8. (i) What are the sources for probable errors. Explain the mechanism for best fit of an experimental data. 4

(ii) Calculate the error in measured power W for an error 'h' in the voltage V across a resistor and 'k' in the resistance R. Which of the errors is dominant ? 4

Roll No. .....

91526

B. Sc. 2nd Sem. Physics (Hons.)
(New Scheme)
Examination – May, 2016

MATHEMATICAL PHYSICS - II

Paper : Phy-201

Time : Three Hours] *[Maximum Marks : 40*

Before answering the questions, candidates should ensure that they have been supplied the correct and complete question paper. No complaint in this regard, will be entertained after examination.

Note : Attempt *five* questions in all, selecting at least *two* questions from each Unit.

UNIT – I

1. Differentiate between linear and non-linear differential equations by giving *two* examples of each

type. Underline the difference in the mechanism for complete solution of the *two* types. Obtain solution of $x^2 d^2y/dx^2 + 4x\, dy/dx + 2y = \log x$. 8

2. Define Wronskian and describe its application to check independence of the solutions of a second order homogenous differential equation. Apply it to the solutions of $xd^2 y/dx^2 - 2dy/dx = 0$. 8

3. For equations reducible to linear equations with constant coefficients, solve : 4 × 2

(i) $x^2 d^2 y/dx^2 - 3x\, dy/dx + y = \log x\, [\{\sin(\log x) + 1\}/x]$

(ii) $(2x-1)^2 d^2 y/dx^2 + (2x-1)\, dy/dx - 2y = 8x^2 - 2x + 3$

4. (i) Apply variation of parameters to solve :

$d^2y/dx^2 + 4y = \tan 2x$ 4

(ii) Using method of undetermined coefficients, obtain solution of

$d^2y/dx^2 - 5dy/dx + 6y = e^{3x} + \sin x$ 4

UNIT – II

5. What are Dirichlet conditions. Obtain a Fourier series to represent e^{-ax} from $x = -\pi$ to $x = \pi$. Hence derive series for $\pi/\sinh \pi$. 8

6. (i) Present Fourier Series expansion of

$$f(x) = \begin{cases} \pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$$ 4

(ii) Derive the expression for output of a Full-wave rectifier as Fourier Series. 4

7. (i) Obtain a half range cosine series expansion for

$$f(x) = \begin{cases} 0, & 0 \le x \le l/2 \\ (l - x), & \frac{l}{2} \le x \le l \end{cases}$$ 4

(ii) Derive the expression for output of a Full-wave rectifier as Fourier Series. 4