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M.Sc. Sem. III Examination
July-Sep-2021
Mathematics
MSM1301 : FUNCTIONAL ANALYSIS-I [New Course]

કુલ સમય :– ૩૦ મીનીટ કુલ પ્રશ્નો : ૩૫ વિદ્યાર્થીએ ટીક કરવાના પ્રશ્નો : ૨૫

નોંધ : વિદ્યાર્થીએ માત્ર ૨૫ પ્રશ્નો જ ટીક કરવાના રહેશે. જો વધારે ટીક કરેલ હશે તો પ્રથમ ૨૫ પ્રશ્નો જ ગણતરીમાં લેવામાં આવશે.

1. If N be a normed linear space and x∈ N, then ||(3-4i)x || is …….
[a] 5 ||x|| [b] 25 ||x|| [c] 5 x [d] 25 x

2. If N be a normed linear space and F :RxN→N, F(a,x)=ax, then F is a…….function.
[a] continuous [b] jointly continuous [c] dis-continuous [d] none.

3. If M be a subspace of a linear space L, then zero vector of a Quotient space L/M is ……..
[a] L [b] 0 [c] M [d] None

4. If M be a linear subspace of a normed linear space N, then N/M is a Banach space , if……
[a] M is closed [b] N is a Banach space [c] M is closed and N is a Banach space [d] None

5. $||x||_\infty$=……., where x=(-2.5, 3.4, -5.7)
[a] 2.5 [b] 3.4 [c] 5.7 [d] 4.8

6 $||x||_1$ =……, where x =(-2.5, 3.4, -5.7)
[a] 2.5 [b] 3.4 [c] 5.7 [d] 11.6

7. If p= 2.5 , then conjugate exponent of p is……..,
[a] 1.6666…. [b] 0.4 [c] 25 [d] none

8. If d is a discrete metric on a normed linear space R , then d (-2, -3) is…….,
[a] -5 [b] -1 [c] 1 [d] 6

9 If T is a linear transformation from a normed linear space N Into a normed linear space N' and if T is continuous , then || T(x)||……..k ||x||, for some k≥0.
[a] ≥ [b]> [c] ≤ [d] <

10 If T is an operator on a normed linear space N, then
[a] discontinuous [b] bounded [c] identity function [d] none

11 Space $(R^5)^*$ is……,
[a] R [b] $R^{\frac{1}{5}}$ [c] R^5 [d] none

12 Space $(l^{1.5})^*$ is……,
[a] l^3 [b] $l^{0.3}$ [c] $l^{\frac{2}{3}}$ [d] none

13 If x is a none zero vector of R^3 , then there exists f_0 :N→R such that f_0(x) is …….,
[a] 1 [b] ||x|| [c] x [d] 0

14 If M is a closed linear subspace of a normed linear space R^7 and if x∉ R^7, then for some f∈ $(R^7)^*$, f(M) is……..,
[a] 1 [b] zero vector [c] real number zero [d] none

15 $Space\ ((l^{45})^*)^*$ is……..,
[a] $l^{\frac{44}{45}}$ [b] $l^{\frac{1}{45}}$ [c] l^{45} [d] none

16 Normed linear space$c_0{}^*$ is……,
[a] l_1 [b] l_∞ [c] l^2 [d] none

17 Normed linear space $l_9{}^{11}$ is …….,
[a] non reflexive [b] reflexive [c] bonded [d] none

18 A homeomorphism from a Banach space B onto Banach Space B' is a ….&… Linear transformation.
[a] injective, continuous. [b] manyone,continuous [c] one to one, discontinuous [d] none

19 If T is a continuous linear transformation from a Banach space B into a Banach space B', then ….is closed.
[a] T(B) [b] $T^{-1}(B')$ [c] { (a, b) / T(a)= b, a∈B } [d] none

20 If x be a complete metric space and if { E_i} be a sequence of subsets of X, then there exist some element $E_j$of a sequence such that its ……have non empty interior.
[a] complement [b] interior [c] boundary [d] closure.

21 If E be a non empty subset of a normed linear subspace N and if g$\in N^*$, then g(E) is always a ……..set.

[a] bounded [b] closed [c] open [d] compact

22 If T^* is a conjugate of T, where T is an operator on a normed linear space N , then for every h$\in N^*$, T^*(h) =……

[a] hoh [b] Toh [c] hoT [d] none

23 If F:ß(N)$\rightarrow$ ß(N^*) , F(T) =T^*, then for $T_1, T_2 \in$ ß(N) , $(T_1 O T_2)^*$ is……

[a] $T_2{}^*$o $T_1{}^*$ [b] $T_1{}^*$o $T_2{}^*$ [c] $T_2 o T_1$ [d] none

24 If T be an operator on a Banach space B and if T^{-1} exists, then ($T^{-1})^*$ is……

[a] T^* [b]T^{-1} [c] ($T^*)^{-1}$ [d] none

25 If L be the linear space of all scalar valued linear functions defined on normed linear space N and f$\in L$, then $T^{'}$: L$\rightarrow$L, [$T^{'}$(f)](x) is……,

[a] (foT)(x) [b] f(x) T(x) [c] (Tof) (x) [d] none

26 The mapping T$\rightarrow T^*$ is a ……mapping ß(N) into ß(N^*)

[a] identity [b] zero [c] none [d] norm-preserving

27 If x be a compact Hausdorff space and if X is a finite set, then ……is reflexive.

[a] C(x) [b] x [c] ß(x) [d] none

28 If H be a complex Hilbertspace , then for x,y,z$\in$H, (x, (2-3i)y + 5z) is……..

[a] 2(x,y)-5z [b] 3(x,y)-5z [c] (2+3i) (x,y) +5z [d] none

29 A …….subset of a Hilbert space H contains a unique vector of ……..norm.

[a] closed, smallest [b] closed, biggest [c] closed convex, smallest [d] none .

30 If 0 is a zero vector of a Hilbert space H, then orthogonal Complement of a set {0} is…….. and orthogonal complement of a set H is…..

[a] H,{0} [b] H, H [c] {0}, {0} [d] none

31 If $\{e_1, e_2, e_3\}$ be a finite orthonormal set of R^3 and if x$\in R^3$, then $\sum_{i=1}^{3} |(x, e_i)|^2$……

[a] $\geq ||x||^2$ [b] $< ||x||^2$ [c] $\leq ||x||^2$ [d] none

32 If T is an operator on a Hilbert space H and if (Tx,x)=0,$\forall$x$\in H$, then T=……function

[a] none zero [b] zero [c] identity [d] none

33 If F and G are self adjoint operators on a Hilbert space H and if we define FoG = $\frac{1}{2}$[FG +GF] ,then FoG is always…….

[a] not normal [b] not self adjoint [c] self adjoint [d] none

34 If T is an operator on a Hilbert space H and T^*T =identity operator, then (Tx, Ty) =…….for all x,y$\in H$

[a] (x,x) [b] (y,Y) [c] (x,y) [d] none

35 If P and Q are the projections on closed linear subspaces M and N on a Hilbert space H and if P$\leq Q$, then PQ=QP=……..,

[a] Q [b] P [c] zero operator [d] none