Part III

物理学 / PHYSICS
(தமிழ் மற்றும் ஐந்து விளக்கங்களும் / Tamil & English Versions)

Instructions: Check the question paper for fairness of printing. If there is any lack of fairness, inform the Hall Supervisor immediately.

புதிய - I / PART - I

Note: i) Answer all the questions. ii) Choose and write the correct answer.

30 x 1 = 30

1. Pettier coefficient at a junction of a thermocouple depends on the
   a) current in the thermocouple
   b) time for which current flows
   c) temperature of the junction
   d) charge that passes through the thermocouple.
2. Which device is used for the measurement of electric current?
   a) Moving coil galvanometer  
   b) Voltmeter  
   c) 0-10 A ammeter  
   d) 0-1 A ammeter

Of the following devices which has small resistance?
   a) Moving coil galvanometer  
   b) 0-1 A ammeter  
   c) 0-10 A ammeter  
   d) Voltmeter.

3. Electromagnetic induction is not used in
   a) transformer  
   b) room heater  
   c) A.C. generator  
   d) choke coil.

4. The self-inductance of a straight conductor is
   a) zero  
   b) infinity  
   c) very large  
   d) very small.

5. Which of the following devices does not allow D.C. to pass through?
   a) Resistor  
   b) Inductor  
   c) Capacitor  
   d) All of these.

6. According to Bohr's postulates, which of the following quantities take discrete values?
   a) Kinetic energy  
   b) Potential energy  
   c) Angular momentum  
   d) Momentum.
7. **X-ray**

   a) **conversion of energy into mass**
   b) a phenomenon of conversion of kinetic energy into radiation
   c) principle of conservation of charge
   d) conversion of momentum.

8. **In holography, which of the following is recorded in photographic film?**

   a) Frequency alone
   b) Amplitude alone
   c) Phase alone
   d) Phase and amplitude.

9. **At the threshold frequency the velocity of electron is**

   a) zero
   b) maximum
   c) minimum
   d) infinite.

10. **When the momentum of a particle increases, its de Broglie wavelength**

    a) increases
    b) decreases
    c) does not change
    d) infinity.
11. The following arrangement performs the logic function of ………………. gate.

- a) AND
- b) OR
- c) NAND
- d) EX-OR.

12. In a PN junction diode on the side of N but very close to the junction there are

- a) donor atoms
- b) acceptor atoms
- c) immovable positive ions
- d) immovable negative ions.

13. Lenz’s law is in accordance with the law of

- a) conservation of charges
- b) conservation of flux
- c) conservation of momentum
- d) conservation of energy.

14. Printed documents to be transmitted by fax are converted into electrical signals by the process of

- a) reflection
- b) scanning
- c) light variation.
15. $H_\alpha, H_\beta, H_\gamma, H_\delta$ என்பன தீர்மானத்தில் இருந்து அடுத்து வரும் பின்னர் அடுத்து வரும் பின்னர் அடுத்து வரும் பின்னர் அடுத்து வரும் பின்னர் அடுத்து வரும் பின்னர் 

அ) $H_\alpha, H_\beta, H_\gamma, H_\delta$ 

ஆ) $H_\delta, H_\gamma, H_\beta, H_\alpha$ 

இ) $H_\beta, H_\delta, H_\gamma, H_\alpha$ 

ஈ) $H_\alpha, H_\beta, H_\delta, H_\gamma$ 

Arrange the spectral lines $H_\alpha, H_\beta, H_\gamma, H_\delta$ in the increasing order of their wavelength:

a) $H_\alpha, H_\beta, H_\gamma, H_\delta$  

b) $H_\delta, H_\gamma, H_\beta, H_\alpha$  

c) $H_\beta, H_\delta, H_\gamma, H_\alpha$  

d) $H_\alpha, H_\beta, H_\delta, H_\gamma$  

16. தளபதி மிக்கும் தளபதி 2 m நீளம் இருக்கும் நீளத்தால் தளபதி 400 Vm$^{-1}$ அளவுகாட்சிகளை அளவிட்டு நீளம் 100 Vm$^{-1}$ என்பது என்ன?

அ) 50 மீ.  

ஆ) 4 மீ.  

இ) 15 மீ.  

Electric field intensity is 400 Vm$^{-1}$ at a distance of 2 m from a point charge. It will be 100 Vm$^{-1}$ at a distance

a) 50 cm 

b) 4 cm 

c) 4 m 

d) 15 m.

17. மூட்டூர்நல் பகுதியில் ஏனைய சிற்றுப்பகுதிகளில் உள்ள 50 μC பின்னர் சிற்றுப்பகுதிகள் புகை விளிப்பிட்டு வேண்டியது என்பது

அ) மூட்டூர்  

ஆ) புகை விளிப்பிட்டு வேண்டியது

இ) புகை விளிப்பிட்டு வேண்டியது  

ஈ) மூட்டூர்.

The work done in moving 50 μC charge between two points on equipotential surface is

a) zero  

b) finite positive  

c) finite negative  

d) infinite.
18. The unit of relative permittivity is
   a) $C^2 N^{-1} m^{-2}$
   b) $Nm^2 C^{-2}$
   c) No unit
   d) $NC^{-2} m^{-2}$.

19. A cell of $emf$ 2.2 V sends a current of 0.2 A through a resistance of 10 $\Omega$. The internal resistance of the cell is
   a) 0.1 $\Omega$  
   b) 1 $\Omega$  
   c) 2 $\Omega$  
   d) 1.33 $\Omega$.

20. The electric field intensity at a short distance $r$ from uniformly charged infinite plane sheet of charge is
   a) proportional to $r$
   b) proportional to $\frac{1}{r}$
   c) proportional to $\frac{1}{r^2}$
   d) independent of $r$.

21. Intermediate frequency in FM receiver is
   a) 455 kHz  
   b) 10.7 MHz  
   c) 40 MHz  
   d) 22 MHz.

22. Atomic spectrum is a
   a) band absorption spectrum
   b) band emission spectrum
   c) line absorption spectrum
   d) pure line spectrum.
23. When a drop of water is introduced between the glass plate and plano-convex lens in Newton's rings system, the ring system
   a) contracts  
   b) expands 
   c) remains same 
   d) first expands, then contracts.

24. 55° का रंगीन रेखा रचनामें आकारणीय तटीय रेखायांक तटीय कारण रहता करता है?
   a) 1.4281  
   b) 1.7321 
   c) 1.4141  
   d) 1.5051.

  Refractive index of a material for a polarising angle of 55° is
   a) 1.4281  
   b) 1.7321 
   c) 1.4141  
   d) 1.5051.

25. दो बालक्षण मिलाकर कर्मात्मक अंशों उसी तरह प्रतिकारण करता तथा कान्तिक सिद्धांत के अनुसार विद्यमान है?
   a) धारावर्गीय 
   b) तृतीयाश्र 
   c) रेखा प्रभाव धारावर्गीय।

  In a Nicol prism, the ordinary ray is prevented from coming out of Canada balsam by the phenomenon of
   a) reflection  
   b) polarisation 
   c) diffraction 
   d) total internal reflection.

26. अमेरिका के मांसिन नामों में बेव 0.03 amu ले जी प्रतिकारण के प्रमाणों
   a) 27.93 eV  
   b) 27.93 keV 
   c) 27.93 GeV 
   d) 27.93 MeV.

  The mass defect of certain nucleus is 0.03 amu. Then its binding energy is
   a) 27.93 eV  
   b) 27.93 keV 
   c) 27.93 GeV 
   d) 27.93 MeV.
27. The half-life period of a radioactive element with decay constant 0.0693/day is
   a) 10 days
   b) 14 days
   c) 100 days
   d) 1.4 days.

28. The nucleons in a nucleus are attracted by
   a) gravitational force
   b) electrostatic force
   c) nuclear force
   d) magnetic force.

29. Which of the following is massless and chargeless but carrier of energy and spin?
   a) Neutrino
   b) Muon
   c) Pion
   d) Kaon.

30. Avalanche breakdown is primarily dependent on the phenomenon of
   a) recombination
   b) doping
   c) ionization
   d) collision.
31. State Coulomb's law in electrostatics.

32. शक्तिपूर्वक 'विद्युत निरंतर'. अगला अर्थ कौन सा?

Define 'electric flux'. What is its unit?

33. निरंतररूप में विद्युत मिश्रित पट्टी पर एमएच निर्णय.

Compare emf and potential difference.

34. लाइट निरंतररूप कौन सा?

State Ohm's law.

35. परिमाण तौर पर विद्युत ट्यूब जिनका एमएच बंधन बनता है निरंतरता जोड़ा जाता है.

From the following network find the effective resistance between A and B.

![Diagram](image)

36. विद्युत निरंतर रूप में चुम्बकीय तापमान 15 ग्रे के निरंतरकीय विद्युत निरंतर वास्तवक तापमान 4 x 10^{-6} T तथा विद्युत निरंतर विद्युतक तापमान.

A long straight wire carrying current produces a magnetic induction of 4 x 10^{-6} T at a point 15 cm from the wire. Calculate the current through the wire.
37. **Define unit of self-inductance.**

38. **Define Q factor.**

39. **Distinguish between Fresnel and Fraunhofer diffraction.**

40. A plano-convex lens of radius 3 m is placed on an optically flat glass plate and is illuminated by a monochromatic light. Calculate the wavelength of light if the radius of the 8th dark ring is 3.6 mm.

41. **What are the characteristics of laser?**

42. Calculate the longest wavelength that can be analysed by a rock salt crystal of spacing \( d = 2.82 \text{ Å} \) in the first order.

43. Write the applications of photoelectric cells (any three).
44. Tritium has a half-life of 12.5 years. What fraction of the sample will be left over after 50 years?

45. What do you mean by artificial radioactivity?

46. What is Zener breakdown?

47. Define 'bandwidth' of an amplifier.

48. What are universal gates? Why are they called so?

49. For a transistor to work, how is the biasing provided?

50. What is skip distance?
51. Write the properties of electric lines of forces.

52. Discuss the variation of resistance with temperature with an expression and a graph.

53. a) An iron box of power 400 W is used daily for 30 minutes. If the cost per unit is 75 paise, find the weekly expense on using the iron box.

b) In a metre bridge the balancing length for a 10 Ω resistance in left gap is 51.8 cm. Find the unknown resistance and specific resistance of a wire of length 108 cm and radius 0.2 mm.

54. Explain how a galvanometer is converted into an ammeter.
55. Obtain an expression for the current flowing in a circuit containing resistance only to which alternating emf is applied. Find the phase relationship between voltage and current.

56. A parallel beam of monochromatic light is allowed to incident normally on a plane transmission grating having 5000 lines/cm. A second order spectral line is found to be diffracted at angle of 30°. Find the wavelength of light.

57. Explain the origin of characteristic X rays.

58. A metallic surface when illuminated with light of wavelength 3333 Å emits electrons with energies up to 0.6 eV. Calculate the work function of the metal.

59. Obtain de Broglie's wavelength of matter waves.

60. Explain the formation of cosmic ray showers.

61. Explain the functions of an operational amplifier as a summing amplifier.

62. Write the merits and demerits of digital communication.
63. Explain the principle of a capacitor. Obtain the expression for the capacitance of a parallel plate capacitor.

64. Explain the experiment to verify Joule's law of heating.

65. Explain the principle, construction and working of a single phase A.C. generator.

66. Explain emission spectrum and absorption spectrum in detail.

67. Explain J. J. Thomson experiment to determine the specific charge of an electron.
68. Obtain the expression for radioactive disintegration law. Also obtain the relation between half-life period and decay constant.

69. Explain the function of a bridge rectifier.

70. Make an analysis of amplitude modulated wave. Plot the frequency spectrum.