**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 603**

**Time :** 09:42:00 **MATHEMATICS**

**Marks :** 563

4.DETERMINANTS

**Single Correct Answer Type**

| 1. | If and , then equals | | | | | | | |
|  | a) | 4 | b) | 6 | c) | 8 | d) | None of these |
| 2. | If are, respectively, the cofactors of the elements of the determinant , then the value of is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 3. | Let . Then the value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 4. | The number of distinct real root of in the interval is | | | | | | | |
|  | a) | 0 | b) | 2 | c) | 1 | d) | 3 |
| 5. | If then equals | | | | | | | |
|  | a) | 1 | b) |  | c) | 2 | d) |  |
| 6. | Given and , where and are not all zero, then the value of is | | | | | | | |
|  | a) | 0 | b) | 1 | c) |  | d) | None of these |
| 7. | If is a cube root of unity, then value of the determinant is | | | | | | | |
|  | a) | 0 | b) | 1 | c) |  | d) |  |
| 8. | If, then the value of is | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 3 | d) | 4 |
| 9. | . The value of is equal to | | | | | | | |
|  | a) | 1 | b) |  | c) | Zero | d) | None of these |
| 10. | The parameter, on which the value of the determinant does not depend, is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 11. | If , then | | | | | | | |
|  | a) | are in A.P. | b) | are in G.P. | c) | are in H.P. | d) | None of these |
| 12. | The determinant is equal to | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 13. | If , then is | | | | | | | |
|  | a) | Purely real | | | b) | Purely imaginary | | |
|  | c) | where | | | d) | where | | |
| 14. | If and are non-zero real numbers, then is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 15. | If , then ‘’ is equal to | | | | | | | |
|  | a) | 0 | b) |  | c) | 3 | d) | None of these |
| 16. | Let be three mutually perpendicular unit vectors, then the value of is equal to | | | | | | | |
|  | a) | Zero | b) |  | c) |  | d) | None of these |
| 17. | The value of the determinant is | | | | | | | |
|  | a) |  | | | b) | 0 | | |
|  | c) |  | | | d) |  | | |
| 18. | If are the roots of then the value of the determinant | | | | | | | |
|  | a) |  | b) |  | c) | 0 | d) |  |
| 19. | If is a complex cube root of unity, then value of is | | | | | | | |
|  | a) | 0 | b) |  | c) | 2 | d) | None of these |
| 20. | If are in A.P., then the value of the determinant  is | | | | | | | |
|  | a) | 1 | b) |  | c) |  | d) |  |
| 21. | If and then the value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 22. | Value of , where are non-zero real numbers, is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 23. | Roots of the equation are | | | | | | | |
|  | a) | Independent of and | | | b) | Independent of and | | |
|  | c) | Depend on and | | | d) | Independent of and | | |
| 24. | If and are the roots of the equation , then is equal to | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 25. | If and discriminant of is negative, then is | | | | | | | |
|  | a) | +ve | | | b) |  | | |
|  | c) | ve | | | d) | 0 | | |
| 26. | If and , then is a polynomial of degree | | | | | | | |
|  | a) | 0 | b) | 1 | c) | 2 | d) | 3 |
| 27. | If are non-zero real numbers and if the equations have a non-trivial solution, then equals | | | | | | | |
|  | a) |  | b) |  | c) | 1 | d) | None of these |
| 28. | If , then the line passes through the fixed point which is | | | | | | | |
|  | a) | (1, 2) | b) | (1, 1) | c) | (, 1) | d) | (1, 0) |
| 29. | The value of determinant is | | | | | | | |
|  | a) | Always positive | b) | Always negative | c) | Always zero | d) | Cannot say anything |
| 30. | If , then | | | | | | | |
|  | a) | and has one common root | | | b) | and has one common root | | |
|  | c) | Sum of roots of is | | | d) | None of these | | |
| 31. | If , then represents | | | | | | | |
|  | a) | A straight line parallel to -axis | | | b) | A straight line parallel to -axis | | |
|  | c) | Parabola | | | d) | A straight line with negative slope | | |
| 32. | If , then is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 33. | Let such that no two of them are equal and satisfy , then equation has | | | | | | | |
|  | a) | At least one root in | | | b) | At least one root in | | |
|  | c) | At least one root in | | | d) | At least two roots in | | |
| 34. | Consider the set of all determinants of order 3 with entries 0 or 1 only. Let be the subset of consisting of all determinants with values . Then | | | | | | | |
|  | a) | is empty | | | | | | | |
|  | b) | has as many elements as | | | | | | | |
|  | c) |  | | | | | | | |
|  | d) | has twice as many elements as elements as | | | | | | | |
| 35. | If and , then the value of is | | | | | | | |
|  | a) | 1 | b) | 2 | c) |  | d) |  |
| 36. | If , etc and , etc, and , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 37. | Which of the following is not the root of the equation | | | | | | | |
|  | a) | 2 | b) | 0 | c) | 1 | d) |  |
| 38. | If and , then is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 39. | If , where are all different, then the determinant vanishes when | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 40. | If the system of equations has a non-zero solution then the possible values of are | | | | | | | |
|  | a) |  | b) | 1, 2 | c) | 0, 1 | d) |  |
| 41. | Value of depends upon | | | | | | | |
|  | a) | only | b) | only | c) | only | d) | None of these |
| 42. | The set of equations , has non-trivial solution(s) | | | | | | | |
|  | a) | For non value of and | | | b) | For all values of and | | |
|  | c) | For all values of and only two values of | | | d) | For only one value of and all values of | | |
| 43. | Let , then value of is | | | | | | | |
|  | a) | Non-negative | b) | Non-positive | c) | Negative | d) | Positive |
| 44. | Let . Then the value of is equal to | | | | | | | |
|  | a) | Zero | b) |  | c) | 16 | d) |  |
| 45. | The value of the determinant is equal to | | | | | | | |
|  | a) | 1 | b) | 0 | c) | 2 | d) | 3 |
| 46. | Let be the set of third-order determinants that can be made with the distinct non-zero real numbers . Then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 47. | If are the angles of a triangle and the system of equations  Has non-trivial solutions, then triangle is necessarily | | | | | | | |
|  | a) | Equilateral | b) | Isosceles | c) | Right angled | d) | Acute angled |
| 48. | If and the system of equations and is consistent, then the possible real values of are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 49. | Let be the real numbers. Then following system of equation in and , , has | | | | | | | |
|  | a) | No solution | | | b) | Unique solution | | |
|  | c) | Many solutions | | | d) | Finitely many solutions | | |
| 50. | The value of is equal to | | | | | | | |
|  | a) | Zero | b) |  | c) |  | d) | None of these |
| 51. | The value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 52. | The value of the determinant is equal to | | | | | | | |
|  | a) | 1 | b) |  | c) | 0 | d) | None of these |
| 53. | The number of positive integral solutions of the equation is | | | | | | | |
|  | a) | 0 | b) | 3 | c) | 6 | d) | 12 |
| 54. | In triangle if  , then the triangle must be | | | | | | | |
|  | a) | Equilateral | b) | Isosceles | c) | Obtuse angled | d) | None of these |
| 55. | If then is equal to | | | | | | | |
|  | a) | 0 | b) | 1 | c) | 500 | d) |  |
| 56. | If and are 3-digit even natural numbers and  , then is | | | | | | | |
|  | a) | Divisible by 2 but not necessarily by 4 | | | b) | Divisible by 4 but not necessarily by 8 | | |
|  | c) | Divisible by 8 | | | d) | None of these | | |
| 57. | The system of equations  Has no solution if is | | | | | | | |
|  | a) | Either or 1 | b) |  | c) | 1 | d) | Not |
| 58. | are distinct real numbers, not equal to one. If and have a non-trivial solution, then the value of is equal to | | | | | | | |
|  | a) |  | b) | 1 | c) | Zero | d) | None of these |
| 59. | If , then the value of is | | | | | | | |
|  | a) | 2 | b) | 4 | c) | 0 | d) | None of these |
| 60. | and . Then is equal to | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 61. | If are different , then the value of satisfying is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | 0 |
| 62. | Let be a positive integer and  Then the value of is given by | | | | | | | |
|  | a) | 0 | b) |  | c) |  | d) |  |
| 63. | For the equation | | | | | | | |
|  | a) | There are exactly two distinct roots | | | b) | There is one pair of equation real roots | | |
|  | c) | There are three pairs of equal roots | | | d) | Modulus of each root is 2 | | |
| 64. | If are in G.P. with common ratio and are in G.P. with common ratio , and equations have only zero solution, then which of the following is not true? | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 65. | The value of the determinant is | | | | | | | |
|  | a) | Dependant on | | | b) | Dependant on | | |
|  | c) | Dependant on | | | d) | 0 | | |
| 66. | If are angles of a triangle, then the value of is | | | | | | | |
|  | a) | 1 | b) |  | c) |  | d) |  |
| 67. | If , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 68. | If are in A.P., then the value of determinant is | | | | | | | |
|  | a) | 1 | b) | 0 | c) |  | d) |  |
| 69. | If , then the value of the determinant  is | | | | | | | |
|  | a) | 0 | b) |  | c) | 1 | d) | None of these |
| 70. | If , and are in G.P., then the value of depends on | | | | | | | |
|  | a) | and | | | b) | and | | |
|  | c) | and | | | d) | Independent of and | | |
| 71. | If are non-zeros, then the system of equations has a non-trivial solution if | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 72. | If and if , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 73. | If , where , then value of ‘’ is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 74. | If from a G.P. and , for all , then is equal to | | | | | | | |
|  | a) | 0 | b) | 1 | c) | 2 | d) | 3 |
| 75. | The value of , where are, respectively, and terms of an H.P., is | | | | | | | |
|  | a) |  | b) | 0 | c) | 1 | d) | None of these |
| 76. | If , then the value of the determinant , where , is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 77. | Suppose and. Then | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 78. | The value of the determinant is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 79. | If are positive and are the and terms, respectively, of a G.P., then is | | | | | | | |
|  | a) | 0 | b) |  | c) |  | d) | None of these |
| 80. | If the determinant , then the value of is | | | | | | | |
|  | a) | 0 | b) | 2 | c) |  | d) | 1 |
| 81. | If are different from zero and , then the value of the expression is | | | | | | | |
|  | a) | 0 | b) |  | c) | 1 | d) | 2 |
| 82. | If and are the given determinants, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 83. | If a determinant of order is formed by using the numbers 1 or , then the minimum value of the determinant is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 84. | If the system of linear equations and has a unique solution, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 85. | If  and , then the value of is | | | | | | | |
|  | a) | 1 | b) | 2 | c) | 4 | d) | None of these |
| 86. | If denotes the greatest integer less than or equal to the real number under consideration, and , then the value of the determinant  is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 87. | If and the system of equations  Has a non-trivial solution, then value of is | | | | | | | |
|  | a) |  | b) | 0 | c) | 1 | d) | 2 |
| 88. | When the determinant is expanded in powers of , then the constant term in that expression is | | | | | | | |
|  | a) | 1 | b) | 0 | c) |  | d) | 2 |
| 89. | If the value of the determinant is positive, then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 90. | If , then the value of is | | | | | | | |
|  | a) | 8 | b) | 27 | c) | 1 | d) |  |
| 91. | The determinant if | | | | | | | |
|  | a) | are in A.P. | b) | are in G.P. | c) | are in H.P. | d) | are in A.P. |
| 92. | The value of the determinant of order, being given by  is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 93. | If , one root of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |

**Multiple Correct Answers Type**

| 94. | The determinant is equal to zero, if | | | | | | | |
|  | a) | are in AP | | | b) | are in GP | | |
|  | c) | are in HP | | | d) | is the root of | | |
| 95. | If then | | | | | | | |
|  | a) | is independent of | b) | is independent of | c) | is a constant | d) |  |
| 96. | If , then | | | | | | | |
|  | a) |  | | | b) | is a straight line parallel to -axis | | |
|  | c) |  | | | d) | None of these | | |
| 97. | If , then | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | 0 | | |
| 98. | The determinant is divisible by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 99. | Let , where the symbols have their usual meanings. The is divisible by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of the above |
| 100. | The determinant , if | | | | | | | |
|  | a) | are in A.P. | b) | are in G.P. | c) | are in H.P. | d) | is a root of the equation |
| 101. | The determinant is divisible by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 102. | If , then | | | | | | | |
|  | a) | Graphs of is symmetrical about origin | | | b) | Graphs of is symmetrical about -axis | | |
|  | c) |  | | | d) | is an odd function | | |
| 103. | If , where is a polynomial of degree <3, then | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 104. | Eliminating from , we get | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 105. | If determinant is | | | | | | | |
|  | a) | Positive | b) | Independent of | c) | Independent of | d) | None of these |
| 106. | If and then | | | | | | | |
|  | a) | Re | b) | Im | c) | Re | d) | Im |
| 107. | If , then | | | | | | | |
|  | a) | has exactly 2 real solutions in | | | b) | has exactly 3 real solutions in | | |
|  | c) | Range of function is | | | d) | Range of function is | | |
| 108. | If , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 109. | If are non-zero real numbers such that , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 110. | If , then is divisible by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 111. | The values of for which the system of equations admits of non-trivial solution is | | | | | | | |
|  | a) | 2 | b) | 5/2 | c) | 3 | d) | 5/4 |
| 112. | If , then a factor of is | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 113. | Which of the following has/have value equal to zero? | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) |  | | |
| 114. | If , then | | | | | | | |
|  | a) |  | | | b) |  | | |
|  | c) |  | | | d) | None of these | | |
| 115. | The roots of the equation are | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| 116. | is independent of | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 117. | If , then | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| 118. | Let where the symbols have their usual meanings. Then is divisible by | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |
| --- | --- | --- | --- |
| **Assertion - Reasoning Type** | | | |
| This section contain(s) 0 questions numbered 119 to 118. Each question containsstatement 1(Assertion) and statement 2(Reason). Each question has the 4 choices (a), (b), (c) and (d) out of which **only one** is correct. | | | |
|  | a) | Statement 1 is True, Statement 2 is True; Statement 2 **is** correct explanation for Statement 1 | |
|  | b) | Statement 1 is True, Statement 2 is True; Statement 2 **is not** correct explanation for Statement 1 | |
|  | c) | Statement 1 is True, Statement 2 is False | |
|  | d) | Statement 1 is False, Statement 2 is True | |

|  |  |  |  |
| --- | --- | --- | --- |
| 119 |  | | |
|  | **Statement 1:** | | If , then |
|  | **Statement 2:** | | If system of equations has non-trivial solutions, |

|  |  |  |  |
| --- | --- | --- | --- |
| 120 | Consider the system of equation and | | |
|  | **Statement 1:** | | If the system has infinite number of solutions, then |
|  | **Statement 2:** | | The determinant for |

|  |  |  |  |
| --- | --- | --- | --- |
| 121 |  | | |
|  | **Statement 1:** | | If and are the angles of a triangle and  , then triangle may not be equilateral |
|  | **Statement 2:** | | If any two rows of a determinant are the same, then the value of that determinant is zero |

|  |  |  |  |
| --- | --- | --- | --- |
| 122 | Let are three integers lying between 1 and 9 such that are three digit numbers | | |
|  | **Statement 1:** | | The value of the determinant is zero |
|  | **Statement 2:** | | The value of a determinant is zero, if the entries in any two rows (or columns) of the determinant are correspondingly proportional |

|  |  |  |  |
| --- | --- | --- | --- |
| 123 |  | | |
|  | **Statement 1:** | | is independent of |
|  | **Statement 2:** | | If is independent of . |

|  |  |  |  |
| --- | --- | --- | --- |
| 124 |  | | |
|  | **Statement 1:** | | If are even natural numbers, then is an even natural number. |
|  | **Statement 2:** | | Sum and product of two even natural numbers is also an even natural number. |

|  |  |  |  |
| --- | --- | --- | --- |
| 125 | Consider the determinant | | |
|  | **Statement 1:** | | has one root |
|  | **Statement 2:** | | The value of skew-symmetric determinant of odd-order is always zero |

|  |  |  |  |
| --- | --- | --- | --- |
| 126 |  | | |
|  | **Statement 1:** | | If the system of equations and has a non-trivial solution, then the value of is 0 |
|  | **Statement 2:** | | The value of skew-symmetric matrix of order 3 is zero |

|  |  |  |  |
| --- | --- | --- | --- |
| 127 |  | | |
|  | **Statement 1:** | | is equal to 0 |
|  | **Statement 2:** | | The value of skew-symmetric matrix of order 3 is zero |

|  |  |  |  |
| --- | --- | --- | --- |
| 128 | Consider the system of the equations and | | |
|  | **Statement 1:** | | System of equations has infinite solutions when |
|  | **Statement 2:** | | If the determinant , then |

|  |  |  |  |
| --- | --- | --- | --- |
| 129 |  | | |
|  | **Statement 1:** | | If |
|  | **Statement 2:** | |  |

|  |  |  |  |
| --- | --- | --- | --- |
| 130 | Consider the determinant , where and | | |
|  | **Statement 1:** | | The values of satisfying are |
|  | **Statement 2:** | | If then |

|  |  |  |  |
| --- | --- | --- | --- |
| 131 |  | | |
|  | **Statement 1:** | | If then coefficient of in is zero. |
|  | **Statement 2:** | | If , then ,where dash denotes the differential coefficient. |

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Matrix-Match Type** | | | | | | | | | |
| This section contain(s) 0 question(s). Each question contains Statements given in 2 columns which have to be matched. Statements (A, B, C, D) in **columns I** have to be matched with Statements (p, q, r, s) in **columns II**. | | | | | | | | | |

| 132. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | is | | (p) | | Independent of | |
|  | **(B)** | is | | (q) | | Independent of | |
|  | **(C)** | is | | (r) | | Independent of | |
|  | **(D)** | If , and are the sides of a triangle and and are the angles opposite to and , respectively, then | | (s) | | Dependent on | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | p | r | r | q |  |  |
|  | **b)** | s | p | r | s |  |  |
|  | **c)** | s | p | q | s |  |  |
|  | **d)** | p,q,r | q | s | p, q, r |  |  |

| 133. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | Coefficient of in | | (p) | | 10 | |
|  | **(B)** | Value of is | | (q) | | 0 | |
|  | **(C)** | If are in A.P. and | | (r) | |  | |
|  | **(D)** | If ,  then is | | (s) | |  | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | s | r | r |  |  |
|  | **b)** | p | q | p | p |  |  |
|  | **c)** | s | p | s | s |  |  |
|  | **d)** | q | r | q | q |  |  |

| 134. |  | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** | The value of the determinant  is | | (p) | | 1 | |
|  | **(B)** | If one of the roots of the equation  is , then  sum of the all other five roots is | | (q) | |  | |
|  | **(C)** | The value of  is | | (r) | | 2 | |
|  | **(D)** | If  then | | (s) | |  | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | r | s | s | q |  |  |
|  | **b)** | s | r | q,r | p |  |  |
|  | **c)** | p | s | q | r |  |  |
|  | **d)** | q | p | r | s |  |  |

| 135. | Match the following elements ofwith their cofactors and choose the correct answer. | | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  | **Column-I** | | | **Column- II** | | | |
|  | **(A)** |  | | (1) | |  | |
|  | **(B)** | 1 | | (2) | | 32 | |
|  | **(C)** | 3 | | (3) | | 4 | |
|  | **(D)** | 6 | | (4) | | 6 | |
|  |  |  | | (5) | |  | |
|  | **CODES :** | | | | | | | |

|  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- |
|  |  | **A** | **B** | **C** | **D** |  |  |
|  | **a)** | 2 | 4 | 1 | 3 |  |  |
|  | **b)** | 2 | 4 | 3 | 1 |  |  |
|  | **c)** | 4 | 2 | 1 | 3 |  |  |
|  | **d)** | 4 | 1 | 2 | 3 |  |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **Linked Comprehension Type**  This section contain(s) 16 paragraph(s) and based upon each paragraph, multiple choice questions have to be answered. Each question has atleast 4 choices (a), (b), (c) and (d) out of which **only one** is correct.  **Paragraph for Question Nos. 136 to -136** | | | | | | | | |
| Let p be an odd prime number and Tp be the following set of 2×2 matricesTp=A=abca;a,b,c∈0,1,2,...,p-1 | | | | |

| 136. | The number of in such that is either symmetric or skew-symmetric or both, and det() is divisible by is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 137 to - 137** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Let ∆≠0 and∆c denotes the determinant of cofactors, then ∆c=∆n-1, where n(>0) is the order of ∆.on the basis of above information, answer the following questions. | | | | |

| 137. | If are the roots of the equation , then the value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) |  |
| **Paragraph for Question Nos. 138 to - 138** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| fx=x+c1x+ax+ax+bx+c2x+ax+bx+bx+c3and gx=c1-xc2-x(c3-x) | | | | |

| 138. | Coefficient of in is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| **Paragraph for Question Nos. 139 to - 139** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the function fx=a2+xabacabb2+xbcacbcc2+x | | | | |

| 139. | Which of the following is true? | | | | | | | |
|  | a) | and have one positive common root | | | | | | | |
|  | b) | and have one negative common root | | | | | | | |
|  | c) | and have no common root | | | | | | | |
|  | d) | None of these | | | | | | | |
| **Paragraph for Question Nos. 140 to - 140** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Given that the system of equations x=cy+bz, y=az+cx, z=bx+ay has non-zero solutions and at least one of the a, b, c is a proper fraction | | | | |

| 140. | is | | | | | | | |
|  | a) | >2 | b) | >3 | c) | <3 | d) | <2 |
| **Paragraph for Question Nos. 141 to - 141** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the system of equationsx+y+z=6x+2y+3z=10x+2y+λz=μ | | | | |

| 141. | The system has unique solution if | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| **Paragraph for Question Nos. 142 to - 142** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Let α, β be the roots of the equation ax2+bx+c=0. Let Sn=αn+βnFor n≥1 and ∆=31+S11+S21+S11+S21+S31+S21+S31+S4 | | | | |

| 142. | If , then the equation has | | | | | | | |
|  | a) | Positive real roots | b) | Negative real roots | c) | Equal roots | d) | Imaginary roots |
| **Paragraph for Question Nos. 143 to - 143** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Let ∆=-bcb2+bcc2+bca2+ac-acc2+aca2+abb2+ab-ab and the equation px3+qx2+rx+s=0 has roots a, b, c where a, b, c∈R+ | | | | |

| 143. | The value of is | | | | | | | |
|  | a) |  | b) |  | c) |  | d) | None of these |
| **Paragraph for Question Nos. 144 to - 144** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Consider the polynomial function fx=1+xa1+2xb111+xa1+2xb1+2xb11+xa, a, b, being positive integers | | | | |

| 144. | The constant term in is | | | | | | | |
|  | a) | 2 | b) | 1 | c) |  | d) | 0 |
| **Paragraph for Question Nos. 145 to - 145** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| If x>m, y>n, z>rx, y, z>0 such that xnrmyrmnz=0 | | | | |

| 145. | The value of is | | | | | | | |
|  | a) | 1 | b) |  | c) | 2 | d) |  |
| **Paragraph for Question Nos. 146 to - 146** | | | | | | | | |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| Suppose f(x) is a function satisfying the following conditions:f0=2, f1=1,f has a minimum value at x=5/2For all x, f'x=2ax2ax-12ax+b+1bb+1-12(ax+b)2ax+2b+12ax+b | | | | |

| 146. | The value of is | | | | | | | |
|  | a) | 1/4 | b) | 1/2 | c) |  | d) | 3 |

**Integer Answer Type**

| 147. | If , then the value of is | | | | | | | |
| 148. | If then is | | | | | | | |
| 149. | Absolute value of sum of roots of the equation is | | | | | | | |
| 150. | The value of for which the system of equation  Has no solution, is | | | | | | | |
| 151. | If are in H.P., and then the value of Dis (where [ ] represents the greatest integer function) | | | | | | | |
| 152. | Sum of values of for which, the equations: and have a solution is | | | | | | | |
| 153. | Let are the real roots of the equation and. If the system of equations (in and) given by  has non-trivial solutions, then the value of is | | | | | | | |
| 154. | Let and then the value of is where and , | | | | | | | |
| 155. | If , where , such that and then the value of is | | | | | | | |
| 156. | If are in A.P. and then | | | | | | | |
| 157. | The value of is | | | | | | | |
| 158. | If , then the value of is | | | | | | | |
| 159. | Three distinct points and are collinear then is equal to | | | | | | | |
| 160. | Given , then the value of is | | | | | | | |
| 161. | If , then the real value of is | | | | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 603**

**Time :** 09:42:00 **MATHEMATICS**

**Marks :** 563

4.DETERMINANTS

|  |
| --- |
| **: ANSWER KEY :** |

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1) d 2) b 3) a 4) c**  **5) b 6) c 7) b 8) b**  **9) c 10) b 11) a 12) d**  **13) b 14) d 15) b 16) b**  **17) b 18) c 19) a 20) b**  **21) c 22) d 23) a 24) d**  **25) c 26) c 27) b 28) b**  **29) a 30) b 31) b 32) b**  **33) a 34) b 35) c 36) c**  **37) b 38) c 39) b 40) d**  **41) d 42) a 43) c 44) d**  **45) b 46) b 47) b 48) c**  **49) b 50) b 51) a 52) a**  **53) b 54) b 55) a 56) a**  **57) b 58) b 59) b 60) a**  **61) d 62) a 63) c 64) c**  **65) d 66) d 67) d 68) b**  **69) a 70) d 71) a 72) a**  **73) b 74) a 75) b 76) d**  **77) d 78) c 79) a 80) a**  **81) d 82) b 83) b 84) a**  **85) c 86) c 87) a 88) c**  **89) b 90) c 91) b 92) a**  **93) d 1) b,d 2) b,d 3) a,b 4) d**  **5) a,b 6) a,c 7) d 8) a,b,c,d**  **9) a,c 10) a,b 11) b,c 12) a,b**  **13) b,c 14) a,c 15) b,c 16) a,b,c**  **17) a,b,c 18) a,b 19) c,d 20) a,b,c**  **21) a,c 22) a,c 23) a,b,c 24) b,c**  **25) a,c 1) a 2) b 3) a 4) d**  **5) a 6) d 7) a 8) a**  **9) a 10) b 11) d 12) b**  **13) a 1) d 2) c 3) b 4) c**  **1) d 2) c 3) c 4) d**  **5) c 6) a 7) d 8) a**  **9) d 10) c 11) b 1) 5 2) 4 3) 4 4) 2**  **5) 2 6) 3 7) 3 8) 2**  **9) 8 10) 1 11) 0 12) 8**  **13) 0 14) 2 15) 4** | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 603**

**Time :** 09:42:00 **MATHEMATICS**

**Marks :** 563

4.DETERMINANTS

|  |
| --- |
| **: HINTS AND SOLUTIONS :** |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 1 | **(d)**  Applying and , we get | | | | | | | |
| 2 | **(b)** | | | | | | | |
| 3 | **(a)**  Applying and , we get | | | | | | | |
| 4 | **(c)**  Using ,  Applying and , we get  Thus, or  As , we get | | | | | | | |
| 5 | **(b)**  The degree of the determinant is and the degree of the expression on R.H.S. is 2 | | | | | | | |
| 6 | **(c)**  (1)  (2)  (3)  Since are not all zero, the above system has a non-trivial solution. So, | | | | | | | |
| 7 | **(b)**  (Operating ) | | | | | | | |
| 8 | **(b)**  We have,  [Applying on L.H.S.]  [Applying on L.H.S.]  [Applying on L.H.S.] | | | | | | | |
| 9 | **(c)**  +  Now, [as ] | | | | | | | |
| 10 | **(b)**  Let,  Expanding along first row, we have  Which is independent of | | | | | | | |
| 11 | **(a)**  Applying , we get  [Expanding along ]  [Applying and ]  Hence are in A.P. | | | | | | | |
| 12 | **(d)**  Let,  Then,  [Applying ]  [Applying ]  [Expanding along ] | | | | | | | |
| 13 | **(b)**  (Taking transpose)  is purely real | | | | | | | |
| 14 | **(d)**  Applying and , we get  Applying and taking common, we get  [ and are identical] | | | | | | | |
| 15 | **(b)**  In each determinant applying and then taking out common, we get | | | | | | | |
| 16 | **(b)** | | | | | | | |
| 17 | **(b)**  Applying and using in , we get  (as and are identical) | | | | | | | |
| 18 | **(c)**  Operation gives  From the given equation, . So the value of determinant is 0 | | | | | | | |
| 19 | **(a)**  Operating , we have | | | | | | | |
| 20 | **(b)**  Since are in A.P., therefore, Now,    [Applying ]  [] | | | | | | | |
| 21 | **(c)** | | | | | | | |
| 22 | **(d)**  Applying , we get  (and ) | | | | | | | |
| 23 | **(a)**    roots are independent of | | | | | | | |
| 24 | **(d)**  (where is cube roots of unity) | | | | | | | |
| 25 | **(c)**  Here and , i.e.,  Now,  [Operating ] | | | | | | | |
| 26 | **(c)**  Operating , we get    [Operating and ]  Which is a polynomial of degree 2 | | | | | | | |
| 27 | **(b)**  For non-trivial solution | | | | | | | |
| 28 | **(b)**  Applying and then , and taking common from , we get  (expanding along )  Hence,  Therefore, line passes through the fixed point (1, 1) | | | | | | | |
| 29 | **(a)**  Determinant formed by the cofactors of is | | | | | | | |
| 30 | **(b)**  Applying we get  Applying and , we get | | | | | | | |
| 31 | **(b)**  , hence two identical rows constant | | | | | | | |
| 32 | **(b)**  We divide L.H.S. by and by , by and by on the R.H.S. to obtain  Taking limit as , we get  [Applying ] | | | | | | | |
| 33 | **(a)**  Given determinant,    Let  So, satisfies the Roll’s theorem and hence, has at least one root in | | | | | | | |
| 34 | **(b)**  For every ‘det. with 1’ we can find a det. with value by changing the sign of one entry of ‘1’. Hence there are equal number of elements in and .  Therefore, (b) is the correct option | | | | | | | |
| 35 | **(c)**  Since each element of is the sum of two elements, putting the determinant as sum of two determinants, we get  Since all are distinct, we have or | | | | | | | |
| 36 | **(c)**  We have, | | | | | | | |
| 37 | **(b)**  Operating , gives    Therefore, gives | | | | | | | |
| 38 | **(c)**  Hence, the given equation gives | | | | | | | |
| 39 | **(b)**  We have,  (1)  Also,  (taking common from )  (Multiplying by )  Then,  Now given that are all different, then | | | | | | | |
| 40 | **(d)**  For the given homogeneous system of equations to have non-zero solution, determinant of coefficient matrix should be zero, i.e., | | | | | | | |
| 41 | **(d)** | | | | | | | |
| 42 | **(a)**  . Since only trivial solution is possible | | | | | | | |
| 43 | **(c)**  Applying and reduce the determinant to  ,  Which is clearly negative for | | | | | | | |
| 44 | **(d)**  Let the given determinant be equal to . Then,  Now, as and are identical | | | | | | | |
| 45 | **(b)** | | | | | | | |
| 46 | **(b)**  The total number of third-order determinants is Since the number of determinants is even and in which there are pairs of determinants which are obtained by changing two consecutive rows,  So | | | | | | | |
| 47 | **(b)**  Let,  It is clear that either or or is sufficient to make . It is not necessary that triangle is equilateral. Also, isosceles triangle can be obtuse one | | | | | | | |
| 48 | **(c)**  The given system is consistent  Now, | | | | | | | |
| 49 | **(b)**  Let  Then the given system of equations is  Coefficient determinant is  Hence, the given system of equation has unique solutions | | | | | | | |
| 50 | **(b)**  Applying , we get | | | | | | | |
| 51 | **(a)**  Applying , we get | | | | | | | |
| 52 | **(a)**  [Applying ]  [Applying ] | | | | | | | |
| 53 | **(b)**  Multiplying by by and by , we get  Taking common from , respectively, we get  Using , we have  Using and , we get  Hence,  Therefore, the ordered triplets are (2, 1, 1,), (1, 2, 1,), (1, 1, 2) | | | | | | | |
| 54 | **(b)**  Applying , we get  Since , therefore  or or  Hence, the triangle is definitely isosceles | | | | | | | |
| 55 | **(a)**  Taking common from and common from , we get  Applying , we get  Thus , | | | | | | | |
| 56 | **(a)**  As and are even natural numbers, each of is divisible by 2. Let for Thus,  Where is some natural number. Thus, is divisible by 2. That may not be divisible by 4 can be seen by taking the three numbers as 112, 122 and 134. Note that  Which is divisible by 2 but not by 4 | | | | | | | |
| 57 | **(b)**  For no solution or infinitely many solutions  But for , there are infinite solutions. When , we have  Adding, we get , which is not true. Hence there is no solution | | | | | | | |
| 58 | **(b)**  Since the system has non-trivial solution,  Applying , we get  Dividing throughout by , we get | | | | | | | |
| 59 | **(b)**  Applying , we get  Now, applying , we get    Evaluating along , we get  Hence, | | | | | | | |
| 60 | **(a)**  The given determinant is obtained by corresponding co-factors of determinant ; hence . Now | | | | | | | |
| 61 | **(d)**  Since for the determinant reduces to the determinant of a skew-symmetric matrix of odd order which is always zero, hence is the solution of the given equation | | | | | | | |
| 62 | **(a)**  Using the sum property, we get  But ,  and . Therefore, | | | | | | | |
| 63 | **(c)**  Therefore, has roots | | | | | | | |
| 64 | **(c)**  As are in G.P. with common ration and are in G.P. having common ratio  Also the system of equation has only zero (trivial) solution  and | | | | | | | |
| 65 | **(d)**  The given determinant, on simplification, gives | | | | | | | |
| 66 | **(d)**  Since and ,  and  By taking common from and , respectively,  We have  By taking common from and , respectively,  We have | | | | | | | |
| 67 | **(d)**  (given) | | | | | | | |
| 68 | **(b)**  The given determinant is  (Using and ) | | | | | | | |
| 69 | **(a)** | | | | | | | |
| 70 | **(d)**  Since are in G.P. and if is the common ratio of the G.P., then  Therefore, given determinant is  [, are identical] | | | | | | | |
| 71 | **(a)**  The given system of equations will have a non-trivial solution if  Operating and , we get | | | | | | | |
| 72 | **(a)**  or  If we have  and  =0 (i)  Which is not possible as gives . And gives . Therefore, Eq. (i) does not hold simultaneously  or  Which is satisfied only by i.e., so | | | | | | | |
| 73 | **(b)**  Taking common from last row, we get  (as it will make first and third row is identical) | | | | | | | |
| 74 | **(a)**  We have,  Similarly,  Substituting these values in second column of determinant, we get | | | | | | | |
| 75 | **(b)**  Let be the first term and be the common difference of corresponding A.P. Then  Applying and then taking common from we get | | | | | | | |
| 76 | **(d)**  We have , therefore etc | | | | | | | |
| 77 | **(d)**  In the first determinant, apply and then  In second determinant take common from and then apply . Then take common from and then apply . Finally taking common from , we have  ultimately | | | | | | | |
| 78 | **(c)**  We have, | | | | | | | |
| 79 | **(a)**  Let first term of G.P. is and common ration is . Then,  , etc | | | | | | | |
| 80 | **(a)**  Operating on the L.H.S. we get | | | | | | | |
| 81 | **(d)**  Applying , we get  Expanding along , we get | | | | | | | |
| 82 | **(b)** | | | | | | | |
| 83 | **(b)**  Let  Applying , we get  Which has minimum value of | | | | | | | |
| 84 | **(a)**  The given system of linear equations has a unique solution if  i.e., if or | | | | | | | |
| 85 | **(c)**  Consider the triangle with vertices and and and . Then area of triangle is  where  Squaring and simplifying, we get  4  Hence, | | | | | | | |
| 86 | **(c)**        Hence, the given determinant is | | | | | | | |
| 87 | **(a)**  Applying , we get  Dividing by , we obtain | | | | | | | |
| 88 | **(c)**  The required constant term is | | | | | | | |
| 89 | **(b)**  We have,    , where | | | | | | | |
| 90 | **(c)**  We observe that the elements in the pre-factor are the cofactor of the corresponding elements of the post-factor. Hence,  **Alternative solution:**  Writing on both sides, we get | | | | | | | |
| 91 | **(b)**  Given,  Operating , we get  Hence, are in G.P. | | | | | | | |
| 92 | **(a)**  We have,  [Applying ]  times|  [Expanding along ] | | | | | | | |
| 93 | **(d)**  Operating , we get | | | | | | | |
| 94 | **(b,d)**  Since, given that  Applying , we get  are in GP or is the root of the equation . | | | | | | | |
| 95 | **(b,d)**  Applying , we get  [expanding along ]  Which is independent of . Also, | | | | | | | |
| 96 | **(a,b)**  Applying , we obtain  Applying , we get  Applying , we get | | | | | | | |
| 97 | **(d)**  Applying and , we get  Expanding along , we get | | | | | | | |
| 98 | **(a,b)**  Applying and taking common, we get  Applying and , we get  Thus is divisible by and | | | | | | | |
| 99 | **(a,c)**    Applying and  Then, | | | | | | | |
| 100 | **(d)**  Multiplying by by and by , we obtain  Applying , we get  This shows that is independent of and  Applying , we get  [Expanding along ]  Taking common from , respectively, we get  Where  Applying , we get  [Applying and ] | | | | | | | |
| 101 | **(a,b,c,d)**  Let ,then on applying , we get  Applying  Applying  Now, if  Also, it can be easily seen that is divisible by . | | | | | | | |
| 102 | **(a,c)**  [interchanging and columns]  is an odd function  Hence, the graph is symmetrical about origin. Also, is an odd function [where is fourth derivative of ]. Hence, | | | | | | | |
| 103 | **(a,b)**  By partial fractions, we have  and | | | | | | | |
| 104 | **(b,c)**    or  Now, on eliminating we get    Also, on applying , we get | | | | | | | |
| 105 | **(a,b)**  Applying ,  Hence, is independent of | | | | | | | |
| 106 | **(b,c)**  Applying | | | | | | | |
| 107 | **(a,c)**  Now,  or  has 2 real solutions in  Also, | | | | | | | |
| 108 | **(b,c)**  In the left-hand determinant, each element is the cofactor of the elements of the determinant  (say)  Hence,  [Since ] | | | | | | | |
| 109 | **(a,b,c)**  We have, | | | | | | | |
| 110 | **(a,b,c)**  Applying and , we get  Hence, | | | | | | | |
| 111 | **(a,b)** | | | | | | | |
| 112 | **(c,d)**  Applying , we get  [Applying and ]  [expanding along ] | | | | | | | |
| 113 | **(a,b,c)**    [taking common from ] | | | | | | | |
| 114 | **(a,c)**  [Applying ]  which is independent of | | | | | | | |
| 115 | **(a,c)**  (i)  Taking common from , we have quadratic equation in  Now in (i), if we put and are the same, hence is one root of the equation  If we put , then and are same. Hence, is the other root | | | | | | | |
| 116 | **(a,b,c)**  Operating , we get | | | | | | | |
| 117 | **(b,c)**  constant | | | | | | | |
| 118 | **(a,c)**  [Applying and ]  Thus, is divisible by and | | | | | | | |
| 119 | **(a)**  We are given that  (i)  (ii)  (iii)  The determinant in the question involves a column consisting the elements and . So multiplying (i), (ii) and (iii) by and , respectively, we get  (iv)  (v)  (vi)  Since and occur in all the three equations, putting , we get the system  (vii)  System (vii) must have a common solution (i.e., system is consistent). So, | | | | | | | |
| 120 | **(b)**  Let . Now,  Clearly, for , all of are zero | | | | | | | |
| 121 | **(a)**  (1)  Then or or , for which any two rows are same.  For (1) to hold it is not necessary that all the three rows are same or | | | | | | | |
| 122 | **(d)**  Which is zero provided are in AP. | | | | | | | |
| 123 | **(a)**  Let  =++ | | | | | | | |
| 124 | **(d)**    , which is not a natural number. | | | | | | | |
| 125 | **(a)**  For , the determinant reduces to the determinant of a skew-symmetric matrix of odd order which is always zero. Hence, is the solution of the given equation | | | | | | | |
| 126 | **(a)**  As the given system of equations has non-trivial solutions, hence  When , then the determinant becomes skew-symmetric of odd order, which is equal to zero. Thus, | | | | | | | |
| 127 | **(a)**  where is skew symmetric | | | | | | | |
| 128 | **(b)**  The system of equations is inconsistent if and one of is non-zero where  We have, ,  The determinant give in statement 2 is , for which or  makes all the determinants zero. But for , all the determinants are not zero  Hence, both statements are true but statement 2 is not correct explanation of statement 1 | | | | | | | |
| 129 | **(d)**  Given, | | | | | | | |
| 130 | **(b)**  where and  Hence, both the statements are true but statement 2 is not correct explanation of statement 1 | | | | | | | |
| 131 | **(a)**  Let  or | | | | | | | |
| 132 | **(d)**  Multiplying by by and by , we obtain  Applying , we get  This shows that is independent of and  Applying , we get  [Expanding along ]  Taking common from , respectively, we get  Where  Applying , we get  [Applying and ] | | | | | | | |
| 133 | **(c)**  Coefficient of in is coefficient of in  Therefore, coefficient of is  Let | | | | | | | |
| 134 | **(b)**  The given determinant is  Applying and , we have  [Applying and ]  [Applying and ]  [Expanding along ]  Let . Then  Hence sum of other five roots is 2  Taking common from , we get    Applying and , we get  [Applying ]  , which is an integer  Applying and , we get | | | | | | | |
| 135 | **(c)**  Let  Cofactor of  Cofactor of  Cofactor of  Cofactor of | | | | | | | |
| 136 | **(d)**  Given,  a, b, c  If is skew-symmetric matrix, then  Thus, divides only when  Again, if and  Thus, divides if either divides or divides .  divides  divides , only when  choices  divides .  choices, including included in (i)  Total number of choices are | | | | | | | |
| 137 | **(c)**  If | | | | | | | |
| 138 | **(c)**  In given determinant applying and , we get  So, is linear. Let . Then  Then, (1)  Also,  Similarly,  and  Now from (1), we get | | | | | | | |
| 139 | **(d)**  Applying and taking common, we get  Applying and , we get  Thus is divisible by and . Also, graph of is | | | | | | | |
| 140 | **(c)**  The system of equations  (1)  (2)  (3)  Has a non-zero solution if  (4)  Then clearly the system has infinitely many solutions. From (1) and (2), we have  or [from (4)]  or (5)  From (5), we see that are all positive or all negative. Given that one of is proper fraction, so  which gives  (6)  Using (4) and (6), we get  or (7) | | | | | | | |
| 141 | **(a)**  Thus the system has unique solutions if or and the system has infinite solutions if or and . System has no solution if and at least one of is non-zero or and | | | | | | | |
| 142 | **(d)**  [multiplying row by row]  (say)  Now,  If , i.e., , then roots are imaginary  If one root is and since coefficients are real, the other root is . Hence the equation is . Then the value of is  If i.e., , then roots are real and distinct but nothing can be said about | | | | | | | |
| 143 | **(a)**  Multiplying by respectively, and then taking common from and , we get  Now, using and , and then taking common from and , we get  Now, applying , we get  Expanding along , we get  Now given are all positive, then  AM. G.M.  If , then , and given that , from ,  we have  (since all roots are positive) | | | | | | | |
| 144 | **(d)**  Let,    Putting , we get  Now differentiating both sides with respect to and putting , we get  Hence coefficient of is 0. Since and is a repeating root of the equation | | | | | | | |
| 145 | **(c)**  Applying and , we get  Dividing by , we have  Now, A.M. G.M. | | | | | | | |
| 146 | **(b)**  Applying  Applying and , we get  Hence,  Clearly, discriminant of the equation is less than 0. Hence, has imaginary roots. Also, . and minimum value of is  Hence, range of the is | | | | | | | |
| 147 | **(5)**  Applying  Now, | | | | | | | |
| 148 | **(4)**  Clearly when | | | | | | | |
| 149 | **(4)**  Applying and  or | | | | | | | |
| 150 | **(2)**  System of equations  (1)  (2)  (3)  Since system has no solution.  Therefore, (1) and (2)  Since system has no solution, | | | | | | | |
| 151 | **(2)**  We have  Since  Hence,  and | | | | | | | |
| 152 | **(3)**  (1)  (2)  (3)  Since , solution is not unique solution.  The system will have infinite solutions if  or  Also for these values of | | | | | | | |
| 153 | **(3)**  Equation has roots  Since the given system of equations has non-trivial solutions, so | | | | | | | |
| 154 | **(2)**  Using in and , we have | | | | | | | |
| 155 | **(8)**  Putting  Clearly coefficient of  coefficient of  Now | | | | | | | |
| 156 | **(1)**  Where is the common difference of A.P.    Similarly, | | | | | | | |
| 157 | **(0)** | | | | | | | |
| 158 | **(8)**  Let  Applying    Apply | | | | | | | |
| 159 | **(0)**  and | | | | | | | |
| 160 | **(2)**  [Taking 2 common from and ]  [, then ]  [ and then ] | | | | | | | |
| 161 | **(4)** | | | | | | | |