BSc DEGREE EXAMINATION DECEMBER 2017

(Second Semester)

Branch – **ELECTRONICS**

MATHEMATICS-II

Time : Three Hours Maximum : 75 Marks

SECTION-A (20 Marks)

Answer **ALL** questions

ALL questions carry **EQUAL** marks (10 x 2 = 20)

1 Show that $\lim_{n\to\infty}\left(1-\frac{1}{n}\right)^n = \frac{1}{e}$

2 $\log\left(\frac{1+x}{1-x}\right) =$

3 Define odd functions of Fourier series.

4 Define Fourier series.

5 Prove that $F\{f(x-a)\} = e^{ias}F(s)$

6 Define convolution of two functions.

7 Solve $\left(D^2-2D+1\right)y = 0$

8 Prove that $\Gamma(1) = 1$

9 What is the condition for convergence of Gauss-Jacobi method of iteration?

10 Define Trapezoidal rule.

SECTION - B (25 Marks)

Answer **ALL** Questions

ALL Questions Carry **EQUAL** Marks (5 x 5 = 25)

11 a Prove that $\frac{e^2-1}{e^2+1} = \frac{\frac{1}{1!}+\frac{1}{3!}+\frac{1}{5!}+\ldots}{1+\frac{1}{2!}+\frac{1}{4!}+\ldots}$

OR

b Prove that $\frac{a-x}{a}+\frac{1}{2}\left(\frac{a-x}{a}\right)^2+\frac{1}{3}\left(\frac{a-x}{a}\right)^3+\ldots. = \log a - \log x$

12 a Determine the Fourier series of $f(x) = \frac{1}{2}(\pi - x)$ where $0 \le x \le 2\pi$

OR

b Find a sine series for f(x)=c in the range 0 to π

13 a Prove that $\int_{-\infty}^{\infty}|f(x)|^2\,dx = \int_{-\infty}^{\infty}|F(s)|^2\,ds$

OR

b Prove that $F_c\{f(ax)\} = \frac{1}{a}F_c\left(\frac{s}{a}\right)$

14 a Solve $(D^2+16)y=\cos 4x$

OR

Cont...

b Evaluate $\int_0^{\frac{\pi}{2}} \sin^{10}\theta d\theta$

15 a Solve the following system of equation by Gauss Jordan Method.

$x+3y+3z=16$
$x+4y+3z=18$
$x+3y+4z=19$

OR

b Evaluate $\int_0^1 xe^x dx$ using simpon's $\frac{1}{3}$ rule with h=0.25.

SECTION - C (30 Marks)

Answer any **THREE** Questions
ALL Questions Carry **EQUAL** Marks (3 x 10 = 30)

16 Prove that $\sum_{n=0}^{\infty} \frac{5n+1}{(2n+1)!} = \frac{e}{2} + \frac{2}{e}$

17 Find the fourier series for $f(x) = \begin{cases} -\pi; -\pi < x < 0 \\ x; 0 < x < \pi \end{cases}$ and deduce that

$$\frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \ldots\ldots = \frac{\pi^2}{8}$$

18 State and prove convolution theorem.

19 Solve $\left(D^2 - 4\right)y = e^{-4x} + \sin 2x$.

20 Solve the following system of equations
$10x+2y+z=9$
$x+10y-z=-22$
$-2x+3y+10z=22$
using Gauss Seidal Method.

Z-Z-Z

END