**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 601**

**Time :** 09:51:00 **MATHEMATICS**

**Marks :** 582

3.MATRICES

|  |  |  |  |  |  |  |  |  |
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| **Single Correct Answer Type** | | | | | | | | |

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| 1. | If and is a 2 unit matrix, then  is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 2. | is always equal to (where is -order square matrix) | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 3. | If A and B are two non-zero square matrices of the same order such that the product , then | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | Both *A* and *B* must be singular | b) | Exactly one of them must be singular | c) | Both of them are non-singular | d) | None of these |

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| 4. | If is non-singular and , then  Is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 5. | The number of 3matrices whose entries are either 0 or 1 and for which the system has exactly two distinct solutions, is | | | | | | | |

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|  | a) | 0 | b) |  | c) | 168 | d) | 2 |

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| 6. | If is a non-diagonal involutory matrix, then | | | | | | | |

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|  | a) |  | b) |  | c) | is non-zero singular | d) | None of these |

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| 7. | Let and. Then has the value equal to | | | | | | | |

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|  | a) | 0 | b) | 1 | c) | 2 | d) | None |

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| 8. | The product of matrices and  is a null matrix if | | | | | | | |

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|  | a) |  | b) | , | c) | , | d) |  |

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| 9. | If is a square matrix of order such that |adj(adjA)|then the value of can be | | | | | | | |

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|  | a) | 4 | b) | 2 | c) | Either 4 or 2 | d) | None of these |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 10. | If *A* and *B* are square matrices of the same order and *A* is non-singular, then for a positive integer is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 11. | If adj, then adj is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 12. | If and  Then is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 13. | If is a nilpotent matrix of index 2, then for any positive integer is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 14. | If is singular matrix, then adj is | | | | | | | |

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|  | a) | Singular | b) | Non-singular | c) | Symmetric | d) | Not defined |

|  |  |  |  |  |  |  |  |  |
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| 15. | If *P* is an orthogonal matrix and and ,  Then is, where is involutary matrix | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 16. | If , then sum of all the elements  of matrix is | | | | | | | |

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|  | a) | 0 | b) | 1 | c) | 2 | d) |  |

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| 17. | If and are symmetric matrices of the same order and  and , then is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 18. | If =, then the value of is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 19. | If is a skew-symmetric matrix and is odd positive integer, then is | | | | | | | |

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|  | a) | A skew-symmetric matrix | b) | A symmetric matrix | c) | A diagonal matrix | d) | None of these |

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| 20. | If (where ) satisfies the equations , then | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 21. | Let and. Which of the following is true? | | | | | | | |

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|  | a) | has a unique solution | b) | has exactly three solutions | c) | has infinity many solutions | d) | is inconsistent |

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| 22. | If , then in terms of  Function of is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 23. | is an involuntary matrix given by  , then the inverse of will be | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 24. | Given that matrix. If and , then is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 25. | For each real. Let be the matrix  and . Then | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 26. | If and , then is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 27. | If , and if is invertible,  Then which of the following is not true? | | | | | | | |

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|  | a) |  | b) |  | c) | |adj||adj| | d) | is invertble if and only if is invertible |

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| 28. | If and , then equals | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 29. | If is root of , then choose the correct statement:  If is odd,  If is odd,  If is even,  If is even, | | | | | | | |

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|  | a) | i, ii, iii | b) | ii, iii, iv | c) | i, ii, iii, iv | d) | i, iii, iv |

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| 30. | Let and be two matrices. Consider the statements  or  Then | | | | | | | |

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|  | a) | (i) and (ii) are false, (iii)is true | b) | (i) And (iii) are false, (i) is true | c) | (i) is false, (ii) and (iii) are true | d) | (i) and (iii) are false, (ii) is true |

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| 31. | If , then equals | | | | | | | |

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|  | a) | *O* | b) | *I* | c) |  | d) | *2I* |

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| 32. | If both and are orthogonal matrices, then | | | | | | | |

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|  | a) | *A* is orthogonal | b) | *A* is skew-symmetric matrix of even order | c) |  | d) | None of these |

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| 33. | Let and be two real numbers such that  If , then is | | | | | | | |

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|  | a) | Unit matrix | b) | Null matrix | c) |  | d) | None of these |

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| 34. | For two unimodular complex numbers and,  is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 35. | Elements of matrix of order are defined as(where is cube coot of unity), then trace () of the matrix is | | | | | | | |

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|  | a) | 0 | b) | 1 | c) | 3 | d) | None of these |

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| 36. | If , then the inverse of is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 37. | If is a skew-symmetric matrix, then trace of is equal to | | | | | | | |

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|  | a) |  | b) | 1 | c) |  | d) | None of these |

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| 38. | Let be an -order square matrix and be its adjoint, then is (where is a scalar quantity) | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 39. | The matrix for which is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 40. | The matrix is | | | | | | | |

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|  | a) | Idempotent matrix | b) | Involutory matrix | c) | Nilpotent matrix | d) | None of these |

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| 41. | The inverse of a diagonal matrix is | | | | | | | |

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|  | a) | A diagonal matrix | b) | a skew symmetric matrix | c) | A symmetric matrix | d) | None of these |

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| 42. | If , then is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 43. | The inverse of a skew-symmetric matrix of odd order is | | | | | | | |

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|  | a) | A symmetric matrix | b) | A skew symmetric | c) | Diagonal matrix | d) | Does not exist |

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| 44. | If is an idempotent matrix, then | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 45. | If are idempotent matrices, then is equal  To | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | *O* |

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| 46. | If -order square matrix is a orthogonal, then,  is | | | | | | | |

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|  | a) | Always if is even | b) | Always 1 if is odd | c) | Always 1 | d) | None of these |

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| 47. | The equation has  (i)for (p) rational roots  (ii) for (q) irrational roots  (r) integral roots  Then  (i)(ii) | | | | | | | |

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|  | a) | (p) (r) | b) | (q) (p) | c) | (p) (q) | d) | (r) (p) |

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| 48. | If is order 3 square matrix such that =2, then  |adj(adj(adj A))| is | | | | | | | |

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|  | a) | 512 | b) | 256 | c) | 64 | d) | None of these |

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| 49. | In which of the following type of matrix inverse does not exist always | | | | | | | |

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|  | a) | Idempotent | b) | Orthogonal | c) | Involuntary | d) | None of these |

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| 50. | If are skew symmetric matrices of same order, then will be | | | | | | | |

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|  | a) | Symmetric | b) | Skew-symmetric | c) | Neither symmetric nor skew-symmetric | d) | Data not adequate |

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| 51. | If , then | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 52. | If is a non-singular matrix such that and  , then matrix is | | | | | | | |

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|  | a) | Involuntary | b) | Orthogonal | c) | Idempotent | d) | None of these |

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| 53. | If and , then is | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

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| 54. | If , then det{adj( is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

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| 55. | The number of diagonal matrix of order for which is | | | | | | | |

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|  | a) | 1 | b) | 0 | c) |  | d) |  |

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| 56. | Let and. Then the value  Of is | | | | | | | |

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|  | a) | 2 | b) | 1 | c) | 4 | d) | None of these |

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| 57. | If , then eauals | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 58. | Giventhen the value of such that the given system of equations has no solution, is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 3 | b) | 1 | c) | 0 | d) | -3 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 59. | If then is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 60. | If and are square matrices of the same order and is non-singular, then for a positive integer , is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 61. | If and are squares matrices such that and then det equals | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 0 | b) | 1 | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 62. | If and are two matrices such that and , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) | is idempotent | d) | is nilpotent |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 63. | Identify the incorrect statement in respect of two square matrices and conformable for sum and product: | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 64. | Let be two matrices such that they commute, then for any positive integer ,  (ii) | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | Only (i) is correct | b) | Both (i) and (ii) are correct | c) | Only (ii) is correct | d) | None of (i) and (ii) is correct |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 65. | Which of the following is an orthogonal matrix? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 66. | If then is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 67. | Matrix *A* such that , where is the identity matrix,  Then for is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 68. | If is an orthogonal matrix, then equals | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 69. | If and are square matrices of order , then and commute for every scalar only if | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 70. | If , such that , then  is (where {} represents fractional part function) | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 71. | The number of solutions of the matrix equation is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | More than 2 | b) | 2 | c) | 0 | d) | 1 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 72. | If the system of equations and has infinite solutions, then the value of is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | -1 | b) | 1 | c) | 0 | d) | No real values |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 73. | If is to be the square root of two-rowed unit matrix,  then and should satisfy the relation | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 74. | If and are two non-singular matrices such that , then is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 75. | If , then the value of det() is (where has order 3) | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 1 | b) |  | c) | 0 | d) | Cannot say anything |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 76. | If is a square matrix such that , then is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 77. | If matrix is given by then the determinant of is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 78. | If is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 1 | b) | -1 | c) | 4 | d) | No real values |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 79. | If and , then the values  Of and are equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 1,1 | b) | 1, | c) | 1, 2 | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 80. | Consider three matrices , and  . Then the value of the sum is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 6 | b) | 9 | c) | 12 | d) | None |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 81. | If *A* is symmetric as well as skew-symmetric matrix, then *A* is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | Diagonal matrix | b) | Null matrix | c) | Triangular matrix | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 82. | If and are two non-singular matrices of the same order  Such that, for some positive integer. Then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 83. | If and are two square matrices such that , then  is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | *O* | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 84. | Let , where . Then  is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 85. | If is non-singular matrix, then value of adj in terms of is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 86. | is a matrix such that and  The sum of the elements of is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | 0 | c) | 2 | d) | 5 |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 87. | Let . If is matrix for which , then is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

| **Multiple Correct Answers Type** | | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 88. | If and are three square matrices of the same order, then. Then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | is invertible | c) | may be orthogonal | d) | is symmetric |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 89. | If and then is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | Symmetric matrix | b) | Diagonal matrix | c) | Invertible matrix | d) | Singular matrix |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 90. | If A is unimodular, then which of the following is unimodular? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) | adj | d) | where is cube root of unity |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 91. | Which of the following is correct? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is symmetric if is symmetric | b) | is skew-symmetric if is symmetric | c) | is symmetric if is skew-symmetric | d) | is skew-symmetric if is skew-symmetric |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 92. | If and is a function, we define  Let . Then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is invertible | b) |  | c) | is orthogonal | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 93. | Let , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) | is not invertible | d) | is invertible |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 94. | If is an idempotent matrix, and , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 95. | If , ,  Then is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 2 if | b) | *O* if | c) | 2I if | d) | *O* always |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 96. | If , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 97. | Suppose are real number, with . If are in AP., then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is singular (where ) | b) | The system of equations had infinite number of solutions | c) | is non-singular | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 98. | If , then which of the following is not true? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | is a null matrix | c) | is invertible for all | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 99. | If and are symmetric and commute, then which of the following is/are symmetric? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 100. | The rank of the matrix is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 1 if | b) | 2 is | c) | 3 if | d) | 1 if |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 101. | Let . Then which of following is not true? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 102. | Which of the following statements is/are true about square matrix of order ? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is equal to when is odd only. | b) | If | c) | If is skew-symmetric matrix of odd order, then its inverse does not exist. | d) | holds always. |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 103. | If , and then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 104. | If is an orthogonal matrix, then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 105. | If is skew-symmetric matrix of order and X is column matrix, then is | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | Singular | b) | Non-singular | c) | Invertible | d) | Non-invertible |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 106. | If and , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 107. | If , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | adj | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 108. | Let . Then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) | is not invertible | d) | is invertible |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 109. | If and are two invertible matrices of the same order, then adj is equal to | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | adj adj | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 110. | If is a matrix such that , then which of the following is/are true? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is non-singular | b) | is symmetric | c) | cannot be skew-symmetric | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 111. | If and are two 3diagonal matrices, then which of the following is/are true? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is diagonal matrix | b) | = | c) | is a diagonal matrix | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 112. | If , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | adj(adj)= | b) | |adj(adj)=1| | c) | |adj *A*| | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 113. | If , then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 114. | If is orthogonal, then | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 115. | If and , then which of the following is/are true? | | | | | | | |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | is idempotent | b) | is idempotent | c) | is idempotent | d) | None of these |

|  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 116. | Let and are two non-singular square matrices, and are the transpose matrices of and , respectively, then which of the following are correct? | | | | | | | |

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|  | a) | is symmetric matrix if is symmetric | b) | is symmetric matrix if is symmetric | c) | is skew-symmetric matrix for every matrix | d) | is skew-symmetric matrix if is skew-symmetric |

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| 117. | A skew-symmetric matrix satisfies the relation , where is a unit matrix then is | | | | | | | |

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|  | a) | Idempotent | b) | Orthogonal | c) | Of even order | d) | Odd order |

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| 118. | If are three real numbers and  , then which of following is/are true? | | | | | | | |

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|  | a) | is singular | b) | is symmetric | c) | is orthogonal | d) | is not invertible |

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| **Assertion - Reasoning Type** | | | |
| This section contain(s) 0 question(s) 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 | | |

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| 119 | Let be a 22 matrix with real entries. Let be the 2 2 identity matrix. Denote by Tr (), the sum of diagonal entries of . Assume that | |
|  | **Statement 1:** | If |
|  | **Statement 2:** | If Tr A |

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| 120 |  | |
|  | **Statement 1:** | If are real numbers and and then |
|  | **Statement 2:** | For matrix we have |

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| 121 |  | |
|  | **Statement 1:** | If is a skew-symmetric matrix of order , then |
|  | **Statement 2:** | If is square matrix, then |

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| 122 |  | |
|  | **Statement 1:** | The determinant of a matrix where for all and is zero |
|  | **Statement 2:** | The determinant of a skew-symmetric matrix of odd order is zero |

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| 123 |  | |
|  | **Statement 1:** | If A is orthogonal matrix of order 2, then |
|  | **Statement 2:** | Every two-rowed real orthogonal matrix is of any one of the forms or |

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| 124 | Let be a 2 matrix with non-zero entries and let where is identity matrix.  Define Tr ()=sum of diagonal elements of and *\A\* = determinant of matrix . | |
|  | **Statement 1:** | Tr ()=0 |
|  | **Statement 2:** | *\A\=1.* |

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| 125 | Let A be matrix. | |
|  | **Statement 1:** | Adj(adj ) |
|  | **Statement 2:** |  |

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| 126 |  | |
|  | **Statement 1:** | The inverse of the matrix where is |
|  | **Statement 2:** | The inverse of singular matrix does not exist. |

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| 127 |  | |
|  | **Statement 1:** | , . Then does not exist |
|  | **Statement 2:** | Since is meaningless |

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| 128 |  | |
|  | **Statement 1:** | is a diagonal matrix |
|  | **Statement 2:** | is square matrix such that , then is called diagonal matrix |

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| 129 |  | |
|  | **Statement 1:** | If , then |
|  | **Statement 2:** | For matrix ,  We have. |

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| 130 |  | |
|  | **Statement 1:** | If is such that and then matrix null matrix. |
|  | **Statement 2:** |  |

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| 131 |  | |
|  | **Statement 1:** | For a singular square matrix , |
|  | **Statement 2:** | If then does not exist |

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| 132 |  | |
|  | **Statement 1:** | The inverse of does not exist |
|  | **Statement 2:** | The matrix is non-singular |

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| 133 |  | |
|  | **Statement 1:** | If the matrices are non-singular, then |
|  | **Statement 2:** |  |

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| 134 |  | |
|  | **Statement 1:** | Matrix 3, cannot be expressed as a sum symmetric and skew-symmetric matrix |
|  | **Statement 2:** | Matrix 3, is neither symmetric nor skew-symmetric |

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| 135 |  | |
|  | **Statement 1:** | If are matrices such that and, then |
|  | **Statement 2:** | For matrices of the same order, |

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| 136 |  | |
|  | **Statement 1:** | The matrix is an orthogonal matrix |
|  | **Statement 2:** | If and are orthogonal, then is also orthogonal |

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| 137 |  | |
|  | **Statement 1:** | If diagthen |
|  | **Statement 2:** | If diagthen  diag |

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| 138 |  | |
|  | **Statement 1:** | If a matrix of order , commutes with every matrix of order , then it is scalar matrix |
|  | **Statement 2:** | A scalar matrix of order commutes with every matrix |

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| 139 |  | |
|  | **Statement 1:** | Let be two square matrices of the same order such that and for same positive integers m, n, then there exists a positive integer r such that |
|  | **Statement 2:** | If then can be expanded as binomial expansion |

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| 140 |  | |
|  | **Statement 1:** |  |
|  | **Statement 2:** |  |

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **Matrix-Match Type** | | | | | | | |
| This section contain(s) 0 questions. Each question contains Statements given in 2 columns which have to be matched. Statements in **columns I** have to be matched with Statements in **columns II**. | | | | | | | |

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| 141. |  | | | | | | | |
|  | **Column-I** | | | | **Column- II** | | | |
|  | (A) | If , then =(where is of  Order 3) | | | (p) | 1 | | |
|  | (B) | If , then |adj(adj(2))| (where is of  Order 3) | | | (q) | 4 | | |
|  | (C) | If and, then  (where and are of odd order) | | | (r) | 24 | | |
|  | (D) | and then  is equal to | | | (s) | 0 | | |
|  | **Codes :** | | | | | | | |
|  |  | **A** | **B** | **C** | | | **D** |  | |
|  | ( a) | P | q | r | | | s |  | |
|  | ( b) | r | s | q | | | p |  | |
|  | ( c) | q | p | s | | | r |  | |
|  | ( d) | s | r | p | | | q |  | |

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| 142. | Match List I with List II and select the correct answer using the codes given below the lists | | | | | | | |
|  | **Column-I** | | | | **Column- II** | | | |
|  | (A) | is a square matrix such that | | | (1) | Nilpotent matrix | | |
|  | (B) | is a square matrix such that | | | (2) | Involutory matrix | | |
|  | (C) | is square matrix such that | | | (3) | Symmetric matrix | | |
|  | (D) | is square matrix such that | | | (4) | Idempotent matrix | | |
|  | **Codes :** | | | | | | | |
|  |  | **A** | **B** | **C** | | | **D** |  | |
|  | ( a) | 1 | 3 | 2 | | | 4 |  | |
|  | ( b) | 3 | 4 | 2 | | | 1 |  | |
|  | ( c) | 4 | 3 | 2 | | | 3 |  | |
|  | ( d) | 4 | 1 | 2 | | | 3 |  | |

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| 143. |  | | | | | | | |
|  | **Column-I** | | | | **Column- II** | | | |
|  | (A) | If is an idempotent matrix and is an  Identity matrix of the same order, then  The value of , such that  is | | | (p) | 9 | | |
|  | (B) | If the  where is | | | (q) | 10 | | |
|  | (C) | If A is matrix such that  then is singular if  Order of matrix is | | | (r) | 7 | | |
|  | (D) | If a non-singular matrix is symmetric,  Show that is also symmetric, then  Order of can be | | | (s) | 8 | | |
|  | **Codes :** | | | | | | | |
|  |  | **A** | **B** | **C** | | | **D** |  | |
|  | ( a) | S | r | r,s | | | r,s,q,p |  | |
|  | ( b) | r | s | p,r | | | p,q,r,s |  | |
|  | ( c) | p | q | q,s | | | s,p,q,r |  | |
|  | ( d) | q | p | s,r | | | q,p,r,s |  | |

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| 144. | Match List I with List II and select the correct answer using the codes given below the lists | | | | | | | |
|  | **Column-I** | | | | **Column- II** | | | |
|  | (A) |  | | | (1) |  | | |
|  | (B) |  | | | (2) |  | | |
|  | (C) |  | | | (3) |  | | |
|  | (D) |  | | | (4) |  | | |
|  | **Codes :** | | | | | | | |
|  |  | **A** | **B** | **C** | | | **D** |  | |
|  | ( a) | 1 | 2 | 3 | | | 4 |  | |
|  | ( b) | 3 | 4 | 2 | | | 1 |  | |
|  | ( c) | 4 | 3 | 2 | | | 1 |  | |
|  | ( d) | 2 | 4 | 1 | | | 3 |  | |

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| 145. |  | | | | | | | |
|  | **Column-I** | | | | **Column- II** | | | |
|  | (A) | is if is idempotent | | | (p) |  | | |
|  | (B) | is if is involuntary | | | (q) |  | | |
|  | (C) | is if is nilpotent of index 2 | | | (r) |  | | |
|  | (D) | If a is orthogonal, then | | | (s) |  | | |
|  | **Codes :** | | | | | | | |
|  |  | **A** | **B** | **C** | | | **D** |  | |
|  | ( a) | s | p | q | | | r |  | |
|  | ( b) | p | q | r | | | s |  | |
|  | ( c) | q | r | s | | | p |  | |
|  | ( d) | r | s | p | | | q |  | |

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| **Linked Comprehension Type** | | | | |
| This section contain(s)0 paragraphs. Based upon each paragraph, multiple choice questions have to be answered. Each question has at least 4 choices (a), (b), (c) and (d) out of which **only one** is correct. | | | | |
| **Paragraph for Question Nos. 146 - 145** | | | | |
| A and B are two matrices of same order 3×3, whereA=123234568 and B=325238729 | | | | |

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| 146. | The value of is equal to | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) |  |

| **Paragraph for Question Nos. 147 - 147** | | | | |
| Two n×n square matrices A and B are said to be similar, if there exists a non-singular matrix P such that PAP-1=B | | | | |

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| 147. | If and are two singular matrices, then | | | | | | | |

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|  | a) |  | b) |  | c) |  | d) | None of these |

| **Paragraph for Question Nos. 148 - 148** | | | | |
| Let A and B are two matrices of same order 3×3, where A=12λ+22483510 B=324325214 | | | | |

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| 148. | If is singular matrix, then is equal to | | | | | | | |

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|  | a) | 6 | b) | 12 | c) | 24 | d) | 17 |

| **Paragraph for Question Nos. 149 - 149** | | | | |
| Let A is matrix of order 2×2 such that A2=0 | | | | |

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| 149. | is equal to | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) | *O* | c) |  | d) | None of these |

| **Paragraph for Question Nos. 150 - 150** | | | | |
| If A and B are two square matrices of order 3×3 which satisfyAB=A and BA=B, then | | | | |

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| 150. | Which of the following is true? | | | | | | | |

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|  | a) | If matrix is singular then matrix is non-singular | b) | If matrix is non-singular then matrix is singular | c) | If matrix is singular then matrix is also singular | d) | Cannot say anything |

| **Paragraph for Question Nos. 151 - 151** | | | | |
| Consider an arbitrary 3×3 matrix A=aij a matrix B=bij is formedSuch that bij is the sum of all the elements except aij in the ithrow of AAnswer the following question. | | | | |

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| 151. | If there exists a matrix with constant elements such that then is | | | | | | | |

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|  | a) | Skew-symmetric | b) | Null matrix | c) | Diagonal matrix | d) | None of these |

| **Paragraph for Question Nos. 152 - 152** | | | | |
| Let A=100101010 satisfies An=An-2+A2-I for n≥3. And trace of a square matrix X is equal to the sum of elements in its principal diagonal.Further consider a matrix ∪3×3 with its column as ∪1, ∪2, ∪3 such thatA50∪1=12525, A50∪2=010,A50∪3=010Then answer the following questions | | | | |

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| 152. | The value of equals | | | | | | | |

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|  | a) | 0 | b) | 1 | c) |  | d) | 25 |

| **Paragraph for Question Nos. 153 - 153** | | | | |
| Let A be a square matrix of order 2 or 3 and I be the identity matrix of the same order. Then the matrix A-λI is called characteristic matrix of the matrixA, where λ is some complex number. The determinant of the characteristic matrix is called characteristic determinant of the matrixA which will of course be a polynomial of degree 3 in λ. The equation detA-λI=0 is called characteristic equation of the matrix A and its roots (the values of λ) are called characteristic roots or eigenvalues. It is also known that every square matrix has its characteristic equation | | | | |

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| 153. | The eigenvalues of the matrix are | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) | 2, 1, 1 | b) | 2, 3, | c) | , 1, 3 | d) | None of these |

| **Paragraph for Question Nos. 154 - 154** | | | | |
| Let A be a m×n matrix. If there exists a matrix L of type n×m such thatLAIn, then L is called left inverse ofA. Similarly, if there exists a matrixR of type n×m such thatAR=Im, then R is called right inverse of AFor example, to find right inverse of matrixA=1-11123, we take R=xyzuvwAnd solve AR=I3, i.e.,1-11123xyzuvw=100010001⇒x-u=1 y-v=0 z-w=0 x+u=0 y+v=1 z+w=0 2x+3u=0 2y+3v=0 2z+3w=1 As this system of equations is inconsistent, we say there is no right inverse for matrix A | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 154. | Which of the following matrices is NOT left inverse of  Matrix | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) |  |

| **Paragraph for Question Nos. 155 - 155** | | | | |
| If eA is defined as eA=I+A+A22!+A33!+ ⋯=12fxgxgxfxWhere A=xxxx and 0<x<1, then Iis an identity matrix | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
| 155. | is equal to | | | | | | | |

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| --- | --- | --- | --- | --- | --- | --- | --- | --- |
|  | a) |  | b) |  | c) |  | d) | None of these |

| **Integer Answer Type** | | | | | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 601**

**Time :** 09:51:00 **MATHEMATICS**

**Marks :** 582

3.MATRICES

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

|  |  |  |  |  |
| --- | --- | --- | --- | --- |
| **1) c 2) b 3) b 4) b**  **5) a 6) c 7) c 8) c**  **9) a 10) c 11) c 12) b**  **13) b 14) a 15) b 16) b**  **17) c 18) b 19) a 20) c**  **21) a 22) b 23) a 24) c**  **25) a 26) a 27) a 28) b**  **29) d 30) d 31) b 32) b**  **33) b 34) c 35) d 36) c**  **37) c 38) b 39) d 40) b**  **41) a 42) b 43) d 44) b**  **45) b 46) b 47) c 48) b**  **49) a 50) b 51) a 52) b**  **53) c 54) b 55) d 56) a**  **57) c 58) b 59) a 60) c**  **61) a 62) b 63) d 64) b**  **65) a 66) a 67) c 68) a**  **69) a 70) a 71) a 72) a**  **73) b 74) a 75) d 76) c**  **77) b 78) d 79) b 80) a**  **81) b 82) c 83) a 84) b**  **85) a 86) d 87) b 88) a, b, c**  **89) a, b, c 90) b, c 91) a,d 92) a, c**  **93) a,b,d 94) a, b, c 95) a, b 96) a,c**  **97) a, b, c 98) a, b, c 99) a, b, c 100) b,d**  **101) b, c 102) b, c 103) a, d 104) a, c**  **105) a, d 106) a, b, c 107) a, b, c 108) a, b, c, d**  **109) a, b, c 110) a, c, d 111) a, b, c 112) a, b, c**  **113) a, c 114) a, c 115) a, b, c 116) a, d**  **117) b, c 118) a, b, c 119) c 120) a**  **121) c 122) a 123) a 124) c**  **125) b 126) d 127) a 128) a**  **129) b 130) b 131) d 132) a**  **133) c 134) d 135) d 136) b**  **137) b 138) a 139) b 140) c**  **141) c 142) d 143) b 144) d**  **145) a 146) a 147) a 148) c**  **149) b 150) c 151) d 152) b**  **153) c 154) c 155) a 156) 2**  **157) 6 158) 4 159) 2 160) 8**  **161) 0 162) 1 163) 4 164) 4**  **165) 4 166) 4 167) 0** | | | | |

**ACTIVE SITE TUTORIALS**

**Date :** 07-09-2019 **TEST ID: 601**

**Time :** 09:51:00 **MATHEMATICS**

**Marks :** 582

3.MATRICES

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| **: HINTS AND SOLUTIONS :** |

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| --- | --- | --- | --- | --- |
| **Single Correct Answer Type** | | | | |
| 1 | **(c)**  Since and given  (1)  Now,  [using (1)] | | | |
| 2 | **(b)** | | | |
| 3 | **(b)**  If possible assume that is non-singular, then exists.  Thus,  or(*a* contradiction)  Hence, both and must be singular. | | | |
| 4 | **(b)**  We have, | | | |
| 5 | **(a)**  Since, is linear equation in three variables and that could have only unique, no solution or infinitely many solution.  It is not possible to have two solutions.  Hence, number of matrices is zero. | | | |
| 6 | **(c)**  Therefore, either or . If , then which is not so.  and | | | |
| 7 | **(c)**  and  and  Let and tr. Then,  and  Solving, and Hence, | | | |
| 8 | **(c)**  Now, | | | |
| 9 | **(a)**  We know that in a square matrix of order ,  as is not possible | | | |
| 10 | **(c)**  and so on | | | |
| 11 | **(c)** | | | |
| 12 | **(b)**  We have, | | | |
| 13 | **(b)**  Then, | | | |
| 14 | **(a)**  adj  [If is of order ]  Now, is singular,  Hence adj is singular. | | | |
| 15 | **(b)**  is involuntary  Hence, | | | |
| 16 | **(b)**  Since the product matrix is matrix and the pre-multi-plier of *A* is a matrix, therefore *A* is matrix. Let,  . Then the given equation becomes | | | |
| 17 | **(c)**  Given that  And  Now,. | | | |
| 18 | **(b)**  Let,  adj | | | |
| 19 | **(a)**  Given A is skew-symmetric Hence,  (given is odd)  Hence, is skew-symmetric | | | |
| 20 | **(c)**  We have,  As *A* satisfies therefore  and  As so  Also, | | | |
| 21 | **(a)**  Unique solution | | | |
| 22 | **(b)**  Now, | | | |
| 23 | **(a)**  is involuntary. Hence,  Also, | | | |
| 24 | **(c)**  adj | | | |
| 25 | **(a)** | | | |
| 26 | **(a)**  We have,  And adj  Then | | | |
| 27 | **(a)**  (Multiplying by )  (Multiplying by )  (Changing with )  Hence obviously when . Also, | | | |
| 28 | **(b)**  We have, | | | |
| 29 | **(d)**  If *A* is root of then. Now,  Thus,  Now, | | | |
| 30 | **(d)**  (i) is false  If and , then  (ii) is true as the product is an identity matrix, if and only if is inverse of the matrix  (iii) is false since matrix multiplication in not commutative | | | |
| 31 | **(b)**  Let, | | | |
| 32 | **(b)**  =I and =I  subracting the two results  is even | | | |
| 33 | **(b)**  as and | | | |
| 34 | **(c)** | | | |
| 35 | **(d)**  tr  tr | | | |
| 36 | **(c)** | | | |
| 37 | **(c)**  As *A* is a skew-symmetric matrix,  tr()  Also, | | | |
| 38 | **(b)**  We have, | | | |
| 39 | **(d)**  Let, and  Then the matrix equation is  So *A* is and invertible matrix. Also,  adj  So,  adj  Now, | | | |
| 40 | **(b)**  Hence, the matrix is involutory. | | | |
| 41 | **(a)**  Now,  Cofactor of is  Cofactor of is  Cofactor of is  Cofactor of is  Hence, is also a diagonal matrix. | | | |
| 42 | **(b)**  So *A* is invertible. Also,  adj  Now, | | | |
| 43 | **(d)**  Let *A* be a skew-symmetric matrix of order . By definition,  Hence, does not exist | | | |
| 44 | **(b)**  is idempotent, then | | | |
| 45 | **(b)**  Given are idempotent. Hence,  and | | | |
| 46 | **(b)**  Since is orthogonal, hence  Now, | | | |
| 47 | **(c)**  If ,  (rational roots)  If  (irrational roots) | | | |
| 48 | **(b)**  We know that | | | |
| 49 | **(a)**  For involuntary matrix,  For idempotent matrix,  or  For orthogonal matrix,  .  Thus if matrix *A* is idempotent it may not be invertible. | | | |
| 50 | **(b)**  Hence, *B* is skew-symmetric | | | |
| 51 | **(a)** | | | |
| 52 | **(b)**  Given, | | | |
| 53 | **(c)** | | | |
| 54 | **(b)**  adj  adj | | | |
| 55 | **(d)**  Given,  diag  Hence, all have three possible values. Each diagonal element can be selected in three ways. Hence, the number  Of different matrices is | | | |
| 56 | **(a)**  We have,  Thus, | | | |
| 57 | **(c)**  Given  Now, | | | |
| 58 | **(b)**  Since, given system of equations has no solution, and any one amongstis non-zero.  Where  And | | | |
| 59 | **(a)**  As  or…(i)  As  =  =  …and so on | | | |
| 60 | **(c)**  and so on | | | |
| 61 | **(a)**  det  det | | | |
| 62 | **(b)**  Since andso  Hence, is idempotent and similarly.  Therefore, is nilpotent | | | |
| 63 | **(d)**  is involuntary. Hence,  Also, | | | |
| 64 | **(b)** | | | |
| 65 | **(a)**  Matrix is orthogonal if | | | |
| 66 | **(a)**  We have, | | | |
| 67 | **(c)**  Given,  Now,  Following this, we can say | | | |
| 68 | **(a)**  exists | | | |
| 69 | **(a)** | | | |
| 70 | **(a)**  From given data | | | |
| 71 | **(a)**  Let,  Also,  (using )  or  Therefore, matrices are | | | |
| 72 | **(a)**  Given, equations infinite soluations.  rule, its determinant=0 | | | |
| 73 | **(b)**  We have,  = | | | |
| 74 | **(a)** | | | |
| 75 | **(d)**  det  Now,  det  Thus, det can be 1 or , which we cannot say anything about det. | | | |
| 76 | **(c)**  Given. Now, | | | |
| 77 | **(b)** | | | |
| 78 | **(d)**  and  Which is not possible at the same time.  No real values of exists. | | | |
| 79 | **(b)**  We have,  Comparing the elements of with those of , we have | | | |
| 80 | **(a)**  ++ | | | |
| 81 | **(b)**  Let . Since *A* is skew-symmetric, therefore  and  is symmetric as well, so for all and  for all  Hence, for all and , i.e., is null matrix. | | | |
| 82 | **(c)**  Given | | | |
| 83 | **(a)**  As , we get  or  Now, | | | |
| 84 | **(b)**  We have,  Also,  det | | | |
| 85 | **(a)**  We know that for any non-singular matrix ,  Now put . Then we have | | | |
| 86 | **(d)**  (1)  (2)  Let *A* be given by. The first equation gives  (3)  (4)  For second equation gives  This gives  (5)  (6)  Eqs. (3)+(5) and  Eqs. (4)+(6)and  So the sum | | | |
| 87 | **(b)** | | | |
| **Multiple Correct Answers Type** | | | | |
| 88 | **(a, b, c)**  If then  Also if is orthogonal matrix, then  is invertible | | | |
| 89 | **(a, b, c)**  We have,  diag | | | |
| 90 | **(b, c)**  Hence, only when | | | |
| 91 | **(a,d)**  Let be a symmetric matrix  Then,  Now,  is a symmetric matrix  Now, let be a skew-symmetric matrix  Then,  is a skew-symmetric matrix | | | |
| 92 | **(a, c)**  and  .  Hence sin is invertible.  Also,  Hence, sin *A* is orthogonal. Also,  2sin cos | | | |
| 93 | **(a,b,d)**  Also,  is invertible  And  is invertible | | | |
| 94 | **(a, b, c)**  is an idempotent matrix  Now,  Therefore, is idempotent. Again,  Similarly, | | | |
| 95 | **(a, b)**  Let (say). Then,  =  If letandthen | | | |
| 96 | **(a,c)**  Also, | | | |
| 97 | **(a, b, c)**  Applying , we get  Where d is the common difference of the AP.  Therefore, the given system of equation has infinite number of  Solution. Also, | | | |
| 98 | **(a, b, c)**  We have,  Hence, is invertible.  adj( | | | |
| 99 | **(a, b, c)**  Given that *A* and *B* commute, we have  Also,  (2)  ( if A is symmetric is also symmetric)  Also from Eq. (1),  (3)  Hence, from Eq. (2),  Thus, is symmetric Similarly, is also symmetric Also,  Hence, is symmetric | | | |
| 100 | **(b,d)**  Let  Clearly rank of is 1, if  Also, for  and  Rank of is 2, if | | | |
| 101 | **(b, c)**  Similarly,  And | | | |
| 102 | **(b, c)**  (for any value of )  Given,  Now, | | | |
| 103 | **(a, d)**  Given,  The corresponding elements of equal matrices are equal. | | | |
| 104 | **(a, c)**  *A* is orthogonal matrix.  =  and  and | | | |
| 105 | **(a, d)**  Here is a matrix, is a matrix and is a matrix. Hence is a matrix. Let then,  is null matrix | | | |
| 106 | **(a, b, c)**  We have,  and | | | |
| 107 | **(a, b, c)**  Now, use and | | | |
| 108 | **(a, b, c, d)**  =  We have,  Note that . Since is invertible. Simi-larly, invertible | | | |
| 110 | **(a, c, d)**  Given,  Therefore, *A* is non-singular, hence its inverse exists. Also, multiplying the given equation both sides with we get | | | |
| 111 | **(a, b, c)**  All are properties of diagonal matrix. | | | |
| 112 | **(a, b, c)**  and  Also, | | | |
| 113 | **(a, c)**  We have, | | | |
| 114 | **(a, c)**  Now,  Hence, is orthogonal. Therefore,  Equating the corresponding elements, we get  Solving Eqs. (1), (2) and (3), we get | | | |
| 115 | **(a, b, c)**  Given,  Also,  Now  Similarly,  and are idempotent | | | |
| 116 | **(a, d)**  if is symmetric  Therefore, is symmetric if is symmetric  Also,  Therefore, if is skew-symmetric if is skew-symmetric | | | |
| 117 | **(b, c)**  Since *A* is skew-symmetric, . We have,  r  Again, we know that  and  Where is the order of . Now,  Hence either is even. But  Hence, the only possibility is that is of even order | | | |
| 118 | **(a, b, c)**  Thus, *A* is symmetric and hence singular and not invertible. Also, | | | |
| **Assertion - Reasoning Type** | | | | |
| 119 | **(c)**  Let then    and  If then  If then  det (A)=  Statement II, Tr() =1 Statement II is false. | | | |
| 120 | **(a)**  Given  Hence,  Given,  or  or (1)  Case (i)  From eq. (1)  Case (ii)  Given, | | | |
| 121 | **(c)**  Let  And  is not true | | | |
| 122 | **(a)** | | | |
| 123 | **(a)**  (1)  (2)  (3)  Also, we must have for Eqs. (1) and (2) to get  Defined Hence, without loss of generality, we can assume and  So for we have and for we have | | | |
| 124 | **(c)**  A satisfies  On comparing with we get  Tr  **Alternate**  Let  Now    and  Also, and  Tr(*A*)=  and |A|= | | | |
| 125 | **(b)** | | | |
| 126 | **(d)**  Statement 1 is false  where  Therefore, and hence is singular. So, inverse of is not defined  In statement 2, . Therefore, inverse of is not defined | | | |
| 127 | **(a)**  Statement 1 is true as . Since statement 2 is also true and correct explanation of statement 1 | | | |
| 128 | **(a)**  is square matrix such that for , then is called diagonal matrix. Thus, the given statement is true and is a diagonal matrix | | | |
| 129 | **(b)**  Also,  Then,  Similarly, we can prove that  But again given matrices and are special matrices for which this type of result holds  In general, such result is not true. You can verify with any other matrix. Hence, both statements are true but statement 2 is correct explanation of statement 1 | | | |
| 130 | **(b)**  Let,  Diagonal elements and  Null matrix  Thus, statement 1 is true. Also,  or  Thus, statement 2 is true but it does not explain statement 1 | | | |
| 131 | **(d)**  exists only for non-singular matrix  if exists | | | |
| 132 | **(a)**  is non-singular matrix  is exist | | | |
| 133 | **(c)**  )  Hence, statement 1 is true. Statement 2 is false as is not true | | | |
| 134 | **(d)**  Matrix is which is neither  Symmetric nor skew-symmetric But this is not the reason for which *A* cannot be expressed as sum of symmetric and skew-symmetric matrix. In fact any matrix can be expressed as a sum of symmetric and skew-symmetric matrix. Hence, statement 1 is false but statement 2 is true | | | |
| 135 | **(d)**  is not defined, as order of and are such that theyare not conformable for multiplication | | | |
| 136 | **(b)**  is orthogonal  Also, if and are orthogonal, then is orthogonal | | | |
| 137 | **(b)**  Both the statements are true as both are standard properties of diagonal matrix. But statement 2 does not explain statement 1 | | | |
| 138 | **(a)**  Let  Also, (given)  On comparing, we get  (say)  ...(i)  And  [from Eq. (i)]  (say)  For  Then, scalar matrix  Then, if and  Then, | | | |
| 139 | **(b)**  Since we have  If then  if  and if  Then, for  Thus, both the statements are correct but statement 2 is not currently explaining statement 1 | | | |
| 140 | **(c)**  We know that. Hence, statement 2 is false.  Now,  Then,  Hence, statement 1 is true | | | |
| **Matrix Match Type** | | | | |
| 141 | **(c)**  Product is not defined | | | |
| 142 | **(d)**  is idempotent matrix  is nilpotent matrix  is involutory matrix  is symmetric matrix | | | |
| 143 | **(b)**  Since A is idempotent, now,  =  =  =  We have,  ()  =  Here matrix A is skew-symmetric and since  So As is odd, hence hence a is singular,  If A is symmetric, is also symmetric for matrix of any order | | | |
| 145 | **(a)**  A is involuntary, hence,  and  c if a is nilpotent of index 2, then  d A is orthogonal. Hence, | | | |
| **Linked Comprehension Type** | | | | |
| 146 | **(a)** | | | |
| 147 | **(a)**  Since, | | | |
| 148 | **(c)**  Since,  Now, | | | |
| 149 | **(b)**  Let, | | | |
| 150 | **(c)**  or  or  If then from Eq. (2),  If then from Eq. (1), | | | |
| 151 | **(d)** | | | |
| 152 | **(b)**  Further,  Here,  Also, tr Further,  Similarly,  and i.e., | | | |
| 153 | **(c)**  det  Thus, the characteristic roots are and | | | |
| 154 | **(c)**  As second row of all the options is same, we are to look at the  Elements of the first row. Let the left inverse be . Then,  i.e., ,  Thus, matrices in the options (a), (b) and (d) are the inverses and  Matrix in option (c) is not the left inverse | | | |
| 155 | **(a)**  And so on. Then  and | | | |
| **Integer Answer Type** | | | | |
| 156 | **(2)**  Let be the solution set of the equation , where and is the corresponding unit matrix and then the minimum value of | | | |
| 157 | **(6)**  Given  I=(I-0.4A)(I-) | | | |
| 158 | **(4)**  is and idempotent matrix  (given) | | | |
| 159 | **(2)** | | | |
| 160 | **(8)**  In a skew symmetric matrix, diagonal elements are zero. Also  Hence number of matric | | | |
| 161 | **(0)**  For idempotent matrix,  is non-singular  Thus non-singular idempotent matrix is always a unit matrix.  And  required sum is 0 | | | |
| 162 | **(1)**  Hence, det.  Now  Hence, | | | |
| 163 | **(4)** | | | |
| 164 | **(4)**  Given that  So  Now  Now  So on comparing, we get  Hence , | | | |
| 165 | **(4)**  A diagonal matrix is commutative with every square matrix if it is scalar matrix so every diagonal element is 4 | | | |
| 166 | **(4)**  We have  Now  Identity | | | |
| 167 | **(0)**  And  Let  and | | | |