

SUNDARBAN MAHAVIDYALAYA  
Intermediate Examination 2020  
Subject: Physics (Advanced), SEM-II  
Paper-PHS-A-CC-2-3  
Full Marks-30 Time-2Hrs.

Answer any 15 questions from the following:

1. In a circuit containing inductance and resistance
  - (a) e.m.f. leads the current
  - (b) current leads the e.m.f.
  - (c) current and e.m.f. are in phase
  - (d) anything
  
2. Current in a circuit is wattless when the phase difference between current and voltage is
  - (a) zero
  - (b)  $+\pi/2$
  - (c)  $+\pi$
  - (d)  $-\pi$
  
3. Which of the following does not have dimensions of time
  - (a) CR
  - (b) L/R
  - (c)  $\sqrt{LC}$
  - (d) LC
  
4. An electromagnetic field satisfies
  - (a) Gauss law
  - (b) Faraday's law
  - (c) Ampere's law
  - (d) All of them
  
5. Find whether the discharge of capacitor for the following case of  $C=0.1\ \mu\text{F}$ ;  $L=10\ \text{mH}$ ;  $R=1\ \text{k}\Omega$ 
  - (a) oscillatory
  - (b) non-oscillatory
  - (c) both a and b
  - (d) none of the above
  
6. The coefficient of self-induction of a coil of 1000 turns when a current of 2.5 Amp produces a magnetic flux of 0.5 micro-Weber.
  - (a) 20 mH
  - (b) 200 mH
  - (c) 2 mH
  - (d) 0.2 mH
  
7. A hydrogen atom is paramagnetic. Then a hydrogen molecule will be
  - (a) paramagnetic
  - (b) diamagnetic

- (c) ferromagnetic
- (d) none of these

8. The value of spin magnetic moment of the electron is

- (a)  $eh/4\pi m$
- (b)  $eh/2\pi m$
- (c)  $ehm/2\pi$
- (d)  $hem/4\pi$

9. Numerical value of Bohr magneton.

- (a)  $92.7 \times 10^{(-24)}$  Joule/ Tesla
- (b)  $927 \times 10^{(-24)}$  Joule/ Tesla
- (c)  $9.27 \times 10^{(-24)}$  Joule/ Tesla
- (d)  $0.927 \times 10^{(-24)}$  Joule/ Tesla

10. The magnetic field outside the infinite solenoid is

- (a) zero
- (b)  $\mu_0 ni$
- (c)  $\mu_0 ni/2$
- (d) infinite

11. Mark the statement which is correct in all circumstances

- (a)  $\nabla \times \mathbf{E} = 0$
- (b)  $\nabla \times \mathbf{B} = 0$
- (c)  $\nabla \cdot \mathbf{E} = 0$
- (d)  $\nabla \cdot \mathbf{B} = 0$

where  $\mathbf{E}$  and  $\mathbf{B}$  are electric field intensity and magnetic field intensity respectively.

12. The force experienced by a charged particle moving in a magnetic field is independent of

- (a) velocity of the particle
- (b) charge on the particle
- (c) strength of the field
- (d) mass of the particle

13. Two straight wires are kept in air 2 m apart carrying currents of 50 A and 30 A in the same direction. The force between them

- (a)  $24 \times 10^{(-4)}$  Newton
- (b)  $2.4 \times 10^{(-3)}$  Newton
- (c)  $2.4 \times 10^{(-4)}$  Newton
- (d)  $0.24 \times 10^{(-4)}$  Newton

14. The relation between current density vector  $\mathbf{J}$  and average drift velocity of electrons is

- (a)  $\mathbf{J} = n e \mathbf{v}$
- (b)  $\mathbf{J} = - n e \mathbf{v}$
- (c)  $\mathbf{J} = e \mathbf{v}$
- (d)  $\mathbf{J} = - e \mathbf{v}$

15. The S.I. unit of electric displacement vector is  
(a) Cm  
(b) C/m  
(c) Cm<sup>2</sup>  
(d) C/m<sup>2</sup>
16. Electric susceptibility for vacuum is  
(a) 1  
(b) zero  
(c) - 1  
(d) less than 1 but positive
17. Two protons in the thorium nucleus are  $3 \times 10^{-15}$  m apart. What is their mutual potential energy?  
(a)  $76.8 \times 10^{-14}$  J  
(b)  $768 \times 10^{-14}$  J  
(c)  $7.68 \times 10^{-14}$  J  
(d)  $0.768 \times 10^{-14}$  J
18. The electric potential in space is given by  $V = 3x + 4y - 7z$ . The expression for electric intensity is  
(a)  $[-3\mathbf{i} + 4\mathbf{j} - 7\mathbf{k}]$   
(b)  $[3\mathbf{i} - 4\mathbf{j} + 7\mathbf{k}]$   
(c)  $[-3\mathbf{i} + 4\mathbf{j} + 7\mathbf{k}]$   
(d)  $[3\mathbf{i} + 4\mathbf{j} + 7\mathbf{k}]$
19. The electric field intensity E inside a uniformly charged sphere varies with distance r of the observation point as  
(a)  $E \propto r$   
(b)  $E \propto 1/r$   
(c)  $E \propto r^2$   
(d)  $E \propto 1/r^2$
20. Given that electric field in a region of space  $\mathbf{E} = 2x\mathbf{i} + 2y\mathbf{j} + z\mathbf{k}$ . The volume charge density is  
(a)  $4.425 \times 10^{-12}$  Cm<sup>-3</sup>  
(b)  $442.5 \times 10^{-12}$  Cm<sup>-3</sup>  
(c)  $44.25 \times 10^{-12}$  Cm<sup>-3</sup>  
(d)  $4425 \times 10^{-12}$  Cm<sup>-3</sup>