Parul University

Faculty of Engineering & Technology

Department of Applied Sciences and Humanities

1st Year B.Tech Programme (All Branches)

Mathematics – 1 (303191101)

Assignment -3

Q.1 **Short questions.**

1. Give the definition of 'order' and 'degree'.
2. Find order and degree of the given equations.

   $(i)(\frac{dy}{dx})^2+\frac{d^2y}{dx^2}$, $(ii)\frac{dy}{dx}+(\frac{d^2y}{dx^2})^3+3(\frac{dy}{dx})^3$
3. How many variables have/has in ordinary differential equation. And in partial differential equation.
4. Give the examples of ordinary differential equation and partial differential equation.
5. What is the sufficient condition for Exact differential equation?
6. Integrating factor of non-exact homogeneous differential equation with $Mx+Ny\neq 0$ is_____________.
7. Let $\{a_n\}$ be a sequence, if for every $\varepsilon>0$ there exist an integer N such that $n\geq N \Longrightarrow |a_n-l|<\varepsilon$ if such a number exist then we write $\lim_{n\to\infty} a_n=$ _____.
8. A sequence is said to be convergent if the sequence is has _________ limit.
9. A sequence is $\{a_n\}$ is said to be ____________ if $a_n<a_{n+1}$ for each value of n.
10. A sequence $\{a_n\}$ is bounded above and bounded below both the it is ________.
11. A series is said to be ___________ if while writing the n^{th} partial sum all terms except first and last vanish.
12. The series $\sum_{n=0}^{\infty}\frac{1}{n^p}$ converges if p ___ 1 and diverges if p ___1.
13. "If $\lim_{n\to\infty}\frac{a_n}{b_n}=c>0$, then $\sum a_n$ and $\sum b_n$ both converges or both diverges."

    Above statement is true or false?
14. A series in which the terms are alternatively positive and negative is called a/an____________.
15. $\lim_{n\to\infty}|a_n|^{1/n}=L$ shows the ______ test.

Q.2

Solve examples.

1. Find solution of non-linear differential equation

   $(i)\ x\frac{dy}{dx} + y = x^3y^6\ ,\ \ (ii)\frac{dy}{dx} + \frac{1}{x} = \frac{e^y}{x^2}.$

2. Solve $(i)\ 2xy\ dx + (1 + x^2)\ dy = 0\ (ii)\ \frac{dy}{dx} + \frac{y\cos x + \sin y + y}{\sin x + \cos y + x} = 0.$

3. Find solution of linear differential equation.

   $(i)\ (x+1)\frac{dy}{dx} - y = e^{3x}(x+1)^2\ ,\qquad (ii) y' + y\ tan\ x = \sin 2x$

4. Check the exactness and solve:

   $(i)(x^4 + y^4)dx - xy^3dy = 0\ ,\qquad (ii)(2x\log x - xy)dy + 2ydx = 0.$

5. Verify that $y = e^{-x}(a\cos x + b\sin x)$ is a solution of $y'' + 2y' + 2y = 0$, where $a\ and\ b$ are constants.

6. Form the differential equation of $y = (C_1 + C_2x)e^{2x}$

7. Find the sum of the series $\log 2 + \log\frac{3}{2} + \log\frac{4}{3} + \cdots + \infty.$

8. Test the convergence of the following series using suitable test.

   $(i)\sum_{n=1}^{\infty} n^{-\pi}\ ,\qquad (ii)\sum_{n=1}^{\infty}\sqrt[4]{(n)^2}\ ,\qquad (iii)\sum_{n=1}^{\infty}\frac{2^n}{7^n + 8},$

   $(iv)\sum_{n=1}^{\infty}\frac{1}{4 + \sqrt[3]{n}},\qquad (v)\sum_{n=1}^{\infty}\frac{3^n}{2^{n+3}}\ ,\qquad (vi)\sum_{n=1}^{\infty}\left(1 + \frac{1}{n}\right)^{-n^2},$

   $(vii)\sum_{n=1}^{\infty}(-1)^n\frac{3n-1}{2n+1}\ ,\qquad (viii)\sum_{n=1}^{\infty}\frac{(-1)^n}{n!},$

   $(ix)\ 1 + \frac{2}{3} + \frac{4}{9} + \cdots + \infty\ ,\qquad (x)\ 1 + \frac{2^2}{2^2} + \frac{3^2}{2^2} + \cdots + \frac{n^2}{2^2}$