

Program : M.A./M.Sc. (Mathematics)

M.A./M.Sc. (Previous)

Paper Code:MT-01

Advanced Algebra

Section – A

(Very Short Answers Questions)

1. Define external direct product.

A Page 1

2. Define internal direct product.

A Page 9

3. If $O(H) = 2$ and $O(K) = 5$ then find $O(H \times K)$

A Page 10

4. If H and K are two sub groups of G such that G is an internal direct product of H and K . Then find $H \cap K$.

A $H \cap K = \{e\}$

5. Define kernel of homomorphism.

A Page 16

6. Define conjugate class.

A Page 22

7. Define normalize of an element in a group.

A Page 23

8. Define centre of a group.

A Page 23

9. Write class equation for the finite group.

A Page 24

10. Define commutator of two elements of a group.

A Page 29

11. Define derived subgroup of a group.

A Page 29

12. Define maximal normal subgroup of a group.
A Page 35
13. Define composition series of a group.
A Page 36
14. Is S_6 a solvable group.
A No
15. Define prime element in an integral domain.
A Page 41
16. Define Euclidean ring.
A Page 42
17. Define Unique factorization domain.
A Page 49
18. Is every Euclidean ring a principal ideal domain?
A yes
19. Is 5 an associate of 5 and -5 in $(\mathbb{Z}, +, \cdot)$
A Yes
20. Define left module over a ring.
A Page 53
21. Define submodule.
A Page 57
22. Define module homomorphism.
A 61
23. Define cyclic module.
A Page 69
24. Is sum of two sub modules a sub module of an R-module?
A Yes
25. Define linear transformation on vector spaces.
A Page 75
26. Define dual space of a vector space V over field F.
A Page 85
27. Define rank of a linear transformation on vector spaces.
A Page 96

28. Let V be a finite dimensional vector space and V^* is its dual space. Is $\dim V^* < \dim V$

A No

29. Is sum of two linear transformation a linear transformation?

A Yes

30. Define field extension.

A Page 103

31. Define algebraic extension of a field.

A Page 106

32. Define simple field extension.

A Page 106

33. Is the field \mathbb{C} of complex number an algebraic extension of \mathbb{R} .

A Yes

34. Define transcendental extension of a field.

A Page 106

35. Define splitting field.

A Page 118

36. Define normal extension of a field.

A Page 119

37. Define separable extension of a field.

A Page 122

38. Define F -automorphism for an extension field K of a field F .

A Page 125

39. Define perfect field.

A Page 124

40. Is a nonconstant polynomial over a field of characteristic zero, separable.

A yes

41. Define Galois extension of a field.

A Page 133

42. Define radical extension of a field.

A Page 141

43. Define Galois group.

A Page 134

44. Is the field $Q(\sqrt[3]{2})$ a radical extension of the field Q of rational numbers?

A Yes

45. Does each matrix determine a linear transformation?

A Yes

46. Is the linear transformation determined by a matrix, independent of the choice of basis?

A No

47. Write the type of matrix of zero map from $V_3(R)$ to $V_2(R)$.

A Zero matrix of 2×3 order.

48. Write type of matrix of identity map on $V_5(R)$

A Identity matrix of order 5×5

49. Define the rank of a matrix.

A Page 159

50. Define similar matrices.

A Page 163

51. Define eigenvectors of a linear transformation.

A Page 166

52. Define eigen space of a linear transformation.

A Page 166

53. Define invertible matrix

A Page 161

54. Is $\text{rank}(A) = \text{rank}(A^T)$

A Yes

55. Define multilinear function.

A 172

56. Define determinant of a matrix.

A Page 175

57. Define characteristic polynomial of a square matrix.

A Page 183

58. Define non singular matrix

A A square matrix A is nonsingular if $\det(A) \neq 0$

59. If A and B are similar matrices then write relation between their determinants.

A $\det(A) = \det(B)$

60. Define norm of a vector

A Page 191

61. Write Schwarz inequality.

A Page 192

62. Define orthogonal vectors.

A Page 125

63. Write Pythagoras theorem.

A Page 197

64. Define adjoint of a linear transformation.

A Page 213

65. Define complete orthonormal set

A Page 207

66. Define self adjoint linear transformation.

A Page 215

67. Define orthogonal linear transformation.

A Page 223

68. Define orthogonal matrix.

A Page 229

69. Are the eigenvalues of self adjoint linear transformation real?

A Yes

70. Matrix A is orthogonal, then What is value of A^T ?

A $A^T = A^{-1}$

71. Write principal axis theorem.

A Page 231

72. Is orthogonal matrix singular.

A No