I. Multiple Choice

1. According to the faraday's law of electromagnetic induction a _____ will interact with an electric circuit to produce an electromotive force (EMF)
   a)Negative field   b)Positive field   c)Current   d)Magnetic field

2. According to Fleming's right hand rule, the direction of induced___ changes whenever the direction of motion of conductor changes
   a)Resistance   b)current   c)power   d)Voltage

3. What mechanism ensures that the light signal remains confined to the core of an optical fiber?
   a)Reflection of light within the cladding
   b) Reflection of light at the outer surface
   c)Total internal reflection within the core
   d)Absorption of light by the core material

4. Which antenna type is primarily used for light gain applications such as satellite communications and radar systems, offering a narrow beam width
   a)Dipole antenna   b)Parabolic antenna   c)Monopole   Antenna
   d)Loop antenna

5. Electric flux is a _____ filed, and it density is a _____ filed
   a)Vector, vector b)Scalar vector   c)vector, scaler   d)scalar scdlor

6. The thumb in Fleming's left hand rule indicates
   a)Force   b)Current   c)field   d)None of the above

7. Tesla =_____ weber/an^2
   a)1   b)10   c)0.1   d)100

8. The force b/n two charges is 200xy, if the distance b/n the charges is doubled the force will be
   a)400N   b)100Nc)50N   d)280N

9. Find H=_____ A/m at the center of a circular coil of diameter im and carrying a current of 2 A
   a) 0.6366 b)0.1636   c)6.366   d)2

10. What is the work done to move a zenith charge flom one point to another in electric circuit carrying some current, b/n those two points?

a)Pressure distance   b)Potential differences
c)Potential distance   d)Pressure differences

11. If the conductor is stationary and the field is champing (varying), then emf induced in it such an emf in known as
a)Self induced EMF   b)Back EMF
c)Static induced EMF   d)Dynamically induced EMF

12. Faraday's laws of electromagnetic induction are related to
a)The EMF of a chemical cell   b)The EMF of a generator
c)The current following in a conductor d)The strength of a magnetic field

13. In a simple, charge free medium, what is the relationship b/n the electric field (E) magnetic field (H) & wave vector (K) of a time harmonic plane wave
a)E,H & K parallel to each other   b)E is p is perpendicular to K and H is parallel to k
b)E & H both are perpendicular to k   d)E Parallel to K, H is perpendicular and to K

14. Which law describes the relationship between time varying electric field & magnetic field in free space
a)Faraday's law of induction   b)Gauss's law for electric filed
c)Ampere's Law   d)Gauss's Law for Magnetic filed

15. What is the expression for the Poyting vector of an isotropic point source at a distance 'R' from the source
a) P.4 πR^2 b)$\frac{p}{4\pi}$ c)$\frac{P}{4\pi R^2}$ d) $\frac{P}{4\pi R}$

16. Wave propagation occurs without attenuation in free space in the Case of
a)Perfect dielectric   b)Semi conductor   c)Conductor   d)Insulator

17. Which of the following effect proves the wave nature of light
a)Photo electric effect   b)Compton effect
c)Pair production   d)Polarization

18. The wave length (+) in meters of an Electromagnetic wave is related to its frequency (f) in mH2 of
a) $\lambda = \frac{3x10^8}{f}$ b) $\lambda = \frac{3x10^{10}}{f}$ c) $\lambda = \frac{300}{f}$ d)None of the above

19. Sun appears red at sunset because
a)The sun has only red
b)Red Colour is scattered more than other colours
c)Red Colour is scattered less them other colours
d)Our eyes are more sensitive to red

20. The group velocity of matter waves associated with a moving particle is
a)The same as phase velocity   b)less than the particle velocity
c)equal to particle velocity   d)More than the particle velocity

21. In electromagnetic spectrum visible light lies in b/n,
    a)X-ray & UV b)Infrared & microwave
    c)Microwave and radio wave d)UV and infrared

II. Fill in the blanks

1. Electromagnetic theory is fundamentally governed by _____ equations.
   Answer: Maxwell's
2. The differential form of Gauss's law for electricity is $\nabla \cdot D$ = _____.
   Answer: ρ_v (volume charge density)
3. The law that states magnetic monopoles do not exist is known as _____.
   Answer: Gauss's law for magnetism
4. In free space, the relationship between electric field intensity (E) and electric flux density (D) is D = _____.
   Answer: $\varepsilon_o E$
5. The displacement current was introduced by Maxwell to modify _____ law.
   Answer: Ampere's
6. The continuity equation represents the principle of conservation of _____.
   Answer: charge
7. The curl of the electric field intensity is given by $\nabla \times E$ = _____.
   Answer: $-\partial B / \partial t$
8. The unit of magnetic flux density (B) is _____.
   Answer: tesla (T)
9. In a linear, isotropic, homogeneous medium, permittivity is _____.
   Answer: constant
10. The ratio of electric field to magnetic field in a plane electromagnetic wave is called _____.
    Answer: intrinsic impedance
11. The speed of an electromagnetic wave in free space is given by c = _____.
    Answer: $1/\sqrt{(\mu_o \varepsilon_o)}$
12. The Poynting vector represents the _____ of electromagnetic energy.
    Answer: power flow density
13. The boundary condition for the tangential component of electric field at an interface is that it is _____.
    Answer: continuous
14. The wave equation for electric field in a source-free region is derived from _____ equations.
    Answer: Maxwell's
15. Skin depth in a conductor decreases with increasing _____ of the signal.
    Answer: frequency
16. In good conductors, electromagnetic waves experience strong _____.
    Answer: attenuation
17. The phenomenon where EM waves bend around obstacles is called _____.
    Answer: diffraction

18. Polarization of an electromagnetic wave is defined by the orientation of the ____ field.
    Answer: electric
19. A wave in which electric and magnetic fields are perpendicular to each other and to the direction of propagation is called a ____ wave.
    Answer: transverse electromagnetic (TEM)
20. The impedance of free space is approximately ____ ohms.
    Answer: 377

III. Descriptive Question

1. Explain Poission's and Laplace's equations
2. State and Explain poynting theorem
3. Derive Maxwell's equations and give its general wave equation
4. Explain propagation of plane EM wave equation for Homogenous isotropic dielectric medium
5. Explain Propagation of EM wave in conducting medium? And explain skin effect in energy transmission?