Program : M.A./M.Sc. (Mathematics)
M.A./M.Sc. (Final)
Paper Code:MT-06
Analysis and Advanced Calculus
Section – A
(Very Short Answers Questions)

1. Define Vector spaces.

A P.N. 1, Point 1.2.

2. Write the condition on which the function ‖. ‖ a semi-norm.

A P.N. 2, Article 1.3.1

3. Give an example of normal linear space.

A P.N.2, Above the Article 1.3.2

4. Define convergence of normal linear space (N, ‖. ‖)

A P.N. 2, Article 1.3.2

5. Define continuity of a function in terms of normal linear space.

A P.N.3, Article 1.3.4

6. Define Banach space.

A P.N.3, Article 1.3.4

7. Define function space.

A P.N.3, Article 1.3.4

8. Define n-Dimensional Euclidean space.

A P.N.3, Article 1.3.4

9. Define Euclidean norm.

A P.N.4, above Article 1.4

10. Define n-Dimensional unitary space.

A P.N.4, Article 1.4

11. Define linear operator or transformation.

A P.N.24, Article 2.2

12. Define bounded linear operator.

A P.N.25, Article 2.2

13. Define continuity of transformation.

A P.N.25, Article 2.2

14. Define functional and conjugate space.

A P.N.25, Article 2.2

15. Define weak convergence of a sequence.

A P.N.37, Article 2.4

16. Define sequentially compact normed linear space.

A P.N.40, Article 2.6.1

17. Define Multilinear mappings.

A P.N.45, Article 3.2

18. Define product space of normal linear space.

A P.N.45,46, Article 3.2

19. Define open mapping theorem.

A P.N.47, Article 3.3

20. Define closed graph theorem.

A P.N.53, Article 3.4

21. Define closed linear transformation.

A P.N.54, Article 3.4

22. Define first dual space of N.

A P.N.61, Article 4.2

23. Define Hahn-Banach Theorem.

A P.N.62, Article 4.3

24. Define the second dual space of N.

A P.N.71, Article 4.4

25. Define natural embedding.

A P.N.71, Article 4.4

26. Define the induced functional.

A P.N.71, Article 4.4

27. Define the inner product spaces.

A P.N.75, Article 5.3

28. Define a complex inner product space and real inner product space.

A P.N.75, Article 5.3

29. Define Hilbert space.

A P.N.79, Article 5.4

30. Write the parallelogram law for the Hilbert space H.

A P.N.81, (Th.4)

31. Write the polarization identity for the Hilbert space H.

A P.N.81, (Th.5)

32. Define orthogonality for the Hilbert space H.

A P.N.92, Article 6.3

33. Define orthogonal complement for the Hilbert space H.

A P.N.92, Article 6.3

34. Define unit vector for Hilbert space H.

A P.N.98, Article 6.5

35. Write the conditions for which a non empty subset $\{e_i\}$of the Hilbert space becomes orthonormal.

A P.N.98, Article 6.5

36. Write Bessel's inequality for finite orthonormal sets.

A P.N.100, Top of the page

37. Define complete orthonormal sets for Hilbert space H.

A P.N.104, Article 6.7 Def. 1

38. Define Fourier expansion of x.

A P.N.104, Article 6.7 Def. 3

39. Define Fourier coefficient sets for Hilbert space H.

A P.N.104, Article 6.7 Def.3

40. Write the Parseval's identity.

A P.N.104, Article 6.7 Def.4

41. Define continuous linear functional for Hilbert space H.

A P.N.116, Article 7.3

42. Define adjoint operator on H.

A P.N.116, Article 7.3

43. Define self-adjoint operator on H.

A P.N.121, Article 7.4

44. Define positive operators.

A P.N.124, Article 7.5

45. Define Normal operators on H.

A P.N.125, Article 7.6

46. Define unitary operators on H

A P.N.129, Article 7.7, Def.1

47. Write the condition on which an operator T on H becomes Isometric.

A P.N.129, Article 7.7 Def.2

48. Define the Perpendicular projection on H.

A P.N.135, Article 8.3.1

49. Define invariance and reducibility for linear operator T in H.

A P.N.138, Article 8.4.1

50. Define the orthogonal projection for H.

A P.N.140, Article 8.5

51. Define the Eigenvalue and Eigenvectors for Hilbert space H.

A P.N.141, Article 8.6

52. Define the existence of Eigenvalues.

A P.N.143, Article 8.7

53. Define the spectral resolution for normal operator T on H.

A P.N.148, Eq. 14, 15

54. Define when two functions F_1 and F_2 are tangential to each other at a point.

A P.N.151, Article 9.2

55. Write the equivalence relation if F_1, F_2 are tangential at V and F_2, F_3 are the also tangential at V.

A P.N.152, Top of the page.

56. Define the derivative of a map.

A P.N.152,

57. Define when the derivative of the constant function $f : V \rightarrow Y$ is zero linear map.

A P.N.153, Example 1

58. Define homeomorphism for Banach space X and Y.

A P.N.156, Top of the page.

59. Define Directional derivative.

A P.N.157, Article 9.3

60. Write any two properties of Higher derivatives.

A P.N.168

61. Define C'-Maps.

A P.N.164, Article 10.2

62. Define integral of a given function f.

A P.N.183, Article 11.1

63. Define the subdivision of the real line.

A P.N.183, Article 11.2

64. Define integral of a step function.

A P.N.184, Article 11.3

65. Define integral of a step function.

A P.N.184, Article 11.4

66. Define Regulated function in [a, b] into X.

A P.N.186, Article 11.5

67. Write any two properties of two regulated functions f and g on [a, b] in X and any scolar $\alpha \in K$.

A P.N.188, Top of the page.

68. Define the differential equation for a continuous map of I × U into X.

A P.N.197

69. Define integral solution of the differential equation $\frac{dx}{dt} = g(t_1 x)$

A P.N.197

70. Define the local flow for a continuous map g at (t_0, x_0)

A P.N.197

71. Define Lipschitz's property.

A P.N.198, Article 12.4

72. Define Locally Lipschitz.

A P.N.202, Article 12.5