Examination October 2020

B.Sc. T.Y (Sem-VI)

2026 Mathematics MAT - 602 Abstract Algebra - II

Time: One Hour **Max. Marks: 25**

Instructions
Solve any 25 questions from Q.1 to Q.30

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1 In a vector space V over field F , if $\alpha \in$ f and X, Y $\in$ f
then α (x + y) = …........

(A) α x + y (B) x + α y (C) α x + α y (D) None of these

2 Vector space is defined over a . . . .

(A) Field (B) Group (C) Ring (D) Monoids

3 If V is a vector space and W is a subspace of V, then the vector space V/W is called .. . …

(A) Null space (B) Quotient space (C) Linear space (D) None of these

4 If W is a subspace of a vector space V, such that dim V = 6 and then W = 2 , then dim (V/W) = … … . .

(A) 12 (B) 8 (C) 5 (D) 4

5 The basis of a vector space cannot contain.. . . . .

(A) A positive vector (B) A negative vector (C) A zero vector (D) Non of these

6 If W is a subspace of finite dimensional vector space V , then

(A) Dim $W \geq Dim\ V$ (B) Dim $W \leq Dim\ V$ (C) Dim W = Dim V (D) None of these

7 If V is a vector space over a field F, then the elements of V are are called . . . .

(A) Constants (B) Scalars (C) Vectors (D) None of these

8 If T is a homomorphism of a vector space U onto vector space V with kernel W , then V is isomorphic to . . . . .

(A) U/W (B) W/U (C) W (D) U

9 In an n-dimensional vector space, each set consisting of n + 1 or more elements is . . . . .

(A) Linearly independent (B) A basis (C) Linearly dependent (D) None of these

10 If dim V = m , then the number of vectors in a basis of V is … . .

(A) Less then n (B) Equal to n (C) Greater than N (D) None of these

11 The number of elements in any basis of a finite- dimensional vector space V over F are 3, then dim V = ...

(A) 5 (B) 4 (C) 2 (D) 3

12 The minimum number of elements required to form a vector space over any field is .. . ..

(A) 2 (B) 3 (C) 1 (D) 4

13 If W is a subspace of a finite dimensional vector space V, then dim W + dim A(W) = ...

(A) 0 (B) Dim V (C) Dim $\hat{V}$ (D) None of these

14 If W_1 and W_2 are subspaces of a finite dimensional vector space V over F_1 then A(W_1 + W_2) = . .. …....

(A) $A(W_1) \cap A(W_2)$ (B) $A(W_1) \cup A(W_2)$ (C) A(W_1) + A (W_2) (D) None of these

15 An orthogonal set of a non-zero vectors is …....

(A) Linearly dependent (B) A basis (C) Linearly independent (D) None of these

16 If W is a subspace of a vector space V over F such that dim V= 8 and dim W = 5, then dim A(W) = … . . . .. .

(A) 3 (B) 8 (C) 13 (D) 24

17 The norm of the vector (2,2,-1) is .. ..

(A) 9 (B) 5 (C) 4 (D) 3

18 In an inner product space V, the inequality $|(u, v)|$ <= $||u||$. || V || is called … . . . .

(A) Bessel's inequality (B) Schwarz inequality (C) Triangle inequality (D) None of these

19 In an inner product space V, if v $\in$ V then $||\frac{v}{||v||}||$ = ...

(A) 1 (B) 0 (C) v (D) ||v||

20 An R-mode M is called . . . . if its only submodules are (0) and M itself

(A) Reducible (B) Irreducible (C) United (D) Cyclic

21 An R- model M is called . . . . R-module if 1 $\in$ R and 1m=m for all m in M

(A) Unital (B) Cyclic (C) Reducible (D) Irreducible

22 If V is finite- dimensional vector space and $\hat{\hat{v}}$ is second dual space of V then . . . . . .

(A) Dim V = dim $\hat{\hat{V}}$ (B) Dim V > dim $\hat{\hat{V}}$ (C) Dim $\hat{\hat{V}}$ < dim V (D) None of these

23 In an inner product space V , if u is orthogonal to v, then . . . . .

(A) (u , v) = 1 (B) (u , v) = -1 (C) (u , v) = 0 (D) None of these

24 The subset of S of a vector space V over F form basis if S is linearly independent and . . . . .

(A) L(S) = S (B) L(S) = V (C) L(F) = F (D) None of these

25 If $\hat{V}$ is a dual space of vector space V over F , then . . . .. .

(A) Dim V + dim $\hat{V}$ = 0 (B) Dim V = dim $\hat{V}$ (C) Dim v – dim $\hat{V}$ = 1 (D) None of these

26 A vector space V with an inner product is called . . . . .

(A) Inner product space (B) Dual space (C) Hilbert space (D) None of these

27 Intersection of two subspace W_1 and W_2 of a vector space V over a field F is . . . .

(A) Always dual space (B) Always subspace (C) Never a subspace (D) None of these

28 Union of two linearly dependent sets of vector is . . . .

(A) Linearly dependent (B) Linearly independent (C) May or may not be linearly independent (D) None of these

29 The basis {(1, 0, 0) , (0, 1, 0) , (0, 0, 1)} of the vector R^3 (R) is know as the .. . .

(A) Hamel basis (B) Standard basis (C) Normal Basis (D) Dual Basis

30 If V is a finite dimensional vector space and $\hat{v}$ is its dual space , x, y $\in$ v, $x \neq y$, then there is an f $\in$ $\hat{v}$ such that

(A) $f(x)=f(y)$ (B) $f(x) \geq o$ (C) $f(x) \neq f(y)$ (D) None of these