

Date: 16.01.2020

Day: Thursday

Time: 02.30 pm to 04.00 pm

Marks: 25

Note: 1) All questions are compulsory.

2) Draw neat labelled diagram whenever necessary.

3) Use of logarithmic table is allowed.

4) Physical constants:- 1) $g = 9.8 \text{ m/s}^2$

2) $\epsilon_0 = 8.85 \times 10^{-12} \text{ C}^2/\text{Nm}^2$

3) $\frac{1}{4\pi\epsilon_0} = 9 \times 10^9 \text{ Nm}^2/\text{C}^2$

4) $G = 6.67 \times 10^{-11} \text{ Nm}^2/\text{kg}^2$

Section – A

Q.1 Select and write the correct answer:

- i. The path followed by the projectile _____. 01
 a) horizontal range b) trajectory c) time of flight d) maximum height
- ii. The permittivity of medium is $26.55 \times 10^{-12} \text{ C}^2/\text{Nm}^2$. The dielectric constant of medium will be _____. 01
 a) 2 b) 3 c) 4 d) 5
- iii. The binding energy of satellite revolving around planet in a circular orbit is $3 \times 10^9 \text{ J}$. Its kinetic energy. 01
 a) $6 \times 10^9 \text{ J}$ b) $-3 \times 10^9 \text{ J}$ c) $-6 \times 10^9 \text{ J}$ d) $3 \times 10^9 \text{ J}$
- iv. Which of the following produces uniform electric field? 01
 a) point charge b) linear charge
 c) two parallel plates d) charge on circular disc

Q.2 Answer the following questions:

- i. State Newton's law of gravitation. 01
- ii. State law of conservation of charge. 01
- iii. A string of length 4.9 m carries a bob at its end. If this is to be used as a conical pendulum. The angle of inclination of the string with the vertical is 60° . Calculate the time period of conical pendulum. Given $g = 9.8 \text{ m/s}^2$. 01

Section – B

Attempt any Four:

- Q.3 State and explain principle of superposition of charges. 02
- Q.4 A person sitting in a moving train throws a ball vertical upward. How does the ball appear to move to an observer. (a) inside the train (b) outside the train 02
- Q.5 State any four characteristic of electric lines of force. 02
- Q.6 Derive an expression for variation in gravitational acceleration of the earth at an altitude. 02
- Q.7 The electric field in a region is given by $\vec{E} = 5.0 \hat{R} \text{ N/C}$. Calculate the electric flux through a square of side 10.0 cm in the following cases. 02
 a) The square is along XY plane. b) The square is along XZ plane.
- Q.8 Two satellites A and B are revolving round a planet. Their periods of revolution are 1 hr and 8 hr respectively. The radius of orbit of satellite B is $4 \times 10^4 \text{ km}$. Find radius of orbit of satellite A. 02

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