

# V57- M.Sc. Math.

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Home Assingment Sem- I and III max marks-20

Program code :- V57 Sem-I Course code :- Code :S24011

- Q.1- A group G is solvable if and only if G has a normal Series abelian factors. (5 Marks)
- Q.2 - Two subnormal series of a group G have isomorphic refinements. (5 Marks)
- Q.3- Let F be a field and F [X] is an Euclidean domain. (5 Marks)
- Q.4- Any homomorphism image of an R-module M is isomorphic with its suitable quotient module. (5 Marks)

Program code :- V57 Sem-I Course code :- Code :S24012

- Q.1- Discuss the existence of two iterated limits and the double limits of the double sequence  
 $f$  is given by i)  $f(p,q) = \frac{p}{p+q}$  and ii)  $f(p,q) = (-1)^{p+q}$ . (5 Marks)
- Q.2- Show that the series  $\sum_{n=1}^{\infty} \frac{x}{(nx+1)\{(n-1)+1\}}$  is uniformly convergent on any interval [a,b],  $0 < a < b$  but only pointwise on the interval [0,b]. (5 Marks)
- Q.3- Let S be an open connected subset of  $R^n$  and  $\bar{f} : S \rightarrow R^m$  be a differential function at each point of S. if  $\bar{f}'(\bar{c}) = \bar{0}$  for each  $\bar{c} \in S$  then show that  $\bar{f}$  is constant on S. (5 Marks)
- Q.4- Find the volume of sphere of radius a. (5 Marks)

Program code :- V57 Sem-I Course code :- Code :S24013

- Q.1-Prove that Every nonempty open set is the disjoint union of a countable collection of open Intervals (5 Marks)
- Q.2- Prove that translate of a measurable set is measurable. (5 Marks)
- Q.3- Theorem - Let  $f$  be a bounded function defined function defined on the closed bounded interval [A b] if  $f$  is Riemann integral over [a,b] then it is Lebesgue integrable over [a,b] and the two integral are equal. (5 Marks)
- Q.4- Prove that any set of real number is open if and only if its complement in  $\mathbb{R}$  is closed (5 Marks)

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Q.1 Compute the solution  $\psi$  of  $y'''' + y'' + y' + y = 1$  which satisfies  $\psi(0) = 0$ ,  $\psi'(0) = 1$ ,  $\psi''(0) = 0$ . (5 Marks)

Q.2 There exist n linearly independent solution of  $L(y) = 0$  or 1. (5 Marks)

Q.3 Obtain two linearly independent solutions of the following equations which are valid near

$$x = 0 \quad x^2 y'' + 3xy' + (1+x)y = 0. \quad (5 \text{ Marks})$$

Q.4 For each of the following problems, compute the first four successive approximations

$$\phi_1, \phi_2, \phi_3, \phi_4 \quad (a) y' = x^2 + y^2, y(0) = 0, \quad (b) y' = y^2, y(0) = 1. \quad (5 \text{ Marks})$$

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Program code :- V57 Sem-I

Course code :- Code :S24015

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Q.1- Show that the inverse square law of attractive force ( central force ) is conservative. (5 Marks)

Q.2- Show that the geodesic ( Shortest distance between two point ) in Euclidian plane is a straight Line (5 Marks)

Q.3- Show that the determinat of an orthogonal matrix is  $\pm 1$ . (5 Marks)

Q. 4- Deduce Hamilton's principle for conservative system from D'Alembert's principle (5 Marks)

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