XI

QUESTION BANK

GRAVITATION

SECTION A

Q.1 Multiple choice questions :- [1 m each]

i) The weight of particle at the centre of Earth is ——
pg 191 (15)

(a) Infinite (b) Zero
(c) Same as that at other place.
(d) Greater than at the poles.

ii) The gravitational potential due to the Earth is maximum minimum at ——. pg 191 (18)

a) The centre of the Earth.
b) The surface of the Earth.
c) A point inside the Earth but not at its centre.
d) Infinite distance.

iii) Kepler's law of Equal areas is an outcome of ——
pg 190 (1)

a) Conservation of energy.
b) Conservation of linear momentum.
c) Conservation of angular momentum.
d) Conservation of mass.

iv) If the kinetic energy of a satellite is 2×10^4 J, then its potential energy will be —— pg 192 (30)

a) -2×10^4 J (b) 4×10^4 J
c) -4×10^4 J (d) -10^4 J.

v) The binding energy of a satellite revolving around planet in a circular orbit is 3×10^9 J, its kinetic energy is —— pg 192 (31)

a) 6×10^9 J (b) $-3 \times 10^{+9}$ J

(c) -6×10^9 J (d) 3×10^9 J

vii) the value of acceleration due to gravity is maximum —

(a) the equator of the Earth. pg 191 (17)

(b) the centre of the Earth.

(c) the pole of the Earth.

(d) Slightly above the surface of the Earth.

viii) Time period of revolution of a satellite around a planet of radius R is T. Period of revolution around another planet whose radius is 3R is — pg 190 (5)

(a) T (b) 9 T

(c) 3T (d) $3\sqrt{3}$ T

Q2 Answer the following :- [1m each]

i) State kepler's law of equal areas. pg 159 (7)

ii) what are the dimensions of the universal gravitational constant- ? pg 161 (23)

iii) State kepler's law of period. pg 159 (8)

iv) Define Binding energy of satellite pg 180 (103)

v) Define Escape velocity of Satellite. pg 175 (76)

vi) State kepler's law of orbits. pg 159 (9)

vii) State S.I unit of gravitational constant pg 161 (22)

xii) what is the period of revolution of polar satellite orbiting close to the surface of the Earth given $R = 6400$ km $g = 9.8\ m/s^2$? pg 182 (112)

SECTION B [2m Each]

Q3. State Newton's law of gravitation. Express it in vector form. pg 161 (20)

Q4. What do you mean by gravitational constant? State its S.I unit.? pg 161 (22)

Q6. Derive an expression for the acceleration due to gravity on the surface of the Earth? pg 165 (35)

Q8. Calculate the acceleration due to gravity at the height of 300 km from the surface of the Earth.
[$M = 5.98 \times 10^{24}$ kg, $R = 6400$ km] pg 170 (59)

Q11. State any two uses of polar satellite? pg 177 (88)

Q12. State any two applications of communication satellite? pg 176 (85)

SECTION C: [3 Marks each]

14] Derive an expression for critical velocity of Satellite. on what factors does it depend? pg 178 (91) ✓

18] Calculate the Kinetic Energy, Potential Energy, Total Energy and binding Energy of an artificial satellite of mass 2000kg orbiting at a height of 3600Km above the surface of the Earth. pg 184 (121) ✓

($G = 6.67 \times 10^{-11}$ Nm^2/kg, Radius of Earth $R = 6400Km$, Mass of earth $M = 6 \times 10^{24}$ kg)

PHYSICS

· ELECTROSTATICS

Q.1] multiple choice Questions: (1 Marks each)

I] Two charges of 1.0C each are placed one metre apart in free space. The force between them will be ...
(a) 9×10^{9} N (b) 10N (c) 1N (d) 9×10^{-9} N Pg-378 (8) ✓

II] Which of the following produces uniform electric field?
(a) Point charge (b) Linear charge (c) Two Parallel Plates
(d) charge distributed in circular surface. Pg-379 (18) ✓

III] When the distance between the charged particles is halved, the force between them becomes Pg-378 (2)
(a) one-fourth (b) half (c) double (d) four times.

IV] The unit of Intensity of electric field is
(a) N/C (b) J/C (c) Vm (d) N/m Pg-379 (12) ✗

V] The SI unit of Permittivity is.. Pg-379 (14) ✗
(a) $N \cdot m^2/C^2$ (b) N/m^2C^2 (c) C^2/N (d) C^2/m^2N

Q.2] Very short answer Questions (1 Marks each)

(ii) What is relative permittivity? Pg-354 (19) ✓

(iii) state Gauss' Law in electrostatics. Pg-366 (66) ✓

(iv) Two Parallel Plates have a potential difference of 10V between them. If the plates are 0.5 mm apart, What will be the strength of electric field? Pg-365 (61)

Q.3] Short Answer questions [2 Marks each]

(ii) An electric dipole has oppasite charges of magnitude 2×10^{-15} C separated by a distance of 0.2 mm. Find the magnitude of dipole moment. Pg-372 (80) ✗

(v) State and explain Coulomb's law of electric charge in Electrostatics. Pg 353 (17)

(vi) Define Electric dipole moment. write S.I unit. Pg 369 (74)

Q.4] Answer in Brief (3 Marks each)

I] Define Electric lines of force. state the Properties of electric lines of force. Pg 362 (50)

IV] A Potential difference of 5000 volt is applied between two parallel Plates 5cm apart a small oil drop having a charge of 9.6×10^{-19} c falls between the Plates. Find

(a) Electric field intensity between the Plates

(b) the force on the oil drop. Pg - 366 (65)

Electromagnetic Waves and Communication System:-

Q.1) Multiple choice Questions [1 Mark Each]

(I) The EM wave emitted by the Sun and responsible for heating the Earth's atmosphere due to green house effect is [Q.19, 452]
(a) Infra-red radiation (b) X-ray
(c) Microwave (d) visible light

(II) Earth's atmosphere is richest in [Q.N.21, Page-452]
(a) UV (b) IR (c) X-ray (d) Microwaves

(III) How does the frequency of a beam of ultraviolet light change when it travels from air into glass? [Q.10, page 452]
(a) No change (b) increases
(c) decreases (d) remains same

(IV) The direction of EM wave is given by
(a) $\vec{E} \times \vec{B}$ (b) $\vec{E} \cdot \vec{B}$ [Q.3, p.451]
(c) along $\vec{E}$ (d) along $\vec{B}$

(V) The maximum distance upto which TV transmission from a TV tower of height 'h' can be received is proportional to [Q.41, P453]
(a) $h^{1/2}$ (b) h (c) $h^{3/2}$ (d) h^2

(VI) The waves used by artificial satellites for communication purposes are [Q.16, 452]
(a) Microwave (b) AM radio waves
(c) FM radio waves (d) X-rays

Electromagnetic waves & Comm. sys.

Q.2) Very short answer questions. [1 Marks Each]

✓ (3) Name the three basic units of any communication system. [Q73, 444] ✓

Q.3) Short Answer Questions. [2 Marks Each]

✓ (3) Give two uses of radio waves. [Q44, 438] ✓
✓ (4) Give two uses of X-rays. [Q53, 440] ✓

Q.4) Short Answer Questions. [3 Marks Each]

✓ (2) Explain ground wave propagation. [Q61, 442]

QUESTION BANK

XI

SOUND WAVES

SECTION A

Q1 Multiple choice Questions :- (1 mark each)

1. Speed of sound is maximum in — pg. 301 (4)
(a) Air (b) water (c) vacuum (d) solid.

2. A sound carried by air from a sitar to a listener is a — pg. 302 (21)
(a) longitudinal stationary wave.
(b) Transverse progressive wave
(c) Transverse stationary wave.
(d) Longitudinal progressive wave.

3. For progressive wave, in the usual notation, which of the following is correct? pg. 301 (16)
(a) $v = nT$ (b) $v = \lambda T$ (c) $n = \frac{v}{\lambda}$ (d) $T = \lambda v$.

6. The temperature at which the speed of sound in air becomes double its value at 0°c is — pg 301 (10)
(a) 273°c (b) 546°c (c) 819°c (d) 1092°c.

Q2. Answer the following :- (1 mark each)

(vii) what is the relation between period and frequency of the wave ? pg 275 (5)

(vi) State S.I unit of frequency. pg. 274 (3)

(viii) Sound wave A has period 0.015 s, sound wave B. has period 0.025 s, which sound has greater frequency ? pg 277 (12)

Section B (2 mark each)

Q3. A tuning fork of frequency 170 Hz produces sound waves of wavelength 2 m. Calculate the speed of sound. pg 277 (13)

Q4. Define :- (i) Amplitude of wave pg 274 (4)
(ii) wavelength of wave.

Q5. Derive relation between velocity v, frequency n, and wavelength λ of the wave. pg 275 (5)

Q7. Distinguish between Transverse wave and longitudinal wave. pg 279 (25)

Q8. What is effect of temperature on speed of sound? pg. 281 (31)

Q10. A certain sound wave in air has a speed 340 m/s and wavelength 1.7m. For this wave, calculate (a) frequency (b) the period. pg 278 (20)

SECTION C (3 mark each)

Q13. What is the effect of humidity of air on the velocity of sound? pg 282 (33)

Q15. State the characteristics of transverse waves. pg 278 (21)

Q16. State the characteristics of longitudinal waves pg 279 (24)

Q18. At what temperature will the speed of sound in air be 1.75 times its speed at NTP? pg 283 (38)

Semiconductors

Q.1) Multiple choice Questions:

1) A p-type semiconductor is
(a) positively charged (b) Uncharged
(c) negatively charged (d) none of the above

4) Current through a reverse biased p-n junction, increases abruptly at [Q.21, 476]
(a) breakdown voltage (b) 0.0V
(c) 0.3V (d) 0.7V

2) A reverse-biased diode, is equivalent to: [Q.22, 476]
(a) an off switch (b) an on switch
(c) a low resistance (d) none of the above

3) Electric conduction through semiconductor is due to: [Q.4, 475]
(a) Electrons (b) holes
(c) none of these (d) both of electrons and holes

4) The energy levels of holes are: [Q.12, 476]
(a) in the valence band (b) in the conduction band
(c) in the band gap but close to valence band
(d) in the band gap but close to conduction band

5) The potential barrier in p-n diode is due to [Q.18, 476]

(a) depletion of positive charge near the junction

(b) accumulation of positive charge near the junction.

(c) depletion of negative charges near the junction

(d) accumulation of positive and negative charges near the junction

Q.2] Very short answer questions: [1 Mark]

1) What is doping ? [Q.23, 460]

2) What is intrinsic semiconductor [Q.16, 459]

Q.3] Short answer questions [2 Marks Each]

1) What is p-n junction diode. Draw its circuit symbol. [Q.53, 469] 467 [Q.70, 470]

2) State any two applications of semiconductors.

Semiconductor

Q4) Long Answer Questions :- [3 Marks Each]

1) Distinguish between Intrinsic and Extrinsic semiconductors [Q37, 463]