

PSG COLLEGE OF ARTS & SCIENCE
(AUTONOMOUS)
BSc DEGREE EXAMINATION MAY 2018
(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 Write down the middle term of $\left(x - \frac{2}{x}\right)^{12}$.
- 2 Prove that $a^x = 1 + \frac{x \log_e a}{1!} + \frac{x^2}{2!} (\log_e a)^2 + \dots$
- 3 Define a periodic function.
- 4 Define an even functions of Fourier series.
- 5 Prove that $F\{e^{iax} f(x)\} = F(s+ia)$.
- 6 Define Parsival's identity.
- 7 Solve $(D^2 + D + 1)y = 0$.
- 8 Define Beta and Gamma functions.
- 9 Gauss-Seidel method is better than Gauss-Jacobi method. Why?
- 10 Evaluate $\int_{-1}^1 \frac{dx}{1+x^2}$ using Gauss two point formula.

SECTION - B (25 Marks)

Answer **ALL** Questions

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

- 11 a Resolve $\frac{9}{(x-1)(x+2)^2}$ into partial fractions.
OR
- b Show that $(\log 2) - \frac{1}{2!}(\log 2)^2 + \frac{1}{3!}(\log 2)^3 - \dots = \frac{1}{2}$.
- 12 a Determine the Fourier series of $f(x) = x$ where $-\pi < x < \pi$.
OR
- b Find the half-range cosine series for the function $f(x) = x^2$, $0 \leq x \leq \pi$.
- 13 a State and prove convolution theorem.
OR
- b Find $F_c\{e^{-ax}\}$ and $F_s\{e^{-ax}\}$.
- 14 a Solve $(D^2 - 4D + 3)y = \sin 3x$.
OR
- b Prove that $\beta(m, n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$.

Cont ...

- 15 a Solve the following system of equation y Gauss elimination method
- $$2x + 3y - z = 5$$
- $$4x + 4y - 3z = 3$$
- $$2x - 3y + 2z = 2$$

OR

- b Evaluate $\int_0^1 \frac{dx}{1+x^2}$, using trapezoidal rule with $h = 0.2$.

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

- 16 Find the sum to infinity of the series.
- $$1 - \frac{1}{4} + \frac{1.3}{4.8} - \frac{1.3.5}{4.8.12} + \dots \infty$$
- 17 Obtain the Fourier series to represent the function $f(x) = |x|$, $-\pi < x < \pi$
and deduce $\frac{1}{1^2} + \frac{1}{3^2} + \dots = \frac{\pi^2}{8}$.
- 18 Find the Fourier cosine transform for $F(x)$ if
 $f(x) = 1$ when $|x| < 1$
 $= 0$ when $|x| > 1$
 and deduce $\int_0^{\infty} \frac{\sin t}{t} dt = \frac{\pi}{2}$.
- 19 Solve $(D^2 + 16)y = e^{-3x} + \cos 4x$.
- 20 Solve the following system of equations
 $30x - 2y + 3z = 75$
 $x + 17y - 2z = 48$
 $x + y + 9z = 15$
 using Gauss Jacobi's method.

Z-Z-Z

END