disc< 0 (c) Disc$\neq 0$ (d) Disc≤ 0

139. If roots of $ax^2 + bx + c = 0, (a \neq 0)$ are complex , then

(a) Disc≥ 0 (b) ✔ Disc< 0 (c) Disc$\neq 0$ (d) Disc≤ 0

140. If roots of $ax^2 + bx + c = 0, (a \neq 0)$ are equal , then

(a) ✔Disc$= 0$ (b) Disc< 0 (c) Disc$\neq 0$ (d) None of these

141. The expression $b^2 - 4ac$ is called:

(a) ✔Discriminant (b) Quadratic equation (c) Linear equation (d) roots

142. Disc of $x^2 + 2x + 3 = 0$ is

(a) 16 (b) -16 (c) ✔ -8 (d) -16

143. An open sentence formed by using sign of " = " is called a/an

(a) ✔Equation (b) Formula (c) Rational fraction (d) Theorem

144. If an equation is true for all values of the variable, then it is called:

(a) a conditional equation (b) ✔ an identity (c) proper rational fraction (d) All of these

145. $(x + 3)(x + 4) = x^2 + 7x + 12$ is a/an:

(a) Conditional equation (b) ✔an identity (c) proper rational fraction (d) a formula

146. The quotient of two polynomials $\frac{P(x)}{Q(x)}, Q(x) \neq 0$ is called :

(a) ✔Rational fraction (b) Irrational fraction (c) Partial fraction (d) Proper fraction

147. A fraction $\frac{P(x)}{Q(x)}, Q(x) \neq 0$ is called proper fraction if :

(a) ✔Degree of $P(x) <$ Degree of $Q(x)$ (b) Degree of $P(x) =$ Degree of $Q(x)$
(c) Degree of $P(x) >$ Degree of $Q(x)$ (d) Degree of $P(x) \geq$ Degree of $Q(x)$

148. A fraction $\frac{P(x)}{Q(x)}, Q(x) \neq 0$ is called proper fraction if :

(a) Degree of $P(x) <$ Degree of $Q(x)$ (b) Degree of $P(x) =$ Degree of $Q(x)$

(c) Degree of P(x) > Degree of Q(x) (d) ✔ Degree of P(x) ≥ Degree of Q(x)

149. The number of Partial fraction of $\frac{x^3}{x(x+1)(x^2-1)}$ are:

(a) 2 (b) 3 (c) ✔ 4 (d) None of these

150. The number of Partial fraction of $\frac{x^5}{x(x+1)(x^2-4)}$ are:

(a) 2 (b) 3 (c) 4 (d) ✔ 6

151. $\frac{9x^2}{x^3-1}$ is an

(a) Improper fraction (b) ✔ Proper fraction (c) Polynomial (d) equation

152. An arrangement of numbers according to some definite rule is called:

(a) ✔Sequence (b) Combination (c) Series (d) Permutation

153. A sequence is also known as:

(a) Real sequence (b) ✔ Progression (c) Arrangement (d) Complex sequence

154. A sequence is function whose domain is

(a) Z (b) ✔ N (c) Q (d) R

155. As sequence whose range is R i. e., set of real numbers is called:

(a) ✔Real sequence (b) Imaginary sequence (c) Natural sequence (d) Complex sequence

1. If $a_n = \{n + (-1)^n\}$, then $a_{10} =$

(a) 10 (b) 11 (c) 12 (d) 13

156. The last term of an infinite sequence is called :

(a) nth term (b) a_n (c) last term (d) does not exist

157. The next term of the sequence $-1, 2, 12, 40, \ldots$ is

(a) ✔112 (b) 120 (c) 124 (d) None of these

158. For $a_n = (-1)^{n+1}$, $a_{26} =$

(a) 1 (b) ✔ -1 (c) 0 (d) 2

159. The next two terms of the sequence $1, -3, 5, -7, 9, -11, \ldots$ are

(a) 13,15 (b) $-13, -15$ (c) ✔ $13, -15$ (d) $-13, 15$

160. For $a_n = \frac{1}{2^n}$, $a_1 =$

(a) 2 (b) ✔ $\frac{1}{2}$ (c) 4 (d) 8

161. A sequence $\{a_n\}$ in which $a_n - a_{n-1}$ is the same number for all $n \in N, n > 1$ is called:

(a) ✔A.P (b) G.P (c) H.P (d) None of these

162. nth term of an A.P is $3n - 1$ then 10th term is :

(a) 9 (b) ✔ 29 (c) 12 (d) cannot determined

1. For $a_n - a_{n-1} = d$

(a) $n = 0$ (b) $n = 1$ (c) ✔ $n > 1$ (d) $n < 1$

163. If a_{n-1}, a_n, a_{n+1} are in A.P, then a_n is

(a) ✔A.M (b) G.M (c) H.M (d) Mid point

164. Arithmetic mean between c and d is:

(a) ✔$\frac{c+d}{2}$ (b) $\frac{c+d}{2cd}$ (c) $\frac{2cd}{c+d}$ (d) $\frac{2}{c+d}$

165. The arithmetic mean between $\sqrt{2}$ and $3\sqrt{2}$ is:

(a) $4\sqrt{2}$ (b) $\frac{4}{\sqrt{2}}$ (c) ✔ $2\sqrt{2}$ (d) none of these

166. $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ may be the A.M between a and b if

(a) ✔$n = 1$ (b) $n = 0$ (c) $n > 1$ (d) $n < 1$

167. The sum of terms of a sequence is called:

(a) Partial sum (b) ✔ Series (c) Finite sum (d) none of these

168. Forth partial sum of the sequence $\{n^2\}$ is called:

(a) 16 (b) ✔ 1+4+9+16 (c) 8 (d) 1+2+3+4

169. Sum of n −term of an Arithmetic series S_n is equal to:

(a) ✔$\frac{n}{2}[2a+(n-1)d]$ (b) $\frac{n}{2}[a+(n-1)d]$ (c) $\frac{n}{2}[2a+(n+1)d]$ (d) $\frac{n}{2}[2a+l]$

170. For any G. P., the common ratio r is equal to:

(a) ✔ $\frac{a_n}{a_{n+1}}$ (b) $\frac{a_{n-1}}{a_n}$ (c) $\frac{a_n}{a_{n-1}}$ (d) $a_{n+1}-a_n, n \in N, n > 1$

171. No term of a G. P., is:

(a) ✔0 (b) 1 (c) negative (d) imaginary number

172. The general term of a G. P., is :

(a) ✔$a_n = ar^{n-1}$ (b) $a_n = ar^n$ (c) $a_n = ar^{n+1}$ (d) None of these

173. Geometric mean between 4 and 16 is

(a) ± 2 (b) ± 4 (c) ± 6 (d) ✔ ± 8

174. For what value of n, $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the positive geometric mean between a and b?

(a) 1 (b) 2 (c) ✔ $\frac{1}{2}$ (d) $\frac{3}{2}$

175. The sum of infinite geometric series is valid if

(a) $|r| > 1$ (b) $|r| = 1$ (c) $|r| \geq 1$ (d)✔ $|r| < 1$

176. For the series $1+5+25+125+\cdots+\infty$, the sum is

(a) -4 (b) 4 (c) $\frac{1-5^n}{-4}$ (d)✔ not defined

177. An infinite geometric series is convergent if

(a) $|r| > 1$ (b) $|r| = 1$ (c) $|r| \geq 1$ (d)✔ $|r| < 1$

178. An infinite geometric series is divergent if

(a) $|r| < 1$ (b) $|r| \neq 1$ (c) $r = 0$ (d) ✔ $|r| > 1$

179. If sum of series is defined then it is called:

(a) ✔Convergent series (b) Divergent series (c) finite series (d) Geometric series

180. If sum of series is not defined then it is called:

(a) Convergent series (b)✔ Divergent series (c) finite series (d) Geometric series

181. The interval in which series $1 + 2x + 4x^2 + 8x^3 + \cdots$ is convergent if :

(a) $-2 < x < 2$ (b) ✔ $-\frac{1}{2} < x < \frac{1}{2}$ (c) $|2x| > 1$ (d) $|x| < 1$

182. If the reciprocal of the terms a sequence form an A. P., then it is called:

(a) ✔H. P (b) G. P (c) A. P (d) sequence

183. The nth term of $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \ldots$ is

(a) ✔$\frac{1}{3n-1}$ (b) $3n-1$ (c) $2n+1$ (d) $\frac{1}{3n+1}$

184. Harmonic mean between 2 and 8 is:

(a) ✔5 (b) $\frac{16}{5}$ (c) ± 4 (d) $\frac{5}{16}$

185. If A, G and H are Arithmetic , Geometric and Harmonic means between two positive numbers then

(a) $G^2 = AH$ (b) ✔ A, G, H are in G. P (c) $A > G > H$ (d) all of these

186. If A, G and H are Arithmetic , Geometric and Harmonic means between two negative numbers then

(a) $G^2 = AH$ (b) A, G, H are in G. P (c) $A < G < H$ (d) ✔ all of these

187. , then S_{2n} is equal to:

(a) $2n+1$ (b)✔ $4n^2 + 4n + 1$ (c) $(2n-1)^2$ (d) cannot be determined

188. $\sum_{k=1}^{n} k^3 =$

(a) $\frac{n(n+1)}{2}$ (b) $\frac{n(n+1)(n+2)}{6}$ (c) ✔ $\frac{n^2(n+1)^2}{4}$ (d) $\frac{n(n+1)^2}{2}$

189. $\sum_{k=1}^{n} 1 =$

(a) 1 (b) 0 (c) k (d) ✔ n

190. $\frac{8!}{7!} =$

(a) ✔8 (b) 7 (c) 56 (d) $\frac{8}{7}$

191. 0! =

(a) 0 (b) ✔ 1 (c) 2 (d) cannot be defined

192. n! =

(a) $n(n-1)$ (b) $(n-1)!$ (c) $(n-2)!$ (d) ✔ $n(n-1)!$

193. $\frac{9!}{6!3!} =$

(a) 80 (b) ✔ 84 (c) 90 (d) 94

194. Factorial form of $\frac{8.7.6}{3.2.1}$ is

(a) $\frac{8!}{3!4!}$ (b) $\frac{8!}{3!3!}$ (c) ✔ $\frac{8!}{3!5!}$ (d) $\frac{8!}{3!6!}$

195. $20_{P_3} =$

(a) 6890 (b) 6810 (c) ✔ 6840 (d) 6880

196. If $^{n}P_{2} = 30$ then n =

(a) 4 (b) 5 (c) 6 (d) 10

197. $^{n}P_{n} =$

(a) n (b) p! (c) ✔ n! (d) $(n-1)!$

198. $^{n}P_{r} =$

(a) n! (b) $\frac{n!}{r!}$ (c) ✔ $\frac{n!}{(n-r)!}$ (d) r!

199. __________ of n different objects is called permutation.

(a) Combination (b) ✔ Permutation (c) Probability (d) Arrangements

200. In haw many ways the letters of the "WORD" can be write?

(a) 2! ways (b) 3! ways (c) ✔ 4! ways (d) 5! ways

201. How many signals can be given by 5 flags of different colors , using 3 at a time

(a) 120 (b) 60 (c) 24 (d) 15

202. $^{n}C_{n} =$

(a) n! (b) 0! (c) ✔ 1 (d) 0

203. $^{n}C_{r} \times r! =$

(a) $^{n}C_{r}$ (b) ✔ $^{n}P_{r}$ (c) $^{n}C_{n}$ (d) r!

204. $^{n}C_{0} =$

(a) 0 (b) ✔ 1 (c) 2 (d) n!

205. For complementary combination $^{n}C_{r} =$

(a) $^{n}C_{n}$ (b) ✔ $^{n}C_{n-r}$ (c) $^{n}C_{r}$ (d) None of these

206. If $^{n}C_{8} = {^{n}C_{12}}$ then n =

(a) 10 (b) ✔ 20 (c) 30 (d) 40

207. In a permutation $^{n}P_{r}$ or $P(n, r)$, it is always true that

(a) ✔ $n \geq r$ (b) $n < r$ (c) $n \leq r$ (d) $n < 0, r < 0$

208. Probability of non-occurrence of an event E is equal to :

(a) ✔ $1 - P(E)$ (b) $P(E) + \frac{n(S)}{n(E)}$ (c) $\frac{n(S)}{n(E)}$ (d) $1 + P(E)$

209. Non occurrence of an event E is denoted by:

(a) $\sim E$ (b) ✔ $\overline{E}$ (c) E^{c} (d) All of these

210. A card is drawn from a deck of 52 playing cards. The probability of card that it is an ace card is:

(a) $\frac{2}{13}$ (b) $\frac{4}{13}$ (c) ✔ $\frac{1}{13}$ (d) $\frac{17}{13}$

211. Four persons wants to sit in a circular sofa, the total ways are:

(a) ✔ 24 (b) 6 (c) 4 (d) None of these

212. Let $S = \{1, 2, 3, \ldots, 10\}$ the probability that a number is divided by 4 is :

(a) $\frac{2}{5}$ (b) ✔ $\frac{1}{5}$ (c) $\frac{1}{10}$ (d) $\frac{1}{2}$

213. A die is rolled , the probability of getting 3 or 5 is:

(a) $\frac{2}{3}$ (b) ✔ $\frac{15}{36}$ (c) $\frac{15}{36}$ (d) $\frac{1}{36}$

214. If E is a certain event , then

(a) $P(E) = 0$ (b) ✔ $P(E) = 1$ (c) $0 < P(E) < 1$ (d) $P(E) > 1$

215. If E is an impossible event ,then

(a) ✔$P(E) = 0$ (b) $P(E) = 1$ (c) $P(E) \neq 0$ (d) $0 < P(E) < 1$

216. Sample space for tossing a coin is:

(a) $\{H\}$ (b) $\{T\}$ (c) $\{H, H\}$ (d) ✔ $\{H, T\}$

217. For independent events $P(A \cup B) =$

(a) $P(A) + P(B)$ (b) ✔ $P(A) + P(B) - P(A \cap B)$ (c) $P(A).P(B)$ (d) $\frac{P(A)}{P(B)}$

218. If $P(A) = \frac{1}{2}$, $P(B) = \frac{1}{2}$ and $P(A \cap B) = \frac{1}{3}$ then $=P(A \cup B) =$

(a) $\frac{1}{2}$ (b) ✔ $\frac{2}{3}$ (c) $\frac{1}{3}$ (d) $\frac{1}{4}$

219. If an event A can occur in p ways and B can occur q ways , then number of ways that both events occur is:

(a) $p + q$ (b) ✔ $p.q$ (c) $(pq)!$ (d) $(p + q)!$

220. If $P(A) = 0.8$ and $P(B) = 0.75$ then $P(A \cap B) =$

(a) 0.5 (b) ✔ 0.6 (c) 0.7 (d) 0.9

221. The statement $4^n + 3^n + 4$ is true when :

(a) $n = 0$ (b) $n = 1$ (c) ✔ $n \geq 2$ (d) n is any +iv integer

222. The method of induction was given by Francesco who lived from:

(a) ✔1494-1575 (b) 1500-1575 (c) 1498-1575 (d) 1494-1570

223. The statement $3^n < n!$ is true, when

(a) $n = 2$ (b) $n = 4$ (c) $n = 6$ (d) ✔ $n > 6$

224. General term in the expansion of $(a + b)^n$ is:

(a) $\binom{n+1}{r}a^{n-r}x$^r (b)✔$\binom{n}{r-1}a^{n-r}x^r$ (c) $\binom{n}{r+1}a^{n-r}x^r$ (d) $\binom{n}{r}a^{n-r}x^r$

225. The number of terms in the expansion of $(a + b)^n$ are:

(a) n (b) ✔ $n + 1$ (c) 2^n (d) 2^{n-1}

226. Middle term/s in the expansion of $(a - 3x)^{14}$ is/are :

(a) T_7 (b) ✔ T_8 (c) $T_6 \& T_7$ (d) $T_7 \& T_8$

227. The coefficient of the last term in the expansion of $(2 - x)^7$ is :

(a) 1 (b) ✔ −1 (c) 7 (d) −7

228. $\binom{2n}{0}+\binom{2n}{1}+\binom{2n}{2}+\cdots+\binom{2n}{2n}$ **is equal to:**

(a) 2^n (b) ✔ 2^{2n} (c) 2^{2n-1} (d) 2^{2n+1}

229. $1+x+x^2+x^3+\cdots$

(a) $(1+x)^{-1}$ (b) ✔ $(1-x)^{-1}$ (c) $(1+x)^{-2}$ (d) $(1-x)^{-2}$

229. **The middle term in the expansion of $(a+b)^n$ is $\left(\frac{n}{2}+1\right)$; then n is**

(a) Odd (b) ✔ even (c) prime (d) none of these

230. **The common starting point of two rays is called:**

(a) Origin (b) Initial Point (c) ✔ Vertex (d)All of these

231. **If the rotation of the angle is counter clock wise, then angle is:**

(a) Negative (b) ✔ Positive (c) Non-Negative (d) None of these

232. **One right angle is equal to**

(a) ✔ $\frac{\pi}{2}$ radian (b) 90° (c) $\frac{1}{4}$ rotation (d) All of these

233. **1° is equal to**

(a) 30 minutes (b) ✔ 60 minutes (c) $\frac{1}{60}$ minutes (d) $\frac{1}{2}$ minutes

234. **1° is equal to**

(a) ✔ $60'$ (b) $3600''$ (c) $(\frac{1}{360})'$ (d) $60''$

235. **60th part of 1° is equal to**

(a) One second (b) ✔ One minute (c) 1 Radian (d) π radian

236. **3 radian is:**

(a) ✔ 171.888° (b) 120° (c) 300° (d) 270°

237. **Area of sector of circle of radius r is:**

(a) $\frac{1}{2}r^2\theta$ (b) ✔ $\frac{1}{2}r\theta^2$ (c) $\frac{1}{2}(r\theta)^2$ (d) $\frac{1}{2r^2\theta}$

238. **Circular measure of angle between the hands of a watch at 4′O clock is**

(a) $\frac{\pi}{6}$ (b) ✔ $\frac{2\pi}{3}$ (c) $\frac{3\pi}{2}$ (d) $\frac{\pi}{3}$

239. **An angle is in standard position , if its vertex is**

(a) At origin (b) ✔ at x − axis (c) aty − axis (d) in 1st Quad Only

240. **If initial and the terminal side of an angle falls on x − axis or y − axis then it is called:**

(a) Coterminal angle (b) ✔ Quadrantal angl (c) Allied angle (d) None of these

241. **0°, 90°, 180°, 270° and 360° are called**

(a) Coterminal angle (b) ✔ Quadrantal angl (c) Allied angle (d) None of these

242. $\sin^2\theta + \cos^2\theta$ is equal to:
(a) 0 (b) -1 (c) 2 (d) ✔ 1

243. $1 + \tan^2\theta$ is equal to:
(a) $\csc^2\theta$ (b) $\sin^2\theta$ (c) ✔ $\sec^2\theta$ (d) $\tan^2\theta$

244. $\csc^2\theta - \cot^2\theta$ is equal to:
(a) 0 (b) ✔ 1 (c) -1 (d) 2

245. If $\tan\theta < 0$ and $\operatorname{cosec}\theta > 0$ then the terminal arm of angle lies in ________Quad.
(a) I (b) ✔ II (c) III (d) IV

246. If $\sec\theta < 0$ and $\sin\theta < 0$ then the terminal arm of angle lies in _________ Quad.
(a) I (b) II (c) ✔ III (d) IV

247. The point $(0, 1)$ lies on the terminal side of angle:
(a) 0° (b) ✔ 90° (c) 180° (d) 270°

248. The point $(-1, 0)$ lies on the terminal side of angle:
(a) 0° (b) 90° (c) ✔ 180° (d) 270°

249. The point $(0, -1)$ lies on the terminal side of angle:
(a) 0° (b) 90° (c) 180° (d) ✔ 270°

250. $2Sin45° + \frac{1}{2}Cosec45° =$
(a) $\sqrt{\frac{2}{3}}$ (b) ✔ $\frac{3}{\sqrt{2}}$ (c) -1 (d) 1

251. $cosec\theta sec\theta sin\theta cos\theta =$
(a) ✔1 (b) 0 (c) $sin\theta$ (d) $cos\theta$

252. $(sec\theta + tan\theta)(sec\theta - tan\theta) =$
(a) ✔1 (b) 0 $sec\theta$ (d) $tan\theta$

253. $\frac{1-sin\theta}{cos\theta} =$
(a) $\frac{cos}{1-sin\theta}$ (b) ✔ $\frac{cos\theta}{1+sin\theta}$ (c) $\frac{sin\theta}{1-cos\theta}$ (d) $\frac{sin\theta}{1+cos\theta}$

254. Fundamental law of trigonometry is , $cos(\alpha - \beta)$
(a) ✔$cos\alpha cos\beta + sin\alpha sin\beta$ (b) $cos\alpha cos\beta - sin\alpha sin\beta$
(c) $sin\alpha cos\beta + cos\alpha sin\beta$ (d) $sin\alpha cos\beta - cos\alpha sin\beta$

255. $sin(\alpha + \beta)$ is equal to:
(a) $cos\alpha cos\beta + sin\alpha sin\beta$ (b) $cos\alpha cos\beta - sin\alpha sin\beta$
(c) ✔ $sin\alpha cos\beta + cos\alpha sin\beta$ (d) $sin\alpha cos\beta - cos\alpha sin\beta$

256. $cos\left(\frac{\pi}{2} - \beta\right) =$

(a) $cos\beta$ (b) $-cos\beta$ (c) ✔ $sin\beta$ (d) $-sin\beta$

257. $\boldsymbol{sin(2\pi-\theta)=}$

(a) $cos\theta$ (b) $-cos\theta$ (c) ✔ $sin\theta$ (d) $-sin\theta$

258. $\boldsymbol{tan(\alpha-\beta)=}$

(a) ✔ $\frac{tan\alpha-tan\beta}{1+tan\alpha tan\beta}$ (b) $\frac{tan\alpha+tan\beta}{1-tan\alpha tan\beta}$ (c) $\frac{tan\alpha-tan\beta}{1-tan\alpha tan\beta}$ (d) $\frac{tan\alpha+tan\beta}{1-tan\alpha tan\beta}$

259. Angles associated with basic angles of measure θ to a right angle or its multiple are called:

(a) Coterminal angle (b) angle in standard position (c) ✔ Allied angle (d) obtuse angle

260. $\boldsymbol{sin\left(\frac{3\pi}{2}+\theta\right)=}$

(a) $sin\theta$ (b) $cos\theta$ (c) $-sin\theta$ (d) ✔ $-cos\theta$

261. cos 315° is equal to:

(a) 1 (b) 0 (c) ✔ $\frac{1}{\sqrt{2}}$ (d) $\frac{\sqrt{3}}{2}$

262. $\boldsymbol{sin(180°+\alpha)sin(90°-\alpha)=}$

(a) ✔ $sin\alpha cos\alpha$ (b) $-sin\alpha cos\alpha$ (c) $cos\gamma$ (d) $-cos\gamma$

263. If α,β and γ are the angles of a triangle ABC then $cos\left(\frac{\alpha+\beta}{2}\right)=$

(a) ✔ $sin\frac{\gamma}{2}$ (b) $-sin\frac{\gamma}{2}$ (c) $cos\frac{\gamma}{2}$ (d) $-cos\frac{\gamma}{2}$

264. Which is the allied angle

(a) ✔ $90°+\theta$ (b) $60°+\theta$ (c) $45°+\theta$ (d) $30°+\theta$

265. 1. $\boldsymbol{\frac{cos11°+sin11°}{cos11°-sin11°}=}$

(a) ✔ $tan56°$ (b) $tan34°$ (c) $cot56°$ (d) $cot34°$

266. 2. If $Sin(\alpha+\beta)$ is $-ive$ and $Cos(\alpha+\beta)$ is $+ive$ then terminal arm of $(\alpha+\beta)$ lies in

267. I Quad (b) II Quad (c) III Quad (d) ✔IV Quad

268. $sin2\alpha$ is equal to:

(a) $cos^2\alpha-sin^2\alpha$ (b) $1+cos2\alpha$ (c) ✔ $2sin\alpha cos\alpha$ (d) $2sin2\alpha cos2\alpha$

269. $\boldsymbol{cos2\alpha=}$

(a) ✔$cos^2\alpha-sin^2\alpha$ (b) $1-2\,sin^2\alpha$ (c) $2\,cos^2\alpha-1$ (d) All of these

270. $\boldsymbol{tan2\alpha=}$

(a) $\frac{2tan\alpha}{1+tan2\,\alpha}$ (b) ✔ $\frac{2tan\alpha}{1-tan^2\alpha}$ (c) $\frac{2\,tan^2\alpha}{1-tan^2\alpha}$ (d) $\frac{tan^2\alpha}{1-tan^2\alpha}$

271. $\boldsymbol{sin3\alpha=}$

(a) $3sin\alpha-2\,sin^3\alpha$ (b) $3sin\alpha+2\,sin^3\alpha$ (c) ✔ $3sin\alpha-4\,sin^3\alpha$ (d) $3cos\alpha-2\,sin^3\alpha$

272. $sin\alpha+sin\beta$ is equal to:

(a) ✔ $2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$ (b) $2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$ (c) $-2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$ (d) $2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

273. $\sin\alpha - \sin\beta$ is equal to:

(a) $2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$ (b) ✔ $2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$
(c) $-2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$ (d) $2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

274. $\cos\alpha + \cos\beta$ is equal to:

(a) $2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$ (b) $2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$
(c) $-2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$ (d) ✔ $2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

275. $\cos\alpha - \cos\beta$ is equal to:

(a) $2\sin\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$ (b) $2\cos\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$
(c) ✔ $-2\sin\left(\frac{\alpha+\beta}{2}\right)\sin\left(\frac{\alpha-\beta}{2}\right)$ (d) $2\cos\left(\frac{\alpha+\beta}{2}\right)\cos\left(\frac{\alpha-\beta}{2}\right)$

276. $2\sin7\theta\cos3\theta =$

(a) ✔ $\sin10\theta + \sin4\theta$ (b) $\sin5\theta - \sin2\theta$ (c) $\cos10\theta + \cos4\theta$ (d) $\cos5\theta - \cos2\theta$

277. $2\cos5\theta\sin3\theta =$

278. ✔ $\sin8\theta - \sin2\theta$ (b) $\sin8\theta + \sin2\theta$ (c) $\cos8\theta + \cos2\theta$ (d) $\cos8\theta - \cos2\theta$

279. Range of $y = \sec x$ is

(a) R (b) ✔ $y \ge 1 or\ y \le -1$ (c) $-1 \le y \le 1$ (d) $R - [-1,1]$

280. Range of $y = \operatorname{cosec} x$ is

(a) R (b) ✔ $y \ge 1 or\ y \le -1$ (c) $-1 \le y \le 1$ (d) $R - [-1,1]$

281. Smallest $+ive$ number which when added to the original circular measure of the angle gives the same value of the function is called:

(a) Domain (b) Range (c) Co domain (d) ✔ Period

282. Domain of $y = \cos x$ is

(a) ✔ $-\infty < x < \infty$ (b) $-1 \le x \le 1$ (c) $-\infty < x < \infty, x \ne n\pi, n \in Z$ (d) $x \ge 1, x \le -1$

283. Domain of $y = \tan x$ is

(a) $-\infty < x < \infty$ (b) $-1 \le x \le 1$ (c) ✔ $-\infty < x < \infty, x \ne \frac{2n+1}{2}\pi, n \in Z$ (d) $x \ge 1, x \le -1$

284. Period of $\cos\theta$ is

(a) π (b) ✔ 2π (c) -2π (d) $\frac{\pi}{2}$

285. Period of $\tan4x$ is

(a) π (b) 2π (c) -2π (d) ✔ $\frac{\pi}{4}$

286. Period of $cot3x$ is

(a) π (b)✔ $\frac{\pi}{3}$ (c) -2π (d) $\frac{\pi}{4}$

287. Period of $3cos\frac{x}{5}$ is

(a) 2π (b) $\frac{\pi}{2}$ (c) π (d) ✔ 10π

288. The graph of trigonometric functions have:

(a) Break segments (b) Sharp corners (c) Straight line segments (d) smooth curves

289. Curves of the trigonometric functions repeat after fixed intervals because trigonometric functions are

(a) Simple (b) linear (c) quadratic (d) ✔ periodic

290. The graph of $y = cosx$ lies between the horizontal line $y = -1$ and

(a) ✔ +1 (b) 0 (c) 2 (d) -2

291. A "Triangle" has :

(a) Two elements (b) 3 elements (c) 4 elements (d) ✔ 6 elments

292. $sin38°24' =$

(a) 0.2611 (b) 0.2622 (c) 0.6211 (d) 0.5211

293. When θ increases from 0° to 90° then $sin\theta, sec\theta$ and $tan\theta$ go on

(a) ✔Increasing (b) Decreasing (c) Constant (d) None of these

294. When θ increases from 0° to 90° then $cos\theta, cosec\theta$ and $cot\theta$ go on

(a) Increasing (b) ✔Decreasing (c) Constant (d) None of these

295. If $sinx = 0.5100$ then $x =$

(a) ✔$30°40'$ (b) $35°40'$ (c) $40°40'$ (d) $44°44'$

296. When we look an object above the horizontal ray, the angle formed is called angle of:

(a) ✔Elevation (b) depression (c) incidence (d) reflects

297. When we look an object below the horizontal ray, the angle formed is called angle of:

(a) Elevation (b) ✔ depression (c) incidence (d) reflects

298. A triangle which is not right is called:

(a) ✔Oblique triangle (b) Isosceles triangle (c) Scalene triangle (d) Right isosceles triangle

299. In any triangle ABC, law of tangent is :

300. $\frac{a-b}{a+b} = \frac{tan(\alpha-\beta)}{tan(\alpha+\beta)}$ (b) $\frac{a+b}{a-b} = \frac{tan(\alpha+\beta)}{tan(\alpha-\beta)}$ (c) ✔ $\frac{a-b}{a+b} = \frac{tan\frac{\alpha-\beta}{2}}{tan\frac{\alpha+\beta}{2}}$ (d) $\frac{a-b}{a+b} = \frac{tan\frac{\alpha+\beta}{2}}{tan\frac{\alpha-\beta}{2}}$

301. In any triangle ABC, $\sqrt{\frac{(S-a)(s-b)}{ab}} =$

(a) $sin\frac{\alpha}{2}$ (b) $sin\frac{\beta}{2}$ (c) ✔ $sin\frac{\gamma}{2}$ (d) $cos\frac{\alpha}{2}$

302. In any triangle ABC, $\sqrt{\frac{(S-b)(s-c)}{bc}} =$

(a) ✔ $sin\frac{\alpha}{2}$ (b) $sin\frac{\beta}{2}$ (c) $sin\frac{\gamma}{2}$ (d) $cos\frac{\alpha}{2}$

303. In any triangle ABC, $\sqrt{\frac{(S-a)(s-c)}{ac}} =$

(a) $sin\frac{\alpha}{2}$ (b) ✔ $sin\frac{\beta}{2}$ (c) $sin\frac{\gamma}{2}$ (d) $cos\frac{\alpha}{2}$

304. In any triangle ABC, $cos\frac{\alpha}{2} =$

(a) $\sqrt{\frac{s(s-a)}{ab}}$ (b) $\sqrt{\frac{s(s-b)}{ac}}$ (c) ✔ $\sqrt{\frac{s(s-a)}{bc}}$ (d) $\sqrt{\frac{s(s-c)}{ab}}$

305. In any triangle ABC, $cos\frac{\beta}{2} =$

(a) $\sqrt{\frac{s(s-a)}{ab}}$ (b) ✔ $\sqrt{\frac{s(s-b)}{ac}}$ (c) $\sqrt{\frac{s(s-a)}{bc}}$ (d) $\sqrt{\frac{s(s-c)}{ab}}$

306. In any triangle ABC, $cos\frac{\gamma}{2} =$

(a) $\sqrt{\frac{s(s-a)}{ab}}$ (b) $\sqrt{\frac{s(s-b)}{ac}}$ (c) $\sqrt{\frac{s(s-a)}{bc}}$ (d) ✔ $\sqrt{\frac{s(s-c)}{ab}}$

307. In any triangle ABC, with usual notations , s is equal to

(a) $a+b+c$ (b) $\frac{a+b+c}{3}$ (c) ✔ $\frac{a+b+c}{2}$ (d) $\frac{abc}{2}$

308. In any triangle ABC, $\sqrt{\frac{s(s-c)}{(s-a)(s-b)}} =$

(a) $sin\frac{\gamma}{2}$ (b) $cos\frac{\gamma}{2}$ (c) $tan\frac{\gamma}{2}$ (d) $cot\frac{\gamma}{2}$

309. In any triangle ABC, $\sqrt{\frac{(s-a)(s-b)}{s(s-c)}} =$

(a) $sin\frac{\gamma}{2}$ (b) $cos\frac{\gamma}{2}$ (c) ✔ $tan\frac{\gamma}{2}$ (d) $cot\frac{\gamma}{2}$

310. To solve an oblique triangles when measure of three sides are given , we can use:

(a) ✔ Hero's formula (b) Law of cosine (c) Law of sine (d) Law of tangents

311. In any triangle ABC Area if triangle is :

(a) $bc\ sin\,\alpha$ (b) $\frac{1}{2}ca\ sin\alpha$ (c) $\frac{1}{2}ab\ sin\beta$ (d) ✔ $\frac{1}{2}absin\gamma$

312. In any triangle ABC, with usual notations, $\frac{a}{2sin\alpha} =$

(a) r (b) r_1 (c) ✔ R (d) Δ

313. In any triangle ABC, with usual notations, $\frac{a}{sin\beta} =$

(a) $2r$ (b) $2\,r_1$ (c) ✔ $2R$ (d) 2Δ

314. In any triangle ABC, with usual notations, $sin\,\gamma =$

(a) R (b) ✔ $\frac{c}{2R}$ (c) $\frac{2R}{c}$ (d) $\frac{R}{2}$

315. In any triangle ABC, with usual notations, $abc =$

(a) R (b) Rs (c) ✔ $4R\Delta$ (d) $\frac{\Delta}{s}$

316. In any triangle ABC, with usual notations, $\frac{\Delta}{s-a} =$

(a) r (b) R (c) ✔ r_1 (d) r_2

317. In any triangle ABC, with usual notations, $\frac{\Delta}{s-b} =$

(a) r (b) R (c) r_1 (d) ✔ r_2

318. In any triangle ABC, with usual notations, $\frac{\Delta}{s-c} =$

(a) ✔ r_3 (b) R (c) r_1 (d) r_2

319. In any triangle ABC, with usual notation , $r: R: r_1 =$

(a) 3:2:1 (b) 1:2:2 (c) ✔ 1:2:3 (d) 1:1:1

320. In any triangle ABC, with usual notation , $r: R: r_1: r_2: r_3 =$

(a) 3:3:3:2:1 (b) 1:2:2:3:3 (c) ✔ 1:2:3:3:3 (d) 1:1:1:1:1

321. In a triangle ABC, if $\beta = 60°$, $\gamma = 15°$ then $\alpha =$

(a) 90° (b) 180° (c) 150° (d) ✔ 105°

322. $Cos^{-1}x =$

(a) $\frac{\pi}{2} - cos^{-1} x$ (b) ✔ $\frac{\pi}{2} - sin^{-1} x$ (c) $\frac{\pi}{2} + cos^{-1} x$ (d) $\frac{\pi}{2} - cosec^{-1}x$

323. $Sec^{-1}x =$

(a) $\frac{\pi}{2} - sec^{-1} x$ (b) $\frac{\pi}{2} - sin^{-1} x$ (c) $\frac{\pi}{2} + sec^{-1} x$ (d) ✔ $\frac{\pi}{2} - cosec^{-1}x$

324. $Tan^{-1}x =$

(a) $\frac{\pi}{2} - sec^{-1} x$ (b) $\frac{\pi}{2} - sin^{-1} x$ (c) ✔ $\frac{\pi}{2} - cot^{-1} x$ (d) $\frac{\pi}{2} - cosec^{-1}x$

325. $Cot^{-1}x =$

(a) $\frac{\pi}{2} - sec^{-1} x$ (b) ✔ $\frac{\pi}{2} - tan^{-1} x$ (c) $\frac{\pi}{2} + sec^{-1} x$ (d) $\frac{\pi}{2} - cosec^{-1}x$

326. $Sin\left(Cos^{-1}\frac{\sqrt{3}}{2}\right) =$

(a) $\frac{\pi}{6}$ (b) ✔ $\frac{1}{2}$ (c) $-\frac{1}{2}$ (d) $\frac{\sqrt{3}}{2}$

327. $Tan^{-1}(\sqrt{3}) =$

(a) $\frac{\pi}{6}$ (b) $-\frac{\pi}{6}$ (c) $-\frac{\pi}{3}$ (d) ✔ $\frac{\pi}{3}$

328. $Sin\left(Sin^{-1}\frac{1}{2}\right) =$

(a) ✔ $\frac{1}{2}$ (b) $\frac{2}{3}$ (c) 2 (d) $\frac{1}{3}$

329. 1. $Sin^{-1}A - Sin^{-1}B =$

(a) ✔ $Sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right)$ (b) $Sin^{-1}\left(A\sqrt{1-A^2} - B\sqrt{1-B^2}\right)$

(c) $Sin^{-1}\left(B\sqrt{1-A^2} + A\sqrt{1-B^2}\right)$ (d) $Sin^{-1}\left(AB\sqrt{(1-A^2)(1-B^2)}\right)$

330. $4.\ Tan^{-1}A + Tan^{-1}B =$

(a) ✔$Tan^{-1}\left(\frac{A-B}{1+AB}\right)$ (b) $Tan^{-1}\left(\frac{A+B}{1+AB}\right)$ (c) $Tan^{-1}\left(\frac{A-B}{1-AB}\right)$ (d) $Tan^{-1}\left(\frac{A+B}{1+AB}\right)$

331. $Cos^{-1}(-x) =$

(a) $-Cos^{-1}x$ (b) $Cos^{-1}x$ (c) ✔ $\pi - Cos^{-1}x$ (d) $\pi - Cosx$

332. $Tan^{-1}(-x) =$

(a) ✔$-Tan^{-1}x$ (b) $Tan^{-1}x$ (c) $\pi - Tan^{-1}x$ (d) $\pi - Tanx$

333. $Cosec^{-1}(-x) =$

(a) ✔$-Cosec^{-1}x$ (b) $Cosec^{-1}x$ (c) $\pi - Cosec^{-1}x$ (d) $\pi - Cosecx$

334. $Cot^{-1}(-x) =$

(a) $-Cot^{-1}x$ (b) $Cot^{-1}x$ (c) ✔ $\pi - Cot^{-1}x$ (d) $\pi - Cotx$

335. **If $tan2x = -1$, then solution in the interval $[0, \pi]$ is:**

(a) ✔$\frac{\pi}{8}$ (b) $\frac{\pi}{4}$ (c) $\frac{3\pi}{8}$ (d) $\frac{3\pi}{4}$

336. **If $sinx + cosx = 0$ then value of $x \in [0, 2\pi]$**

(a) $\{\frac{\pi}{4}, \frac{3\pi}{4}\}$ (b) $\{\frac{\pi}{4}, \frac{7\pi}{4}\}$ (c) ✔ $\{\frac{3\pi}{4}, \frac{7\pi}{4}\}$ (d) $\{\frac{\pi}{4}, \frac{-\pi}{4}\}$

337. **General solution of $4sinx - 8 = 0$ is:**

(a) $\{\pi + 2n\pi\}$ (b) $\{\pi + n\pi\}$ (c) $\{-\pi + n\pi\}$ (d) ✔not possible

338. **General solution of $1 + cosx = 0$ is:**

(a) ✔$\{\pi + 2n\pi\}$ (b) $\{\pi + n\pi\}$ (c) $\{-\pi + n\pi\}$ (d) not possible

1. **For the general solution , we first find the solution in the interval whose length is equal to its:**

(a) Range (b) domain (c) co-domain (d) ✔ period

339. **General solution of every trigonometric equation consists of :**

(a) One solution only (b) two solutions

(c)✔ infinitely many solutions (d) no real solution

340. **Solution of the equation $2sinx + \sqrt{3} = 0$ in the 4th quadrant is:**

(a) $\frac{\pi}{2}$ (b) ✔ $\frac{-\pi}{3}$ (c) $\frac{-\pi}{6}$ (d) $\frac{11\pi}{6}$

341. **If $sinx = cosx$, then general solution is:**

(a) $\{\frac{\pi}{4} + n\pi, n \in Z\}$ (b) $\{\frac{\pi}{4} + 2n\pi, n \in Z\}$ (c)✔ $\{\frac{\pi}{4} + n\pi, \frac{5\pi}{4} + n\pi\}$ (d) $\{\frac{\pi}{4} + n\pi, \frac{5\pi}{4} + n\pi\}$

342. **In which quadrant is the solution of the equation $sinx + 1 = 0$**

(a) 1st and 2nd (b) 2nd and 3rd (c) ✔ 3rd and 4th (d) Only 1st

343. **If $\sin x = 0$ then $x =$**

(a) ✔$n\pi$, $n \in Z$ (b) $\frac{n\pi}{2}$, $n \in Z$ (c) 0 (d) $\frac{\pi}{2}$

Short Questions Section (A)

1) Which of the following have closure property w.r.t addition and multiplication $\{0, -1\}$

Prove that $-\frac{7}{12} - \frac{5}{18} = \frac{-21-10}{36}$

2) Write reflexive property of equality of real number.

3) Simplify by justifying each step. $\frac{\frac{1}{4}+\frac{1}{5}}{\frac{1}{4}-\frac{1}{5}}$

4) Prove the rules of addition. $\frac{a}{c} + \frac{b}{c} = \frac{a+b}{c}$

5) Prove the rules of addition. $\frac{a}{b} + \frac{c}{d} = \frac{ad+bc}{bd}$

6) Prove that $-\frac{7}{12} - \frac{5}{18} = \frac{21-10}{36}$

7) Find the sum, difference and product of the complex numbers $(8,9)$ and $(5,-6)$

8) Simplify: $(-1)^{\frac{-21}{2}}$

9) Simplify $(2,6)(3,7)$

10) Simplify $(2,6) \div (3,7)$ Hint: $\frac{(2,6)}{(3,7)} = \frac{2+6i}{3+7i} \times \frac{3-7i}{3-7i}$ etc.

11) Simplify $(5,-4) \div (-3,-8)$

12) Find the multiplicative inverse of the numbers: $(-4,7)$

13) Find the multiplicative inverse of the numbers: $(\sqrt{2}, -\sqrt{5})$

14) Factorize: $9a^2 + 16b^2$

15) Factorize: $3x^2 + 3y^2$

16) Separate into real and imaginary parts (write as a simple complex number) $\frac{2-7i}{4+5i}$

17) Find the multiplicative Inverse of each of the numbers. $(1,2)$

18) Prove that $\bar{z} = z$ if z is real.

19) Simplify by expressing in the from a + bi $(2 + \sqrt{-3})(3 + \sqrt{-3})$

20) Show that $\forall z \in C. z^2 + \bar{z}^2$ is a real number

21) Show that $\forall z \in C. (z - \bar{z})^2$ is a real number

22) Simplify: $\left(-\frac{1}{2} + \frac{\sqrt{3}}{2}i\right)^3$

23) Find moduli of the complex numbers: $1 - i\sqrt{3}$

24) Write two proper subsets of the set: $\{a, b, c\}$

25) Write down the power set of the each of the sets: $\{+,-,\div,\times\}$

26) Write the converse, inverse and contrapositive of the conditionals: $\sim p \to q$

27) If G is a group under the operation *and $a, b \epsilon G$, find the solution of the equations $a * x = b$, $x * a = b$.

28) ***Find x and y if*** $\begin{bmatrix} 2 & 0 & x \\ 1 & y & 3 \end{bmatrix} + 2\begin{bmatrix} 1 & x & y \\ 0 & 2 & -1 \end{bmatrix} = \begin{bmatrix} 4 & -2 & 3 \\ 1 & 6 & 1 \end{bmatrix}$

29) |xiv) |f $A = \begin{bmatrix} 1 & 2 \\ a & b \end{bmatrix}$ and $A^2 = \begin{bmatrix} 0 & 0 \\ 0 & 0 \end{bmatrix}$, find the values of a and b.

30) if A and B are square matrices of the same order, then explain why in general: $(A + B)(A - B) \neq A^2\ B^2$

31) solve the equation $\begin{vmatrix} 5 & -2 & -4 \\ 3 & -1 & -3 \\ -2 & 1 & 2 \end{vmatrix}$

32) without expansion show that $\begin{bmatrix} 6 & 7 & 8 \\ 3 & 4 & 5 \\ 2 & 3 & 4 \end{bmatrix} = 0$

33) Without expansion show that $\begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ yz & zx & xy \end{vmatrix} = \begin{vmatrix} 1 & 1 & 1 \\ x & y & z \\ x^2 & y^2 & z^2 \end{vmatrix}$

34) Show that $\begin{vmatrix} 1 & a^2 & \frac{a}{bc} \\ 1 & b^2 & \frac{b}{ca} \\ 1 & c^2 & \frac{c}{ab} \end{vmatrix} = 0$

35) Without expansion verify that $\begin{vmatrix} 1 & a^2 & \frac{a}{bc} \\ 1 & b^2 & \frac{b}{ca} \\ & , & c \end{vmatrix}$

36) Show that $\begin{vmatrix} x & 1 & 1 & 1 \\ 1 & x & 1 & 1 \\ 1 & 1 & x & 1 \\ 1 & 1 & 1 & x \end{vmatrix} = (x + 3)(x - 1)^3$

37) Salve the equation by factorization: $\frac{a}{ax-1} + \frac{b}{bx-1} = a + b; x \neq \frac{1}{a}, \frac{a}{b}$

38) Without expansion verify that $\begin{vmatrix} rcos\emptyset & 1 & -sin\emptyset \\ 0 & 1 & 0 \\ rsin\emptyset & 0 & cos\emptyset \end{vmatrix} = r$

39) $if\ A = \begin{bmatrix} 2 & -1 \\ 3 & 1 \end{bmatrix}\ verify\ that\ (A^{-1})^t = (A^t)^{-1}$

40) Without expansion verify that $\begin{vmatrix} mn & l & l^2 \\ nl & m & m^2 \\ lm & n & n^2 \end{vmatrix} = \begin{vmatrix} 1 & l^2 & l^3 \\ 1 & m^2 & m^3 \\ 1 & n^2 & n^3 \end{vmatrix}$

41) find the matrix ***X if*** $X\begin{bmatrix} 5 & 2 \\ -2 & 1 \end{bmatrix} = \begin{bmatrix} -1 & 5 \\ 12 & 3 \end{bmatrix}$

42) Show that: $x^3 - y^3 = (x - y)(x - \omega y)(x - \omega^2 y)$

43) Evaluate: $(1 + \omega - \omega^2)(1 - \omega + \omega^2)$

44) Evaluate: $(1 + \omega - \omega^2)^8$

45) Evaluate: $(-1 + \sqrt{-3})^5 + (-1 - \sqrt{3})^5$

46) Solve the equations: $2x^4 - 32 = 0$

47) Salve the equations: $x^3 + x^2 + x + 1 = 0$

48) Use the factars theorem ta determine if the first polynomial is a factar of the second polynomial. $\omega + 2, 2\omega^3 + \omega^2 - 4\omega + 7$

49) Find four fourth roots of 16

50) If w is a cube root of unity, form an equation whose roots are 2ω and $2\omega^2$

51) Find roots of the equation by using quadratic formula: $15x^2 + 2ax - a^2 = 0$ $\frac{1}{\alpha^2} + \frac{1}{\beta^2}$

52) If α, β are the raots of $3x^2 - 2x + 4 = 0$, find the values of $\frac{\alpha}{\beta} + \frac{\beta}{\alpha}$

53) If α, β are the raots of $3x^2 - 2x + 4 = 0$, find the values of $\alpha^2 - \beta^2$

54) if α, β are the roots of $x^2 - px - p - c = 0$, prove that $(1 + d)(1 + \beta) = 1 - c$

55) if α, β are the roots of the equation $ax^2 + bx + c = 0$, from the equation whose raots are. α^2, β^2

56) If α, β are the raots of the equation $ax^2 + bx + c = 0$, fram the equation whose r0ots are. $\alpha + \frac{1}{\alpha}, \beta + \frac{1}{\beta}$

57) Discuss the nature of the raots of the equation. $x^2 - 5x + 6 = 0$

58) Discuss the nature of the roots of the equation. $25x^2 - 30x + 9 = 0$ $x^2 - 2\left(m + \frac{1}{m}\right)x + 3\ ; m \neq 0$

59) Show that the roots of the equation will be rational: $(p + q)x^2 - px - q = 0$

60) Find two consecutive numbers, whose productis 132 . (Hint: Suppose the numbers are x and x +1}

61) Use synthetic division to find the quotient and the remainder when the polynomial $x^4 - 10x^2 - 2x + 4$ is divided by $x + 3$

62) Discuss the nature of the raots of the equations: $2x^2+5x-1=0$

63) Which of the following sets have closure property w.r.t addition and multiplication ? (i)$\{0,-1\}$ (ii)$\{1,-1\}$

64) Theorems: $\forall z, z_1, z_2 \in C z\bar{z}=|z|^2$

65) Theorems $\forall z, z_1, z_2 \in C \left(\frac{z_1}{z_2}\right)=\frac{\overline{z_1}}{\overline{z_2}}$

66) Find the power set· $\{\{a, b\}, \{b, c\}, \{d, e\}\}$.

67) Reversal law of inverse if a, b are elements of group G, then show that $(ab)^{-1}b^{-1}a^{-1}$

68) Find x and y if $\begin{bmatrix} x+3 & 1 \\ -3 & 3y-4 \end{bmatrix}=\begin{bmatrix} y & 1 \\ -3 & 2x \end{bmatrix}$

69) Solve the equation $x^{\frac{1}{2}}-x^{\frac{1}{4}}-6=0$

70) Solve the equation $x^{\frac{2}{5}}+8=6x^{\frac{1}{5}}$

71) Prove Three Cube Roots of Unity .

72) The Sum of all the three cube roots of unity is zero. i.e., $1+\omega+\omega^2=0$

SHORT QUESTIONS SEC (B)

73) Resolve the following into Partial Fraction: $\frac{6x^3+5x^2-7}{2x^2-x-1}$

74) Resolve the Partial Fraction: $\frac{9}{(x+2)^2(x-1)}$

75) Resolve, $\frac{7x+25}{(x+3)(x+4)}$ into Partial Fractions.

76) Write the first four terms of the sequences, if $a_n=(-1)^n(2n-3)$

77) Write the first four terms of the sequences, if $a_n=na_{n-1}, a_1=1$

78) Find the indicated term of the sequence: $1-3, 5, -7, 9, -11, \ldots\ldots a_8$

79) Find the 13 th term of the sequence $x, 1, 2-x, 3-2x, \ldots.$

80) Which term of the A.P. $-2, 4, 10, \ldots$ is 148?

81) Resolve the Partial Fraction: $\frac{x^2}{(x-2)(x-1)^2}$

82) Resolve, $\frac{x^2+x-1}{(x+2)^3}$ into Partial Fractions.

83) Write the first four terms of the sequences, if $a_n=(-1)^n n^2$

84) Write the first four terms of the sequences, if $a_n=\frac{n}{2n+1}$

85) Write the first four terms of the sequences, if $a_n - a_{n-1} = n + 2, a_1 = 2$

86) If $a_{n-3} = 3n - 5$, find the nth term of the sequence.

87) Which term of the A.P. 5,2, −1, ... is −85 ?

88) How many terms are there in the A.P. in which $a_1 = 11, a_n = 68, d = 3$?

89) If the nth term of the A.P. is 3n − 1, find the A.P

90) xxvii) If $\frac{1}{a}, \frac{1}{b}$ and $\frac{1}{c}$ are in A.P., show that $b = \frac{2ac}{a+c}$

91) Sum the series $\frac{3}{\sqrt{2}} + 2\sqrt{2} + \frac{5}{\sqrt{2}} + \cdots + a_{13}$

92) Sum the series $1 + 4 - 7 + 10 + 13 - 16 + 19\ 22 - 25 + \cdots \ldots$ to 3 n terms.

93) Find the 11 th term of the sequence, $1 + i, 2, \frac{4}{1+i}$

94) Find G.M. between −2 and 8

95) For what value of $n, \frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ is the positive geometric mean between a and b

96) Find the 9th term of the harmonic sequence $\frac{-1}{5}, \frac{-1}{3}, -1, \ldots$

97) Iv) If 5 is the harmonic mean between 2 and b, findxxvi) Find the nth term of the sequence, $\left(\frac{4}{3}\right)^2, \left(\frac{7}{3}\right)^2 \left(\frac{10}{3}\right)^2,$

98) Find $A \cdot M$. between $x - 3$ and $x + 5$

99) Find three A. Ms between 3 and 11 .

100) Sum the series $1.11 + 1.41 + 1.71 + \cdots . + a_{10}$

101) How many terms of the series $-7 + (-5) + (-3) + \cdots$ amount to 65?

102) Find the 12 th term of 1 + I, 2i, −2 + 2i, ...

103) Find G.M. between −2i and 8i

104) Insert two G.Ms. between 1 and 16

105) Find the 9th term of the harmonic sequence $\frac{1}{3}, \frac{1}{5}, \frac{1}{7}, \ldots$

106) The first term of an H.P. is $-\frac{1}{3}$ and the fifth term is $\frac{1}{5}$. Find its 9th term.

107) If A, G and h are the arithmetic, geometric and harmonic means between a and b respectively, show that $G^2 = AH$

108) Find A, G, H and show that $G^2 = A \cdot H$. if (i) $a = -2, = b = 8$ (ii) $a = 2i, b = 4i$ (iii) $a = 9, b = 4$

109)	Find the sequence if $a_n - a_{n-1} = n + 1$ and $a_4 = 14$
110)	If $a_{n-2} = 3n - 11$, find the nth term of the sequence.
111)	Find the sum of the infinite G.P. $2, \sqrt{2}, 1, \dots$
112)	Write in the factorial form: $n(n-1)(n-2)\dots.(n-r+1)$
113)	Write in the factorial form: $\frac{(n+1)(n)(n-1)}{3.2.1}$
114)	Find the value of n when: ${}^{n}P_2 = 30,$
115)	Find the value of n when: ${}^{n}P_4 : {}^{n-1}P_3 = 9:1$
116)	How many arrangements of the letters of the words, taken all together, can be made: i) PAKPATTAN ii) PAKISTAN
117)	In how many ways can 4 keys be arranged on a circular key ring?
118)	Find A, G, H and verify that $A > G > H$ $(G > 0$, if (i) $a = 2, b = 8$ (ii) $a = \frac{2}{5}, b = \frac{8}{5}$
119)	Find the number of terms in the A.P. if: $a_1 = 3$, $d = 47$ and $a_n = 59$
120)	Find three A.Ms between $\sqrt{2}$ and $3\sqrt{2}$.
121)	Find the nth and 8 th terms of H.P ; $\frac{1}{2}, \frac{1}{5}, \frac{1}{8}, \dots$
122)	Evaluate: $\frac{4!2!}{15!(15-15}$
123)	Write in the factorial form: $(n+2)(n+1)(n)$
124)	Find the value of n when: ${}^{11}P_n = 11.10.9$
125)	How many signals can be given by 5 flags of different colours, using 3 flags at a time?
126)	How many arrangements of the letters of the words, taken all together, can be made: i) MATHEMATICS ii) ASSASSINATION
127)	How many nacklaces can be made from 6 beads of different colours?
128)	Evaluate: ${}^{n}C_4$
129)	Find the value of n, when ${}^{n}C_{10} = \frac{12\times 11}{2!}$
130)	Find the value of n and r, when ${}^{n}C_r = 35$ and ${}^{n}P_r = 210$
131)	Experiment: A die is rolled. The top shows Events Happening: (i) 3 or 4 dots (ii) dots less than 5.
132)	Two dice are thrown. What is the probability that the sum of the number of dots appearing on them is 4 or 6?

133)	If $^{n}C_8 = {}^{n}C_{12}$, find n.
134)	A die is rolled. What is the probability that the dots on the top greater than 4?
135)	Using the binomial theorem expand: $(a + 2b)^5$
136)	Find the value of n, when $^{n}C_5 = {}^{n}C_4$
137)	Find the value of n, when $^{n}C_{12} = {}^{n}C_6$
138)	What is the probability that a slip of numbers divisible by 4 is picked from the slips bearing number 1,2,3, … ,10?
139)	Using binomial theorem, find the values to three places of decimals $\sqrt{99}$
140)	Evaluate $\sqrt[8]{30}$ correct to three places of decimal.
141)	If $y = 1. + 2x + 4x^2 + 8x^3 + \cdots$ Show that $x = \frac{y-1}{2y}$
142)	Expand up to four terms taking the values of x such that the expansion in each is valid. $(1-x)^{\frac{1}{2}}$
143)	Using binomial theorem, find the values to three places of decimals $(1.03)^{\frac{1}{2}}$
144)	If a, b, c, d are in G.P, prove that $a^2 - b^2, b^2 - c^2, c^2 - d^2$ are in G.P

Short Questions Section (C)

1	Verify $\sin^2 30^\circ : \sin^2 45^0 : \sin^2 60^\circ : \sin^2 90^\circ = 1:2:3:4$
2	Prove that $\sin 2\alpha = 2\sin\alpha\cos\alpha$
3	Prove that $\cos 20^\circ + \cos 100^\circ + \cos 140^\circ = 0$
4	Solve the triangle ABC if $a = 32, b = 40 \& c = 66$
5	Prove that: $\frac{\cos\theta - \sin\theta}{\cos\theta + \sin\theta} = \frac{\cot\theta - 1}{\cot\theta + 1}$
6	Convert $16^\circ 30'$ to circular measure
7	Solve equation $\sin 2x = \cos x$
8	Show that $r_1 = s\tan\alpha$
9	Prove that $r = (s-b)\tan\frac{\beta}{2}$
10	Prove that $\frac{\sin 2\alpha}{1+\cos\alpha} = \tan\alpha$
11	Convert 21.256^0 to D ^{0} M' S" $''$
12	What is the Circular Measure of the angle between hands of a watch at $5O'$ clock?

13	Express $\sin(x+45°)\sin(x-45°)$ as sum or difference
14	Prove that: $\tan(\alpha+\beta)+\tan\gamma=0$
15	If α,β,γ are the angles of $\triangle$ ABC, prove that $\tan\alpha+\tan\beta+\tan\gamma=\tan\alpha\tan\beta\tan\gamma$
16	Express $2\sin 7\theta\cos 3\theta$ as sum & difference.
17	Show that $\frac{\sin(360°-\theta)\cos(180°-\theta)\tan(180°+\theta)}{\sin(90°-\theta)\cos(90°-\theta)\tan(360°+\theta)}=1$
18	Express $120'40''$ in radians
19	Define Radian.
20	Find θ, when $\ell=10$ cm and $r=2$ cm
21	State Fundamental Law of Trigonometry
22	What is the period of $3\cos\frac{x}{5}$?
23	Give the Cosine of Half the Angle in terms of the sides.
24	At the top of the cliff 80 m high, the angle of depression of a boat is 12°. How far is the boat from the cliff?
25	Find the area of the triangle ABC, given the sides $a=18, b=24, c=30$
26	Define Circum-Radius.
27	Show that $\cos^{-1}\frac{12}{13}=\sin^{-1}\frac{5}{13}$
28	Show that $\cos^{-1}(-x)=\pi-\cos^{-1}x$
29	Give or state hero's formula.
30	Prove that $\sec\theta\csc\theta\sin\theta\cos\theta=1$
31	If α,β,γ are the angles of a triangle ABC then prove that $\sin(\alpha+\beta)=\sin\gamma$
32	Find the value of $\cos 15°$
33	State Fundamental Law of Trigonometry.
34	Prove that $R=\frac{abc}{4\Delta}$ 35. Convert $\frac{25\pi}{36}$ into the measure of sexagesimal system.
35	Solve $\sin x\cos x=\frac{\sqrt{3}}{4}$
36	Express $\sin 5x+\sin x$ as a product.
37	Convert $75°6'30''$ to radians
38	Write domain & range of $\cos x$
39	Write domain & range of $\tan x$

40	Solve the equation $\cot^2\theta = \frac{1}{3}$
41	Prove that $\tan(45° + A)\tan(45° - A) = 1$
42	Show that $(\tan\theta + \cot\theta)^2 = \sec^2\theta \text{cosec}^2\theta$
43	Define In-circle
44	Find the Period of $\sin\frac{x}{5}$
45	Solve $\sin x + \cos x = 0$
46	Prove the identity $1 + \tan\alpha\tan 2\alpha = \sec 2\alpha$
47	Express $\cos 7\theta - \cos\theta$ as a product
48	Define Circum-circle
49	The area of a triangle is 2437 . If $a = 79, c = 97$ then find the angle β
50	Prove that $\sin\left(\theta + \frac{\pi}{6}\right) + \cos\left(\theta + \frac{\pi}{3}\right) = \cos\theta$
51	Show that $\cos(2\sin^{-1}x) = 1 - 2x^2$
52	If $\cot\theta = \frac{15}{8}$ & the terminal arm of the angle is not in I quad, find the values of $\cos\theta$&$\text{cosec}\,\theta$
53	Convert $54°45'$ into radians
54	Prove that $rr_1r_2r_3 = \Delta^2$
55	Express $2\sin 7\theta\sin 2\theta$ as a sum or difference
56	Define the Angle of Elevation
57	Convert $\frac{2\pi}{3}$ into radians
58	Find the solution of the equation $\tan^2\theta - \sec\theta - 1 = 0$ which lie in $[0,2\pi]$
59	Show that $\frac{1-\sin\theta}{\cos\theta} = \frac{\cos\theta}{1+\sin\theta}$
60	A ladder leaning against a vertical wall makes an angle of 24^0 with the wall. If its foot is 5 m from the wall, find its length.
61	Express $\cos 12° + \cos 48°$ as a product
62	Find the period of $3\tan\frac{x}{7}$
63	Prove that $\frac{\cos 11° + \sin 11°}{\cos 11° - \sin 11°} = \tan 56°$
64	Prove that $\frac{\cos 8° - \sin 8°}{\cos 8° + \sin 8°} = \tan 37°$

65 Prove that $\cos 2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

66 Show that $\frac{\sin\alpha-\sin\beta}{\sin\alpha+\sin\beta} = \tan\left(\frac{\alpha-\beta}{2}\right)\cot\left(\frac{\alpha+\beta}{2}\right)$

67 Show that $\frac{\cos(90°+\theta)\text{Sec}(-\theta)\tan(180°-\theta)}{}$

68 Find the measure of the greatest angle, if sides of triangle are 16, 20, 33

69 The measures of side of a triangular plot are 413,214&375 meters. Find the measure of the corner angles of the plot.

70 Prove that $(r_1 + r_2)\tan\frac{\gamma}{2} = a$

71 Prove that $(r_3 + r)\cot\frac{\gamma}{2} = c$ 73. Prove that $abc(\sin\alpha + \sin\beta + \sin\gamma) = 4\Delta s$

72 Solve $4\cos^2 x - 3 = 0$

73 Solve the trigonometric equation $\sec^2\theta = \frac{4}{3}$

74 Verify $\sin^2\frac{\pi}{6} : \sin^2\frac{\pi}{4} : \sin^2\frac{\pi}{3} : \sin^2\frac{\pi}{2} = 1:2:3:4$

75 Find x, if $\tan^2 45° - \cos^2 60° = x\sin 45°\cos 45°\tan 60°$

76 Verify $\sin^2\frac{\pi}{6} + \sin^2 + \text{Tan}^2\frac{\pi}{4} = 2$

77 Prove that $\sec^2 A + \text{cosec}^2 A = \sec^2 A\text{cosec}^2 A$

78 Show that $\tan^{-1} A + \cot^{-1} A = \frac{\pi}{2}$

79 Prove that $\frac{\tan\frac{\theta}{2}+\cot\frac{\theta}{2}}{\cot\frac{\theta}{2}-\tan\frac{\theta}{2}} = \sec\theta$

80 Prove that $\frac{\text{cosec}\,\theta+2\text{cosec}\,2\theta}{\sec\theta} = \cot\frac{\theta}{2}$

81 Prove that $\frac{2\tan\theta}{1-\tan^2\theta} = 2\sin\theta\cos\theta$

82 Prove that $2\tan^{-1} A = \tan^{-1}\frac{2A}{1-A^2}$

83 Prove that $\cos^2\theta - \sin^2\theta = \frac{1-\tan^2\theta}{1+\tan^2\theta}$

84 Prove that $\tan^{-1} A - \tan^{-1} B = \tan^{-1}\frac{A-B}{1-AB}$

85 Give the range and domain of $\cos^{-1} x$

86 Prove that $\tan^{-1}\frac{120}{119} = 2\cos^{-1}\frac{12}{13}$

87 Show that $\sin(2\cos^{-1} x) = 2x\sqrt{1-x^2}$

88	Prove that $\cos 2\alpha = 2\cos^2 \alpha - 1$
89	Write the Triple Angle Identity of $\tan 3\alpha$
90	Prove that $\sec\theta \text{cosec}\,\theta \sin\theta \cos\theta = 1$
91	What is the relation between a radian and a degree?
92	Is the relation $l = r\theta°$ valid?
93	Convert $\frac{19\pi}{32}$ into sexagesimal system.
94	What is the Circular Measure of the angle between hands of a watch at 8O′ clock?
95	A horse is tethered to a peg by a rope of 9 meters length & it can move in a circle with the peg as center. If the horse moves along the circumference of the circle, keeping the rope tight, how far will it have gone when the rope has turned an angle of 55° ?
96	Define Co-terminal Angles
97	Define Allied Angles
98	$\frac{1+\cos\theta}{1-\cos\theta} = (\text{cosec}\,\theta + \cot\theta)^2$

Long Questions

Chapter 2

Q.1 Prove that $p \vee (\sim p \wedge \sim q) \vee (p \wedge q) = p \vee (\sim p \wedge \sim q)$

Q.2 Convert $(A \cup B) \cup C = A \cup (B \cup C)$ into logical form and prove it by constructing the truth table.

Q.3 Give the logical proof of De Morgan's Law.

Q.4 Convert the theorem $(A \cup B)' = A' \cup B'$ to logical statement and prove them by constructing truth tables.

Q.5 Show that the set $\{1, \omega, \omega^2\}, \omega^3 = 1$, is an Abelian group w.r.t ordinary multiplication.

Q.6 Prove that $2x2$ non singular matrices over the real field form a non-abelian group under multiplication.

Q.7 Consider the set $S = \{1, -1, \text{i} - \text{i}\}$.Set up its multiplication table and show that the set S is an abelian group under multiplication.

Q.8 Give logical proofs of the following theorems

i) $A \cap (B \cup C) = (A \cap B) \cup (A \cap C)$

ii) $(A \cup B)' = A' \cap B'$

Q.9 If a,b are elements of a group G, solve the following equations:

ii) $xa = b$

i) $ax = b$

Chapter 3

Q.1 Find x and y if $\begin{bmatrix}2 & 0 & x\\ 1 & y & 3\end{bmatrix} + 2\begin{bmatrix}1 & x & y\\ 0 & 2 & -1\end{bmatrix} = \begin{bmatrix}4 & -2 & 3\\ 1 & 6 & 1\end{bmatrix}$

Q.2 Solve the following system of linear equations: $3x - 5y = 1; -2x + y = -3$

Q.3 Solve the following matrix equation for A: $\begin{bmatrix}4 & 3\\ 2 & 2\end{bmatrix}A - \begin{bmatrix}2 & 3\\ -1 & -2\end{bmatrix} = \begin{bmatrix}-1 & -4\\ 3 & 6\end{bmatrix}$

Q.4 Show that $\begin{vmatrix}-a & 0 & c\\ 0 & a & -b\\ b & -c & 0\end{vmatrix} = 0$

Q.5 Show that $\begin{vmatrix}a+\lambda & b & c\\ a & b+\lambda & c\\ a & b & c+\lambda\end{vmatrix} = \lambda^2(a+b+c+\lambda)$

Q.6 If $A = \begin{bmatrix}1 & 0 & 2\\ 0 & 2 & 1\\ 1 & -1 & 1\end{bmatrix}$ then find A^{-1} by using adjoint of the matrix.

Q.7 Show that $\begin{vmatrix}x & 1 & 1 & 1\\ 1 & x & 1 & 1\\ 1 & 1 & x & 1\\ 1 & 1 & 1 & x\end{vmatrix} = (x+3)(x-1)^3$

Q.8 Show that $\begin{vmatrix}b+c & a & a^2\\ c+a & b & b^2\\ a+b & c & c^2\end{vmatrix} = (a+b+c)(a-b)(b-c)(c-a)$

Q.9 Without expansion ,verify that $\begin{vmatrix}1 & a^2 & \frac{a}{bc}\\ 1 & b^2 & \frac{b}{ca}\\ 1 & c^2 & \frac{c}{ab}\end{vmatrix} = 0$

Q.10 Solve the following systems of linear equations by Cramer's rule.

$$2x + 2y + z = 3$$
$$3x - 2y - 2z = 1$$
$$5x + y - 3z = 2$$

Q.11 Use matrices to solve the following systems:

$$x - 2y + z = -1$$
$$3x + y - 2y = 4$$
$$y - z = 1$$

Q.12 Solve the system of linear equations by Cramer's rule.

$$3x_1 + x_2 - x_3 = -4$$
$$x_1 + x_2 - 2x_3 = -4$$
$$-x_1 + 2x_2 - x_3 = 1$$

Q.13 Use matrices to solve the system

$$x_1 - 2x_2 + x_3 = -4$$
$$2x_1 - 3x_2 + 2x_3 = -6$$
$$2x_1 + 2x_2 + x_3 = 5$$

Chapter 4:

Q.1 Solve by factorization $\frac{a}{ax-1}+\frac{b}{bx-1}=a+b; x\neq\frac{1}{a},\frac{1}{b}$
Q.2 Solve by quadratic formula $(a+b)x^2+(a+2b+c)x+b+c=0$
Q.3 Solve by quadratic formula $(x-a)(x-b)+(x-b)(x-c)+(x-c)(x-a)=0$
Q.4 Solve $x^2+x-4+\frac{1}{x}+\frac{1}{x^2}=0$
Q.5 Solve $4.2^{2x+1}-9.2^x+1=0$
Q.6 Solve $3^{2x-1}-12.3^x+81=0$
Q.7 Show that $(1+\omega)(1+\omega^2)(1+\omega^4)(1+\omega^8)\ldots .2n$ factors $=1$
Q.8 Find the condition that one root of $ax^2+bx+c=0, a\neq 0$ is square of the other.
Q.9 $x^3+y^3+z^3-3xyz=(x+y+z)(x+\omega y+\omega^2 z)(x+\omega^2 y+\omega z)$
Q.10 If the roots of $px^2+qx+q=0$ are α and β, prove that $\sqrt{\frac{\alpha}{\beta}}+\sqrt{\frac{\beta}{\alpha}}+\sqrt{\frac{\bar{q}}{p}}=0$
Q.11 If α,β are the roots of $5x^2-x-2=0$ form the equation whose roots are $\frac{3}{\alpha}$ and $\frac{3}{\beta}$.
Q.12 Show that the roots of $x^2+(mx+c)^2=a^2$ will be equal if $c^2=a^2(1+m^2)$.
Q.13 Show that the roots of $(mx+c)^2=4ax$ will be equal if $c=\frac{a}{m}; m\neq 0$
Q.14 Prove that will have equal roots if $\frac{x^2}{a^2}+\frac{(mx+c)^2}{b^2}=1$ will have equal roots if $c^2=a^2m^2+b^2;; a\neq 0, b\neq 0$
Q.15 Solve $3x+4y=25; \frac{3}{x}+\frac{4}{y}=2$
Q.16 Solve the system of equation : $x+y=a+b$ and $\frac{a}{x}+\frac{b}{y}=2$
Q.17 Prove that sum of three cube roots of unity is zero.
Q.18 Prove that $(-1+\sqrt{-3})^4+(-1-\sqrt{-3})^4=-16$
Q.19 If α,β are the roots of $5x^2-x-2=0$, form the equation whose roots are $\frac{3}{\alpha}$ and $\frac{3}{\beta}$
Q.20 Solve $x^2+(y+1)^2=18; (x+2)^2+y^2=21$

Chpater 6

Q.1 Find n so that $\frac{a^n+b^n}{a^{n+1}+b^{n+1}}$ may be the A.M. between a and b.
Q.2 The sum of 9 terms of an A.P. is 171 and its eight term is 31. Find the series.
Q.3The sum of three numbers in an A.P. is 24 and their product is 440 . Find the numbers.
Q.4 Find the four numbers in A.P. whose sum is 32 and the sum of whose squares is 276.
Q.5 Find three consecutive numbers in G.P. whose sum is 26 and their product is 216.
Q.6 Show that the reciprocals of the terms of the terms of the geometric sequence $a_1, a_1r^2, a_1r^4, \ldots$ from another geometric sequence.
Q.7 If the sum of the four consecutive terms in G.P. is 80 and A.M. of the second and the fourth of them is 30 .Find the terms.

Q.8 If a,b,c,d are in G.P. prove that $a^2-b^2, b^2-c^2, c^2-a^2$ are in G.P. Q.9 For what value of n, is $\frac{a^n+b^n}{a^{n-1}+b^{n-1}}$ the positive geometric mean between two distinct numbers a and b ?

Q.10 If $y=\frac{x}{2}+\frac{1}{4}x^2+\frac{1}{8}x^3+\cdots$ and if $0<x<2$,then prove that $x=\frac{2y}{1+y}$

Q.11 If $y=\frac{2}{3}x+\frac{4}{9}x^2+\frac{8}{27}x^3+\cdots$ and if $0<x<\frac{3}{2}$,then prove that $x=\frac{3y}{2(1+y)}$

Q.12 Find the five numbers in A.P. whose sum is 25 and sum of whose Squares is 135.

Q.13 If S_2, S_3, S_5 are the sums of $2n, 3n, 5n$ terms of an A.P.,show that $S_5=5(S_3-S_2)$

Q.14 Show that the sum of n A.Ms. between a and b is equal to n times their A.M.

Q.15 If $y=1+\frac{x}{2}+\frac{x^2}{4}+\cdots$ then show that $x=2\left(\frac{y-1}{y}\right)$

Q.16 The sum of an infinite geometric series is 9 and the sum of the squares of its terms is $\frac{81}{5}$. Find the series.

Chapter 7

Q.1Find the numbers greater than 23000 that can be formed from the digits 1,2,3,5,6 without repeating any digits.

Q.2 How many 6-digit numbers can be formed,without repeating any digit from the digits 0,1,2,3,4,5 ? In how many of them will 0 be at the tens place?

Q.3 Prove that ${}^{n}C_r + {}^{n}C_{r-1} = {}^{n+1}C_r$

Q.4 How many 6-digit numbers can be formed from the digits 2,2,3,3,4,4? How many Of them will lie between 400,000 and 430,000 ?

Q.5 In how many ways can be letters of the word MISSISSIPPI be arranged when all the letters are to be used?

Q.6 Prove from the first principle that

i) ${}^{n}P_r = {}^{n-1}P_r + r\cdot {}^{n-1}P_{r-1}$

ii) ${}^{n}P_r = n.\ {}^{n-1}P_{r-1}$ Q.7 Find the value of n when

iii) ${}^{11}P_n = 11.10.9$

iv) ${}^{n}P_2 = 30$

Q.8 How many numbers greater than 1000,000 can be formed from the digits 0,2,2,2,3,4,4 ?

Q.9 Find the value of n and r, when ${}^{n}C_r = 35$ and ${}^{n}P_r = 210$

Chapter 8

Q.1 Use mathematical induction to prove that

i) $1+3+5+\cdots+(2n-1)=n^2$

ii) $1+4+7+\cdots+(3n-2)=\frac{n(3n-1)}{2}$

iii) $1+5+9+\cdots+(4n-3)=n(2n-1)$

Q.2 Find the term independent of x in the expansion

i) $\left(x-\frac{2}{x}\right)^{10}$

ii) $\left(\sqrt{x}+\frac{1}{2x^2}\right)^{10}$

Q.3 Find the term involving x^4 in the expansion of $(3-2x)^7$

Q.4 Use binomial theorem to show that $1+\frac{1}{4}+\frac{1.3}{4.8}+\frac{1.3.5}{2.4.6}+\cdots=\sqrt{2}$

Q.5 If x is so small that its square and higher powers can be neglected, then show that

$$\frac{1-x}{\sqrt{1+x}}=1-\frac{3}{2}x$$

Q.6 If $y=\frac{1}{3}+\frac{1.3}{2!}\left(\frac{1}{3}\right)^2+\cdots$,then prove that $y^2+2y-2=0$

Q.7 Find the coefficient of x^5 in the expansion of $\left(x^2-\frac{3}{2x}\right)^{10}$

Q.8 If x is very nearly equal to 1 , then prove that $px^p-qx^q=(p-q)x^{p+q}$

Q.9 Find the term involving x^{-2} in the expression of $\left(x-\frac{2}{x^2}\right)^{13}$

Q.10 Determine the middle term or terms in the following expansions $\left(\frac{3}{2}x-\frac{1}{3x}\right)^{11}$

Q.11 If x is so small that its square and higher powers can be neglected, then show that

$$\frac{1+x}{\sqrt{1-x}}=1+\frac{3}{2}x$$

Q.12 If $2y=\frac{1}{2^2}+\frac{1.3}{2!}\frac{1}{2^4}+\frac{1.3.5}{3!}\frac{1}{2^6}+\cdots$, then prove that $4y^2+4y-1=0$

Chapter 9

Q.1 If $\cot\theta=\frac{15}{8}$ and the terminal arm of the angle is not in first quadrant, find the value $\cos\theta$ and $\operatorname{cosec}\theta$.

Q.2 If $\operatorname{cosec}\theta=\frac{m^2+1}{2m}$ and $0<\theta<\frac{\pi}{2}$ find the value of the remaining trigonometric ratio.

Q.3 Prove the identity $\frac{1}{\operatorname{cosec}\theta-\cot\theta}-\frac{1}{\sin\theta}=\frac{1}{\sin\theta}-\frac{1}{\operatorname{cosec}\theta+\cot\theta}$

Q.4 Prove that $\frac{\tan\theta+\sec\theta-1}{\tan\theta+\sec\theta+1}=\tan\theta+\sec\theta$

Q.5 Prove that $\frac{1-\sin\theta}{\cos\theta}=\frac{\cos\theta}{1+\sin\theta}$

Q.6 $\sin^6\theta-\cos^6\theta=(\sin^2\theta-\cos^2\theta)(1-\sin^2\theta\cos^2\theta)$

Q.7 $\sin^6\theta+\cos^6\theta=1-3\sin^2\theta\cos^2\theta$

Q.8 If $\tan\theta=\frac{1}{\sqrt{7}}$ and the terminal arm of the angle is not in the III quadrant, find the value of $\frac{ssc^2\theta-\sec^2\theta}{\csc^2\theta+\sec^2\theta}=\frac{3}{4}$.

Q.9 Find the value of the other five trigonometric functions of θ, if $\cos\theta=\frac{12}{13}$ and the terminal side of the angle is not in the I quadrant.

Q.10 Prove that $(\tan\theta+\cot\theta)^2=\sec^2\theta\csc^2\theta$

Q.11 If $\cot\theta = \frac{5}{2}$ and terminal arm of the angle is in the first quadrant, find the value of $\frac{3\sin\theta+4\cos\theta}{\cos\theta-\sin\theta}$

Chapter 10

Q.1 Prove the identity $\frac{\sin 3\theta}{\sin\theta} - \frac{\cos 3\theta}{\cos\theta} = 2$

Q.2 If $\sin\alpha = \frac{4}{5}$ and $= \frac{40}{41}$, where $0 < \alpha < \frac{\pi}{2}$ and $0 < \beta < \frac{\pi}{2}$ Show that $\sin(\alpha - \beta) = \frac{113}{205}$

Q.3 Reduce $\cos^4\theta$ to an expression involving only function of multiple of θ, raised to the first power.

Q.4 $\sqrt{\frac{1+\sin\alpha}{1-\sin\alpha}} = \frac{\sin\frac{\alpha}{2}+\cos\frac{\alpha}{2}}{\sin\frac{\alpha}{2}-\cos\frac{\alpha}{2}}$

Q.5 Show that $\cot(\alpha+\beta) = \frac{\cot\alpha\cot\beta-1}{\cot\alpha+\cot\beta}$

Q.6 Reduce $\sin^4\theta$ to an expression involving only function of multiple of θ, raised to the first power.

Q.7 Prove that $\frac{\sin\theta+\sin 3\theta+\sin 5\theta+\sin 7\theta}{\cos\theta+\cos 3\theta+\cos 5\theta+\cos 7\theta} = \tan 4\theta$

Q.8 Prove that $\cos 20^\circ \cos 40^\circ \cos 60^\circ \cos 80^\circ = \frac{1}{16}$

Q.9 Prove that $\sin\frac{\pi}{9}\sin\frac{2\pi}{9}\sin\frac{\pi}{3}\sin\frac{4\pi}{9} = \frac{3}{16}$

Q.10 Prove that $\sin 10^\circ \sin 30^\circ \sin 50^\circ \sin 70^\circ = \frac{1}{16}$

Q.11 Prove that $\frac{\cos 8^\circ - \sin 8^\circ}{\cos 8^\circ + \sin 8^\circ} = \tan 37^\circ$

Q.12 If α, β, γ are the angles of triangle ABC,show that $\cot\frac{\alpha}{2} + \cot\frac{\beta}{2} + \cot\frac{\gamma}{2} = \cot\frac{\alpha}{2}\cot\frac{\beta}{2}\cot\frac{\gamma}{2}$

Q.13 Prove that $\frac{\sin A+\sin 2A}{1+\cos A+\cos 2A} = \tan A$

Q.14 Show that $\cos(\alpha+\beta)\cos(\alpha-\beta) = \cos^2\alpha - \sin^2\beta = \cos^2\beta - \sin^2\alpha$

Chapter 12

Q.1 Solve the triangle ABC, in which $a = 3, c = 6, \beta = 36^\circ 20'$

Q.2 Solve the triangle ABC, in which $a = 7, b = 3, \gamma = 38^\circ 13'$

Q.3 Solve the triangle ABC, in which $a = 32, b = 40, c = 66$

Q.4 The sides of triangle are $x^2 + x + 1, 2x + 1$ and $x^2 - 1$. Prove that the greatest angle of the triangle is 120°.

Q.5 Show that $r = a\sin\frac{\beta}{2}\sin\frac{\gamma}{2}\sec\frac{\alpha}{2}$

Q.6 Show that $r_1 = 4R\sin\frac{\alpha}{2}\cos\frac{\beta}{2}\cos\frac{\gamma}{2}$

Q.7 Show that $r_1 = s\tan\frac{\alpha}{2}$

Q.8 Prove that in equilateral triangle $r: R: r_1 = 1: 2: 3$

Q.9 Prove that $r = s\tan\frac{\alpha}{2}\tan\frac{\beta}{2}\tan\frac{\gamma}{2}$

Q.10 Prove that $(r_1 + r_2)\tan\frac{\gamma}{2} = c$

Q.11 With usual notations, prove that $R = \frac{abc}{4\Delta}$

Q.12 With usual notations, prove that $r = \frac{\Delta}{s}$

Q.13 Prove that Law of Cosine.

Q.14 Prove that Law of Sine.

Q.15 Show that $r = (s-a)\tan\frac{\alpha}{2} = (s-b)\tan\frac{\beta}{2} = (s-c)\tan\frac{\gamma}{2}$

Q.16 Prove that $abc(\sin\alpha + \sin\beta + \sin\gamma) = 4\Delta s$.

Q.17 Prove that $\mathrm{r_1 r_2 + r_2 r_3 + r_3 r_1 = s^2}$

Q.18 Prove that $r_1 + r_2 + r_3 - r = 4R$

Chapter 13

Q.1 Prove that $\sin^{-1}\frac{5}{13} + \sin^{-1}\frac{7}{25} = \cos^{-1}\frac{253}{325}$

Q.2 prove that $\sin^{-1}\frac{3}{5} + \sin^{-1}\frac{8}{17} = \sin^{-1}\frac{77}{85}$

Q.3 Prove that $\sin^{-1}\frac{1}{\sqrt{5}} + \cot^{-1}3 = \frac{\pi}{4}$

Q.4 Prove that $\tan^{-1}\frac{3}{4} + \tan^{-1}\frac{3}{5} - \tan^{-1}\frac{8}{19} = \frac{\pi}{4}$

Q.5 Prove that $\sin^{-1}A + \sin^{-1}B = \sin^{-1}\left(A\sqrt{1-B^2} + B\sqrt{1-A^2}\right.$

Q.6 Prove that $\sin^{-1}\frac{77}{85} - \sin^{-1}\frac{3}{5} = \cos^{-1}\frac{15}{17}$

Q.7 Prove that $\tan^{-1}\frac{1}{11} + \tan^{-1}\frac{5}{6} = \tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{2}$

Q.8 Prove that $2\tan^{-1}\frac{1}{3} + \tan^{-1}\frac{1}{7} = \frac{\pi}{4}$