MRSPTU ASSIGNMENT-1, 2   COURSE CODE MMAT1-205

Course-M.Sc. (Mathematics) Session- May-2017

Subject –Advance Algebra Subject Code- MMAT1-205

Sem-2^{nd} Date of submission- 17/02/17

Assignment –I (Unit-I)

Q-1 Every Inner Product Space is a Metric Space.

Q-2 LetV be an Inner Product Space. Then $|(u, v)| \leq \|u\| \, \|v\|$ for all u, v $\in V$

Q-3 If $\{w_{1,} w_{2,} w_{3,}$-----$w_m\}$ is an orthonormal set in V.then $\sum_{i=1}^{m} |w_{i,} v|^2 \leq \|v\|^2$ for all v $\in V$.

Q-4 State and Prove Gram-Schmidt Orthogonalisation process.

Q-5 Let W be the subspace of R^5 spanned by the vectors a = $(2, 2, 3, 4, -1)$,

b = $(-1, 1, 2, 5, 2), c = (0, 0, -1, -2, 3), d = (1, -1, 2, 3, 0)$. Describe A(W).

Q-6 Let V be the vector space of all Polynomial functions P from R into R which have degree 2 or less. Define three linear functional on V by $f(x) = \int_0^1 p(x)dx$, g(x) = $\int_0^2 p(x)\, dx$, h(x) = $\int_0^{-1} p(x)\, dx$ show that $\{f, g, h\}$ is basis of V. Determine a basis for V where $\{f, g, h\}$ is its dual basis.

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Assignment –II (Unit-II)

Q-1 State and Prove Eienstein Criterion and $f(x) = x^2 - 6x + 12$ is irreducible or not over Z.

Q-2 Find degree and basis of field extension Q $(\sqrt{2}, \sqrt{3}, \sqrt{5})$ and Q$(\sqrt{2}, \sqrt{3})$ over Q.

Q-3 If F⊂E⊂ K and $[E: F] < \infty$ & $[k: E] < \infty$ Then (a) $[k: F] < \infty$,

(b) $[k: F] = [k: E]\ [E: F]$ (c) $[k: E]\ /[k: F]$& $[E: F]/[k: F]$

Q-4 Let p(x) be an irreducible polynomial in F[x] and u be a root of p(x) in some field extension K of F. Then

(a) $F[u] = \{b_0+b_1u+b_2u^2+\ldots\ldots..+b_mu^m/\ b_0+b_1x+b_2x^2+\ldots\ldots..+b_mx^m \in F[x]\}$ i.e F(u)=F[u].

(b) If degree of p(x) = n , then $\{1,u,u^2\ldots\ldots\ldots,u^{n-1}\}$ forms basis of F(u) over F.

Q-5 If E is finite extension of F. Then E is algebraic over F .Is the converse true?

Q-6 For any field K the following are equivalent.

(a) K is algebraically closed.

(b) Every irreducible polynomial in k[x] is of deg1.

(c) Every polynomial in K[x] of positive degree factorize completely in K[x] into linear factors.