

**UG(2) — Ph  
(Sub / Gen) New**

**2017**

*Time : 3 hours*

*Full Marks : 75*

*Pass Marks : 23*

*Candidates are required to give their answers in their own words as far as practicable.*

*The questions are of equal value.*

*Answer five questions, selecting two each from Group – B and Group – C and Group – A is compulsory.*

**Group – A**

1. Answer any three questions of the following :
  - (a) Explain the conditions of sustained interference.
  - (b) Give Stoke's treatment of reflection and refraction of light by a plane boundary.

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**(Turn over)**

- (c) Describe the salient features of a laser beam.
- (d) Describe Peltier effect and Thomson effect.
- (e) Explain complex impedance in alternating current circuits.
- (f) Explain how binding energy is related with the stability of a nucleus.

**Group – B**

2. Discuss the phenomenon of interference in thin films. Obtain the condition for maxima and minima. Show that the interference pattern in the reflected and transmitted system are complimentary.
3. Describe Fraunhofer's diffraction pattern due to a narrow slit and deduce the positions of maxima and minima. Plot the intensity distribution curve.
4. State Maxwell's equations in electromagnetic theory. Show that electromagnetic waves are

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**(2)**

**Contd.**

transverse in nature with electric and magnetic field vectors at right angles to the direction of propagation.

5. What are X-rays ? Describe an experimental arrangement for producing X-rays. Give their properties and uses.

**Group – C**

6. What is a magnetic circuit ? Establish its analogy with an electric circuit. Use the concept to calculate the flux in the air gap of an electromagnet.
7. Explain Seebeck effect and Peltier effect. Derive expressions for Peltier and Thomson coefficients using thermodynamic principles.
8. Write the main features of photoelectric effect. Give Einstein photoelectric equation and explain how this equation explains the features of photoelectric effect.

9. Write short notes on any two of the following :
- (a) Dielectric Polarisation
  - (b) Ballistic Galvanometer
  - (c) Nuclear Fission
  - (d) Scintillation Counter

