

Government College of Engineering, Aurangabad
(An Autonomous Institute of Government of Maharashtra)

F. E. Examination
End semester Examination
GE 102: APPLIED SCIENCE-I

Time: Three Hours

Max. Marks: 70

“Verify the Course Code and check whether you have got the correct question paper”

N.B:-1. All questions are compulsory

2. Figures to the right indicate full marks

3. Assume suitable data if necessary and state it clearly

4. Use of non-programmable calculator is allowed

Section-A

Q.1 (a) Attempt any two of the following: (10)

(i) Show that an electron moves along a parabolic path, when it enters in a uniform Electric field applied perpendicular to its motion.

(ii) Discuss refraction of electron beam across an equipotential surface. Derive an expression for Bethe's law.

(iii) Draw the block diagram of C.R.O and explain function of various blocks.

(b) Attempt any one of the following: (04)

(i) Discuss J.J. Thomson's method for the determination of specific charge (e/m) of an electron.

(ii) Derive the expression for the radius of the circular path of an electron in a uniform electric field applied perpendicular to electron motion.

Q.2 (a) Attempt any two of the following: (10)

(i) Derive the conditions for maxima and minima due to interference of reflected light in thin film of uniform thickness.

(ii) Derive the expression for resolving power of plane diffraction grating.

(iii) Explain how a Laurent's half shade Polarimeter can be used to measure specific rotation of sugar solution.

(b) Attempt any one of the following: (04)

(i) Explain working of quarter wave plate.

(ii) Calculate the specific rotation if the plane of the polarization is turned through 26.4° , traversing 20cm length of 20% sugar solution.

- (ii) Derive the Schrodinger's time independent equation for matter waves.
- (b) A proton is moving with a speed 2×10^8 m/sec. Find the wavelength associate (3)
with it

Given – $h = 6.62 \times 10^{-34}$ J-S ;

Mass of proton – 1.67×10^{-27} kg

SECTION – B

- Q4. (a) Attempt any One.** **04**
- i) Explain Plane of symmetry and center of symmetry, with neat diagram.
 - ii) Distinguish between crystalline solid and amorphous solid with example.
- Q4. (b) Attempt any One.** **03**
- i) Write a note on metallic crystal.
 - ii) How miller indices are determined for a cubic crystal.
- Q5. (a) Attempt any Two.** **10**
- i) What is conductometric titration? State their advantages.
 - ii) Explain the effect of dilution on the conductivity of the solution.
 - iii) What is Kohlrausch's law? Give any two applications.
- Q5. (b) Attempt any One.** **04**
- i) Write a note on galvanizing.
 - ii) Explain the method of anodic protection with diagram.
- Q6. (a) Attempt any Two.** **10**
- i) Define hardness of water. Explain its types with example.
 - ii) Explain the zeolite process with neat diagram.
 - iii) Write a note on priming & foaming.
- Q6. (b) Attempt any One.** **04**
- i) Write a note on green house effect.
 - ii) Write a note on Biochemical oxygen demand.