AE-752

M.Sc. (Final)
Term End Examination, 2016-17

PHYSICS

Optional

Paper - II (C)

Numerical Methods and Physics of Electronic Devices

Time : Three Hours] [*Maximum Marks* : 100
[*Minimum Pass Marks* : 36

Note : Answer any **five** questions in all, selecting at least **two** questions from each Section. All questions carry equal marks.

Section - A

1. Find the eigenvalues and corresponding eigen-vectors of matrix $X = \begin{bmatrix} 1 & 2 \\ 5 & 4 \end{bmatrix}$.

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2. Explain power and Jacobi method.

3. (*a*) What is the order of error in trapezoidal rule ?

(*b*) Evaluate $\int_0^1 \int_0^1 \frac{dx\,dy}{1+x+y}$ by trapezoidal rule.

4. Find all solutions of $e^{2x} = x + 6$ correct to four decimal places, using the Newton-Raphson method.

5. Suppose that $y = y(t)$ is the solution to the initial value problem

$$\frac{dy}{dt} = \tan(y), \quad y(0) = 1$$

Use Euler's method and trapezium method as a predictor-corrector pair (with one correction at each time step). Take the time step to be $h = 0.2$ so as to obtain approximation to $y(0.2)$ and $y(0.4)$.

Section - B

6. What is MOSFET ? Explain the working with necessary diagram and I-V characteristics of it.

7. Write notes on the following :

(*a*) Solar cell

(*b*) Diode lasers

8. What do you mean by Hall effect ? Derive expression for Hall coefficient.

9. Explain Haynes-Shockley experiment in detail.

10. Discuss Direct and Indirect band gap semiconductors.

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