SWAMI KESHVANAND INSTITUTE OF TECHNOLOGY, MANAGEMENT AND GRAMOTHAN, JAIPUR

Sub: Engineering Mathematics-I (1FY2-01)

Assignment 5

Sem/ Sec:……. Branch:……..Session ---------- MM:--------

Date of issue:…….. Date of submission:…….

**Section A( Short answer questions)**

Q.1 Discuss the convergence of sequence $\{b_n\}$, where $b_n = 1+\frac{1}{3}+\frac{1}{3^2}+\ldots+\frac{1}{3^n}$

Q.2 Define Oscillatory series.

Q.3 Test the convergence of sequence $a_n = \frac{n^2-2n}{3n^2+n}$

Q.4 Test the convergence of $\sum_{n=1}^{\infty}\frac{n}{n+1}$

Q.5 Discuss the convergence of the series $\sum_{n=1}^{\infty}(-2^n)$

**Section B ( Analytic / Problem solving questions)**

Q.6 Test the convergence of $\sum x_n$ where $x_n = \sqrt{\frac{n^2+n-1}{n^3-2}}$

Q.7 Examine the convegence or divergence of the series

$$\frac{1}{\sqrt{1}+\sqrt{2}}+\frac{1}{\sqrt{2}+\sqrt{3}}+\frac{1}{\sqrt{3}+\sqrt{4}}+\ldots.$$

Q.8 Test for the convergence of the series $\sum_{n=1}^{\infty}\tan\frac{1}{n}$

Q.9 Show that the series (a) $\sum_{n=1}^{\infty}\frac{(n+2)(n+3)}{n(n-1)}$ is divergent

Q.10 Test the convergence of $\sum_{1}^{\infty}\frac{\sqrt{n+1}-\sqrt{n}}{n^2}$

Q.11 Examine the convergence of the series $\left(\frac{nx}{n+1}\right)^n$

**Section C( Descriptive / Analytical questions)**

Q.12 Test for the convergence of the series

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$$\frac{1}{1.2.3}+\frac{3}{2.3.4}+\frac{5}{3.4.5}+.....$$

Q.13 Show that $\frac{1}{1+\sqrt{2}}+\frac{2}{1+2\sqrt{3}}+\frac{3}{1+3\sqrt{4}}+\ldots$ is divergent

Q.14 Test the convergence of the series

$$\frac{\sqrt{2}-1}{3^3-1}+\frac{\sqrt{3}-1}{4^3-1}+\frac{\sqrt{4}-1}{5^3-1}+\ldots$$

Q.15 Test for convergence $\frac{2}{1^2}x+\frac{3^2}{2^3}x^2+\ldots+\frac{(n+1)^n}{n^{n+1}}x^n+\ldots \quad x>0$

Q.16 Test for convergence $\sum_{n=2}^{\infty}\frac{1}{(\log n)^n}$ Hint: $\because 0<\frac{1}{\log n}<\frac{1}{n}$ and $\lim\frac{1}{n}=0\Rightarrow\lim\frac{1}{\log n}=0$

Q.17 Examine the convergence of the series $x+\frac{3}{5}x^2+\frac{8}{10}x^3+\ldots+\frac{(n^2-1)}{(n^2+1)}x^n+\ldots$

Q.18 Test the convergence of the series $1+\frac{3}{7}x+\frac{3.6}{7.10}x^2+\frac{3.6.9}{7.10.13}+x^3+\ldots$

Q.19 Test for convergence of the series $\sum_{n=2}^{\infty}\frac{(-1)^n x^n}{n(n-1)}$ (0 < x < 1)

Q.20 Test the convergence of $\frac{1^2}{2^2}-\frac{1^2.3^2}{2^2.4^2}+\frac{1^2}{2^2}.\frac{3^2}{4^2}.\frac{5^2}{6^2}....$

Q.21 Examine the convergence of $\sum\frac{x^{2n-2}}{(n+1)\sqrt{n}}$