

RAMAKRISHNA MISSION VIDYAMANDIRA

(Residential Autonomous College affiliated to University of Calcutta)

SECOND YEAR [BATCH 2016-19]

B.A./B.Sc. FOURTH SEMESTER (January – June) 2018

Mid-Semester Examination, March 2018

Date : 17/03/2018

Time : 1 pm – 2 pm

PHYSICS (General)

Paper : IV

Full Marks : 25

Answer any five questions taking at least one from each group

[5×5]

Group – A

1. a) Explain the formation of the “depletion region” in an open circuited PN-junction. [4]
b) How the resistance of a semiconducting material varies with temperature? [1]
2. Derive an expression for the rectification efficiency of a full-wave rectifier. [5]
3. Draw the circuit diagram of a voltage regulator circuit using a zener diode and then explain its working. [5]

Group – B

4. Derive Bragg's law from x-ray diffraction. [5]
5. Explain continuous beta decay spectrum. Give example of β^+ and β^- decay. [3+2]
6. A radio active element P disintegrates to another radioactive element Q with a disintegration constant λ_1 . If Q disintegrates with a disintegration constant λ_2 , find the expression for the number of atoms of Q at any time t with respect to the initial number of P. In this context, what do you mean by transient equilibrium? [5]
7. a) Draw a graph between the frequency of light falling on a metal surface and the maximum kinetic energy of the photo-electron emitted. How will this graph change if
 - i) the intensity of light is changed. [1·5]
 - ii) the metal is changed. [1·5]
- b) A charged particle accelerated by 200V has a de Broglie wave length $0.20\text{\AA}$. Find the mass of the particle. [Charge of the particle = $1.6 \times 10^{-19}\text{C}$] [2]

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