Roll No. of Candidate: _____ GUJ-G1-12-19

Physics (New Scheme) **(INTER PART-II) 419-(I)** **Group: I** **Paper: II**
Time: 20 Minutes **OBJECTIVE** **Marks: 17**
Code: 8471

Note: You have four choices for each objective type question as A, B, C and D. The choice which you think is correct, fill that circle in front of that question number. Use marker or pen to fill the circles. Cutting or filling two or more circles will result in zero mark in that question. Attempt as many questions as given in objective type question paper and leave other blank.

1. Due to polarization, electric field E in a capacitor:
   (A) increases (B) decreases
   (C) first increases then decreases (D) remains same

2. If time constant in RC circuit is small, then capacitor is charged or discharged:
   (A) slowly (B) rapidly (C) at constant rate (D) intermittently

3. Kirchhoff's second rule is based on:
   (A) law of conservation of energy (B) law of conservation of mass
   (C) law of conservation of charge (D) law of conservation of momentum

4. S.I unit of magnetic permeability is:
   (A) $Wb\ A^{-1}m^{-1}$ (B) $Wb\ m^{2}$ (C) $Wb\ mA^{-1}$ (D) $Wb\ Am^{-1}$

5. When ohmmeter gives full scale deflection, it indicates,
   (A) zero resistance (B) infinite resistance (C) small resistance (D) very high resistance

6. Lenz's law deals with the:
   (A) magnitude of induced current (B) direction of induced emf
   (C) direction of induced current (D) magnitude of induced emf

7. When current flowing through an inductor is doubled, then energy stored in it becomes:
   (A) half (B) four times (C) one fourth (D) double

8. In a capacitive circuit of A.C quantity, when $q = 0$, the slope of $q - t$ curve is:
   (A) minimum (B) maximum (C) zero (D) negative

9. When A.C passes through an inductor, voltage leads the current by an angle:
   (A) 0° (B) 45° (C) 90° (D) 180°

10. In extrinsic semi-conductors, doping is of the order of:
    (A) 1 atom to 10^{4} (B) 1 atom to 10^{8} (C) 1 atom to 10^{16} (D) 1 atom to 10^{6}

11. The Boolean equation for exclusive NOR gate is given by:
    (A) $X = A.B + B.A$ (B) $X = \overline{A.\bar{B} + \bar{B}.A}$ (C) $X = \overline{A.\bar{B} + \bar{A}.B}$ (D) $X = A.\bar{B} + \bar{B}.A$

12. The potential barrier for silicon at room-temperature is
    (A) 0.7 volt (B) 0.5 volt (C) 0.3 volt (D) 0.9 volt

13. The unit of work function is:
    (A) volt (B) joule (C) watt (D) farad

14. An electron in H-atom is excited from ground state to $n = 4$, how many spectral lines are possible in this case?
    (A) 3 (B) 4 (C) 5 (D) 6

15. Metastable state is _____ than normal excited state.
    (A) 10^{-5} times larger (B) 10^{-8} times smaller (C) 10^{-3} times smaller (D) 10^{5} times larger

16. A pair of quark and antiquark make a:
    (A) meson (B) hadron (C) lepton (D) baryon

17. The force which is responsible for the breaking up of the radioactive elements is:
    (A) strong nuclear force (B) gravitational force
    (C) electromagnetic force (D) weak nuclear force

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Physics (New Scheme) **(INTER PART-II) 419-(I)** **Group: I** **Paper: II**
Time: 2:40 Hours **SUBJECTIVE** **Marks: 68**
Note: section I is compulsory. Attempt any THREE (3) questions from Section II.

(SECTION – I)

2. Write short answers to any EIGHT questions. **(2 × 8 = 16)**

i. Write any two properties of electric field lines.
ii. Differentiate between electric potential and electric potential difference.
iii. Describe the force or forces on a positive point charge when placed between parallel plates with similar and equal charges.
iv. A particle having a charge of 20 electrons on it falls through a potential difference of 100 v. calculate the energy acquired by it in electron volts (ev).
v. What is the function of grid in case of cathode ray oscilloscope?
vi. How can you prefer potentiometer over voltmeter?
vii. Why does the picture on a TV screen become distorted when a magnet is brought near the screen?
viii. A plane conducting loop is located in a uniform magnetic field that is directed along the x-axis. For what orientation of the loop is the flux a maximum? For what orientation is the flux a minimum?
ix. A metal rod of length 25cm is moving at a speed of $0.5ms^{-1}$ in a direction perpendicular to a 0.25T magnetic field. Find the emf produced in the rod.
x. State Lenz's Law and write its formula.
xi. How would you position a flat loop of wire in a changing magnetic field so that there is no emf induced in the loop?
xii. Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio?

3. Write short answers to any EIGHT questions. **(2 × 8 = 16)**

i. Do bends in a wire effect its electrical resistance? Explain.
ii. Define wheatstone bridge. Draw its circuit diagram.
iii. Distinguish between emf and terminal potential.
iv. Write the advantages and disadvantages of FM over AM.
v. A sinusoidal current has rms value of 10 A. What is the maximum or peak value?
vi. How does doubling the frequency affect the reactance of
   a) An inductor
   b) A capacitor
vii. Distinguish between elastic deformation and plastic deformation.
viii. Define stress and strain. What are their units?
ix. What is meant by strain energy? Write its formula.
x. How does the motion of an electron in an n-type substance differ from the motion of holes in a p-type substance?
xi. Why is the base current in a transistor very small?
xii. What is meant by a current gain of a transistor? Write its formula.

4. Write short answers to any SIX questions. **(2 × 6 = 12)**

i. If the speed of light were infinite, what would the equations of special theory of relativity reduce to.
ii. Can pair production take place in vacuum? Explain.
iii. What are black body radiations?
iv. Bohr's theory of hydrogen atom is based upon several assumptions. Do any of these assumptions contradict classical physics?
v. Explain why laser action cannot occur without population inversion between atomic levels?
vi. What are isotopes? What do they have in common and what are their differences?
vii. How can radioactivity help in the treatment of cancer?
viii. Define mass defect and binding energy.
ix. What are leptons? Give an example.

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(SECTION – II)

5.	(a)	Define electric potential. Calculate the electric potential at the point due a point charge.	4+1
	(b)	The resistance of an iron wire at $0^{o}C$ is $1 \times 10^{4}\Omega$. What is the resistance at $500^{o}C$ if the temperature coefficient of resistance of iron is $5.2 \times 10^{-3}K$?	3
6.	(a)	State Ampere's law. Apply it to calculate the magnetic field due to current flowing through a solenoid.	5
	(b)	A coil of 10 turns and $35cm^2$ area is in a perpendicular magnetic field of 0.5T. The coil is pulled out of the field in 1.0s . Find the induced emf in the coil as it is pulled out of the field.	3
7.	(a)	Describe and explain the principle of generation, transmission and reception of electromagnetic waves.	5
	(b)	The current flowing into the base of a transistor is $100\mu A$. Find its collector current I_C, its emitter current I_E and the ratio $\frac{I_C}{I_E}$, if the value of current gain β is 100.	3
8.	(a)	Define modulus of elasticity. Discuss its different types. Also give stress-strain curve of elastic limit and yield strength.	5
	(b)	Find the mass of a moving object with speed $0.8c$.	3
9.	(a)	What is inner shell transition? Explain the production of x-rays.	1+4
	(b)	Find the mass defect and the binding energy for tritium, if the atomic mass of tritium is 3.016049u.	3