Roll No. 2488 *to be filled in by the candidate.*

(For all sessions)

RWP-21

Paper Code	8	4	7	1

Physics (Objective Type)

Marks: 17

Time: 20 Minutes

NOTE: Write answers to the questions on objective answer sheet provided. Four possible answers A,B,C & D to each question are given. Which answer you consider correct, fill the corresponding circle A,B,C or D given in front of each question with Marker or pen ink on the answer sheet provided.

1.1. Unit of electric flux is:
   (A) Nm^2C^{-2}
   (B) Nm^2C^{-1}
   (C) $N^{-1}m^2C^{-1}$
   (D) $Nm^{-2}C$

2. The statement $\Phi_e = \frac{1}{\varepsilon_c}Q$ was given by:
   (A) Faraday
   (B) Dersted
   (C) Gauss
   (D) Coulomb

3. Reciprocal of resistance is:
   (A) Capacitance
   (B) Conductance
   (C) Inductance
   (D) Resistance

4. Lorentz force is given by:
   (A) $\vec{F} = \vec{I}(\vec{L}\times\vec{B})$
   (B) $\vec{F} = q(\vec{V}\times\vec{B})$
   (C) $\vec{F} = q\vec{E} + q(\vec{V}\times\vec{B})$
   (D) $\vec{F} = q\vec{E}$

5. A power line 10m high carries a current 200A. The magnetic field of the wire at the ground is:
   (A) $4\times10^{-6}T$
   (B) $40\times10^{-6}T$
   (C) $4\times10^{-4}T$
   (D) $4\times10^{-3}T$

6. Relation for energy density in case of an inductor is:
   (A) $\frac{B^2}{2\mu_o}$
   (B) $\frac{\mu_o}{2B^2}$
   (C) $\frac{B}{2\mu_o}$
   (D) $\frac{B}{2\mu_o^2}$

7. The Lenz's law is also a statement of:
   (A) Law of conservation of momentum
   (B) Law of conservation of charge
   (C) Law of conservation of energy
   (D) Faraday's law

8. Peak to Peak value of an alternating voltage is:
   (A) $2V_o$
   (B) 0
   (C) $\frac{V_o}{\sqrt{2}}$
   (D) V_o

9. In RLC series resonance circuit, the condition for resonance is:
   (A) $X_L = X_c$
   (B) $X_L < X_c$
   (C) $X_L > X_c$
   (D) $X_L > Z$

10. Young's modulus of lead is:
   (A) $1.5\times10^{19}Nm^{-2}$
   (B) $7.7\times10^9Nm^{-2}$
   (C) $5.6\times10^9Nm^{-2}$
   (D) $2.2\times10^9Nm^{-2}$

11. Number of diodes used in half wave rectifier is:
   (A) 4
   (B) 3
   (C) 2
   (D) 1

12. S.I unit of current gain of transistor is:
   (A) Coulomb
   (B) Ampere
   (C) Farad
   (D) No unit

13. When platinum wire is heated, it appears cherry red at:
   (A) 1300°C
   (B) 1100°C
   (C) 900°C
   (D) 500°C

14. The value of Wein's constant is:
   (A) 2.9×10^3mK
   (B) $2.9\times10^{-3}mK$
   (C) $2.9mK$
   (D) $2.9\times10^{-2}mK$

15. In Helium-Neon laser, the value of Helium is:
   (A) 85%
   (B) 75%
   (C) 65%
   (D) 60%

16. Half life of Uranium-238 is:
   (A) 4.5×10^{12} years
   (B) 4.5×10^{11} years
   (C) 4.5×10^{10} years
   (D) 4.5×10^9 years

17. The dead time of the counter is:
   (A) $\sim10^{-7}S$
   (B) $\sim10^{-6}S$
   (C) $\sim10^{-5}S$
   (D) $\sim10^{-4}S$

Physics (Essay Type)

Time: 2:40 Hours   **Section - I**   Marks: 68

2- Write short answers of any eight parts from the following.   2 x 8 =16

i. How can you identify that which plate of a capacitor is positively charged?

ii. Is it true that Gauss's law states that the total number of lines of force crossing a closed surface in the outward direction is proportional to the net positive charge enclosed within surface?

iii. Give a comparison of electric and gravitational force.

iv. Describe the process of charging of a capacitor in short.

v. Describe the function of two sets of deflecting plates in cathode ray oscilloscope.

vi. In an AVO meter, how can a single galvanometer perform the function of measuring current, voltage and resistance? Explain.

vii. If a charged particle moves in a straight line through some region of space, can you say that the magnetic field in the region is zero?

viii. How can a current loop be used to determine the presence of a magnetic field in a given region of space?

ix. How an emf is induced in a coil placed in a constant magnetic field? (Hint: Basic principle used in electric generators)

x. What is the significance of negative sign used in Faraday's law of magnetic induction? $\varepsilon = -N \dfrac{\Delta \phi}{\Delta t}$

xi. In a certain region the earth's magnetic field point vertically down. When a plane flies due north, which wing tip is positively charg

xii. Is it possible to change both the area of the loop and the magnetic field passing through the loop and still not have an induced emf in the loop?

3- Write short answers of any eight parts from the following.   2 x 8 =16

i. Explain the term phase of A.C.

ii. Describe a circuit which will give a continuously varing potentia

iii. Explain the elastic constants.

iv. How the comparison of two emfs of cells can be made?

v. Why ordinary silicon diodes do not emit light?

vi. Write down the characteristics of Op-amplifier.

vii. What is meant by Retantivity and Coercivity?

viii. Why a photodiode is operated in reversed biased state?

ix. Why does the resistance of a conductor rise with temperature?

x. Name the device that will **(a)** permit flow of direct current but oppose the flow of alternating current. **(b)** Permit flow of alternating current but not the direct current.

xi. When 10V are applied to an A.C circuit, the current flowing in it is 100mA. Find its impedance.

xii Draw a stress strain curve for a ductile material and then define the term yield point and ultimate tensile stress

4- Write short answers of any six parts from the following.   2 x 6 =12

i. What do you mean by quark?

ii. Can pair production take place in vacuum? Explain.

iii. What is fission chain reaction?

iv. Define ionization energy and ionization potential.

v. Explain why LASER action cannot occur without population inversion between atomic levels?

vi. What do you understand by background radiation? State two sources of this radiation.

vii. A particle which produce more ionization is less penetrating. Why?

viii. What happens to total radiation from a black body if its absolute temperature is doubled?

ix. Define work function and threshold frequency.

Section - II

8x3=24

NOTE: Answer any three questions from the following.

5. (a) What is Wheatstone Bridge? Give its principle, construction and working. How can it be used to determine unknown resistance?   05

(b) A particle having a charge of 20 electrons on it falls through a potential difference of 100 volts. Calculate the energy acquired by it in electron volt.   03

6. (a) State and explain Ampere's Law. Calculate the magnetic field due to current carrying solenoid using Ampere's Law.   05

(b) A solenoid has 250 turns and its self inductance is 2.4 mH. What is the flux through each turn, when the current is 2A? What is the induced emf when the current changes at 20 AS^{-1}?   03

7. (a) An alternating current is passing through R-L-C series circuit. How this circuit works as resonance circuit. Discuss frequency, current graph of this circuit.   08
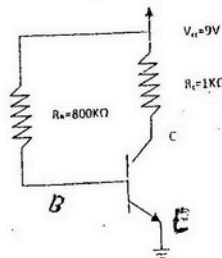
(b) In Circuit given, there is negligible potential drop between B and E. If β is 100. Calculate
(i) Base current   (ii) Collector current.

8. (a) Define strain energy and derive a relation for strain energy in a deformed materials.   05

(b) A sheet of lead 5mm thick reduces the intensity of a beam of γ-rays by a factor 0.4. Find half value thickness of lead sheet which will reduce the intensity to half of its initial value.   03

9. (a) Apply uncertainty principle to an atom in order to find that an electron can never be found inside of a nucleus and it can exist in the atom but outside the nucleus.   05

(b) A particle of mass 5.0 mg moves with speed of 8.0 ms^{-1}. Calculate its deBroglie wavelength.   03

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