MATH-022

M. A. / M. Sc. (Fourth Semester) Examination, 2020

(CBCS Course)

MATHEMATICS

Paper : First (MAT-C-401)

(Functional Analysis-II)

Maximum Marks : 60

Note: *Attempt all questions. All question carry equal marks.*

1. State and prove uniferm boundedness theorem.

2. State and prove open mapping theorem.

3. Define the direct sum of two closed subspaces of a Hilbert space H. Show that if Y is a closed subspace of H then :

$$H = Y \oplus Z,\ Z = Y^{1}$$

4. Explain the Gram-Schmidt orthogonalization process in an inner proudct space X in details.

5. State and prove the Riesz representation theorem for bounded linear functional's on a Hilbert space H.

MATH-023

M. A. / M. Sc. (Fourth Semester) Examination, 2020

(CBCS Course)

MATHEMATICS

Paper : MAT-C-402

(Fundamental of Computer Science-II)

Maximum Marks : 40

Note: *Attempt all questions. All questions carry equal marks.*

1. Explain multilevel inheritance with a C++ program.

2. Write short notes on :

(a) put ( ) function

(b) get ( ) function

3. Explain different types of users.

4. Explain different types of normalization.

5. What is User Interface? Write in short about different types of user interface.

MATH-024

M. A. / M. Sc. (Fourth Semester) Examination, 2020

(CBCS Course)

MATHEMATICS

Paper : MAT-E-403 (B)

(Mechanics)

Maximum Marks : 60

Note: *Attempt all questions. All question carry equal marks.*

1. State and prove theorem on total energy.

2. Derive Hamilton canonical equation.

3. State and prove principle of Least action.

4. Show that Poisson bracket are invariant under canonical transformation.

5. Find the attraction and potential of a thin uniform rod at an external point.

MATH-025

M. A. / M. Sc. (Fourth Semester) Examination, 2020

(CBCS Course)

MATHEMATICS

Paper : MAT-E-404(A)

(Theory of Linear Operator-II)

Maximum Marks : 60

Note: *Attempt all questions. All question carry equal marks.*

1. State and prove spectral theorem.

2. If E_1 and E_2 are compact, complex spectral measures s.f. $\int \lambda \, dE_1(\lambda) = \int \lambda dE_2(\lambda)$ then prove $E_1 = E_2$.

3. Let $S : D(S) \to H$ and $T : D(T) \to H$ be are densely defined linear operators in a complex hilbert space H. Then if S $\subset$ T prove $T^* C S^*$.

4. Prove that the spectrum $\sigma(T)$ of a self-adjoint linear operator $T : D(T) \to H$ is real and closed. Where H is complex Hilbert space and $D(T)$ is dense in H.

5. Prove that the multiplication operator is not bounded.

MATH-026

M. A. / M. Sc. (Fourth Semester) Examination, 2020

(CBCS Course)

MATHEMATICS

Paper : (MAT-E-405-CA)

(Operations Research-II)

Maximum Marks : 60

Note: *Attempt all questions. All questions carry equal marks.*

1. The characteristics of a project schedule are as given below :

Inside this determine :

(a) Construct PERT network

(b) Compute earliest and latest expected time for each event

(c) Find critical path

Activity	Time (days)	Activity	Time (days)
1-2	4	5-6	4
1-3	1	5-7	8
2-4	1	6-8	1
3-4	1	7-8	2
3-5	6	8-10	5
4-9	5	9-10	7

2. Give advantages of integer programming.

3. Solve the game :

$$\begin{array}{c} \\ \text{Player A} \end{array} \begin{array}{c} \text{Player B} \\ \begin{bmatrix} 2 & 1 & 0 & -2 \\ 1 & 0 & 3 & 2 \end{bmatrix} \end{array}$$

4. Define non linear programming problem. Also give the formulation of a non-linear programming problem.

5. Explain separable programming in detail.