| PHYSICS GROUP : FIRST | | TIME : 20 MINUTES |
| --- | --- | --- |
| | | MARKS :17 |

### OBJECTIVE

**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 marks in that question.

### QUESTION NO. 1

1  A particle of mass m and charge q is released from rest in a uniform of electric field E. The K.E attained by the particle after moving a distance ' d ' is

(A) $\frac{Ed}{q}$     (B) $qE^2d$     (C) $qEd$ ●     (D) $\frac{qE}{d^2}$

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2  Two charges are placed at a certain distance a part in vacuum. If a dielectric slab is placed between them , the force between them

(A) Will increase     (B) Will decrease ●     (C) Will remain unchanged

(D) May increase or decrease depending on the material of the slab

3  If the current passing through a conductor is reduced to half, then heat produced becomes

(A) 2 times     (B) Remains the same     (C) $1/4$ times ●     (D) Becomes half

4  Weber ampere per meter is equal to

(A) Joule     (B) Newton ●     (C) Tesla     (D) Henry

5  An electron is moving in a circle of radius ' r ' in a uniform magnetic field B suddenly the field is reduced to $\frac{B}{2}$ .The radius of circle now becomes

(A) $r/2$     (B) $r/4$     (C) $2r$ ●     (D) $4/r$

6  Which of the following quantity remains unchanged in a transformer ?

(A) Voltage     (B) Current     (C) Power     (D) Frequency ●

7  Maximum motional emf in a conductor is given by ' vBL '.  At which angle the conductor moves in magnetic field such that emf in it becomes half then its maximum value

(A) $0°$     (B) $30°$ ●     (C) $45°$     (D) $60°$

8  In R-L-C series circuit the phase angle between $X_L$ and $X_C$ is

(A) $Tan^{-1}\left(\frac{WL}{R}\right)$     (B) $Tan^{-1}\frac{\frac{1}{wRC}}$     (C) $Tan^{-1}\left(\frac{Z}{R}\right)$     (D) $\pi$ ●

9  The power factor of an A.C circuit has

(A) SI unit ampere     (B) SI unit volt     (C) SI unit watt     (D) Zero ●

10  Curie temperature for iron is about

(A) 750 K     (B) 570 K     (C) 1023 K ●     (D) 378 K

11  The value of input resistance of op – amp is of the order of

(A) Few Ohms     (B) Milli Ohms     (C) Kilo Ohms     (D) Mega Ohms ●

12  A device which converts a physical quantity into voltage is called a

(A) Sensor ●     (B) Inverter     (C) Amplifier     (D) Photodiode

13  We can never accurately describe all aspects of subatomic particles simultaneously. It is correct according to

(A) Uncertainty principle ●     (B) de – Broglie theory     (C) Einstein theory     (D) Photoelectric effect

14  If one photon is obtained in annihilation of matter then which of the following conservation law not hold

(A) Energy     (B) Momentum ●     (C) Charge     (D) All these law would not hold

15  In the Bohr's model of the hydrogen atom , the lowest orbit corresponds to

(A) Infinite energy     (B) Maximum energy     (C) Minimum energy     (D) Zero energy

16  Mass equivalent of 931  Mev energy is

(A) $6.02 \times 10^{-31}$ Kg     (B) $1.66 \times 10^{-27}$ Kg ●     (C) $1.67 \times 10^{-27}$ Kg     (D) $6.02 \times 10^{-27}$ Kg

17  If energy of γ-radiation is less than 0.5  Mev  the dominant process is

(A) Photoelectric effect ●     (B) Compton effect     (C) Pair production     (D) Black body radiation

**PHYSICS**
**GROUP : FIRST**

**SUBJECTIVE PART**

TIME: 2 HRS 40 MINUTES
MARKS: 68

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### SECTION – I

**QUESTION NO. 2   Write short answers any Eight (8) of the following**          16

| | |
|---|---|
| i | What is the effect of medium between the charges on Coulomb's force ? Explain |
| ii | Describe four properties of electric field lines. |
| iii | Electric lines of force never cross. Why ? |
| iv | Do electrons tend to go to region of high potential or of low potential ? |
| v | Define magnetic flux and magnetic flux density. |
| vi | Define right hand rule for the determination of direction of magnetic field of current carrying wire. |
| vii | How can a current loop be used to determine the presence of magnetic field in a given region of space ? |
| viii | How can you use a magnetic field to separate isotopes of chemical element ? |
| ix | For what purpose bromine is mixed in principal gas in Geiger tube ? |
| x | Write down two advantages of solid state detector. |
| xi | What do we mean by the term critical mass ? |
| xii | A particle which produces more ionization is less penetrating. Why ? |

**QUESTION NO. 3   Write short answers any Eight (8) of the following**          16

| | |
|---|---|
| i | What is Wheatstone bridge ? How it can be used to determine unknown resistance ? |
| ii | What are the difficulties in testing whether the filament of a lighted bulb obeys Ohm's law ? |
| iii | Give some application of thermistor ? |
| iv | Explain the conditions under which electromagnetic waves are produced from the source ? |
| v | How the reception of a particular radio station is selected on your radio set ? |
| vi | What is choke ? Give its uses. |
| vii | Discuss the mechanism of electrical conduction by Holes and electrons in a pure semiconductor element. |
| viii | Differentiate between intrinsic and extrinsic semiconductor. |
| ix | What are crystalline and polymeric solids. |
| x | Why is the base current in a transistor is very small ? |
| xi | Why charge carrier are not present in the depletion region ? |
| xii | How reverse biasing of semiconductor diode occure ? Show by diagram. |

**QUESTION NO. 4   Write short answers any Six (6) of the following**          12

| | |
|---|---|
| i | Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio ? |
| ii | Can an electric motor be used to drive an electric generator with the output from the generator being used to operate the motor ? |
| iii | Find the energy stored in an inductor of inductance 100 mH carrying a current of 2 A. |
| iv | Which has the lower energy quanta ? Radiowaves or x – rays |
| v | Is it possible to create a single electron from energy ? Explain. |
| vi | State uncertainty principle in terms of position and momentum of a particle. Also write its mathematical expression. |
| vii | Write down the postulates of special theory of relativity. |
| viii | Is energy conserved when an atom emits a photon of light ? |
| ix | Find the speed of an electron in the first Bohr orbit. |

### SECTION-II

**Note:** Attempt any Three questions from this section   (Part A = 5 Marks & Part B = 3 Marks   8 x 3 = 24)

| | |
|---|---|
| Q.5.(A) | What is Electromotive force ? Derive the relation of terminal potential difference. |
| (B) | In Bohr's atomic model of Hydrogen atom, the electron is in an orbit around the nuclear proton at a distance of $5.29 \times 10^{-11}$ m with a speed of $2.18 \times 10^{6}$ $ms^{-1}$. Find the electric potential that a proton exerts at this distance. |
| Q.6.(A) | State Ampare's law. Calculate the magnetic field due to current carrying solenoid. |
| (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 2 A ? What is the induced emf when the current changes at 20 $As^{-1}$ ? |
| Q.7.(A) | Prove that the closed loop gain of OP – AMP as inverting amplifier is given by   $G = -\dfrac{R_2}{R_1}$ |
| (B) | An iron core coil of 2.0 H and 50 Ω is placed in series with a resistance of 450 Ω. An A.C supply of 100V , 50 Hz is connected across the circuit. Find the current flowing in the coil. |
| Q.8.(A) | Define magnetic hysteresis. Write a note on hysteresis loop, its main features and its applications. |
| (B) | What is the mass of a 70 kg man in a space rocket traveling at 0.8 c from us as measured from earth |
| Q.9.(A) | How does uncertainty principle explain that electrons cannot exist inside the nucleus ? |
| (B) | The half life of $_{38}Sr^{91}$ is 9.70 hours. Find its decay constant. |

| PHYSICS | | TIME : 20 MINUTES |
|---|---|---|
| GROUP : SECOND | | MARKS :17 |

## OBJECTIVE

**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 marks in that question.
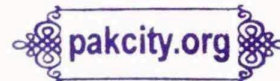
### QUESTION NO. 1

1. Second postulate of special theory of relativity is
   (A) Wrong   (B) Virtual   (C) Experimental fact   (D) Sometimes correct

2. For low energy quanta, dominant properties are
   (A) Particle nature   (B) Wave nature   (C) Dual nature   (D) Multi nature

3. Longest wavelength of Paschen series is   ($R_H$ = Rydberg's constant)
   (A) $\dfrac{9}{R_H}$   (B) $\dfrac{144}{7R_H}$   (C) $\dfrac{1}{R_H}$   (D) $\dfrac{400}{9R_H}$

4. For a radioactive sample of initial population No, decayed fraction after 4 half – lives is
   (A) $\dfrac{1}{16}$   (B) $\dfrac{1}{4}$   (C) $\dfrac{3}{4}$   (D) $\dfrac{15}{16}$

5. The energy output per nucleon in fusion is greater than energy output per nucleon in fission
   (A) 25 times   (B) 6 to 7 times   (C) 17 times   (D) 200 times

6. A test charge experiences force due to applied electric field
   (A) Parallel   (B) Anti - Parallel   (C) Perpendicular   (D) Oblique

7. Unit +ve charge is placed over a spherical hollow surface, flux crossing it outwards is
   (A) $\dfrac{1}{\varepsilon_0}$   (B) Zero   (C) $\dfrac{2}{\varepsilon_0}$   (D) $2\varepsilon_0$

8. Heat energy is converted to electrical energy by
   (A) Primary cells   (B) Thermo-couples   (C) Solar cells   (D) Generators

9. A high speed graph plotting device is
   (A) Voltmeter   (B) Galvanometer   (C) Ammeter   (D) C.R.O

10. Lamp and scale arrangement is used in galvanometers to measure deflection
    (A) Stable   (B) Dead beat   (C) Sensitive   (D) Astatic

11. The behaviour is like resistors in alternating current
    (A) Capacitor   (B) Motor   (C) Inductor   (D) Generator

12. A transformer with many secondary coils is used for
    (A) Door bell   (B) TV receiver   (C) Power transmission   (D) Transistor radio

13. An alternating quantity can be represented by a
    (A) Static vector   (B) Rotating vector   (C) Scalar   (D) Straight line

14. At resonance, the voltage of inductor and capacitor in series RLC circuit are
    (A) In phase   (B) Out of phase   (C) Perpendicular   (D) Oblique

15. The reverse current to reduce the magnetization to zero is called
    (A) Retentive   (B) Remanance   (C) Coercive   (D) Magnetization

16. A fast switching device responding in nano – seconds is
    (A) PN Junction   (B) Photo diode   (C) LED   (D) Photo – voltaic cell

17. When output of non – inverting amplifier is fed back directly to inverting input, gain is
    (A) Zero   (B) $\dfrac{R_2}{R_1}$   (C) One   (D) $1-\dfrac{R_2}{R_1}$

**PHYSICS**   TIME: 2 HRS 40 MINUTES

**GROUP : SECOND**   **SUBJECTIVE PART**   MARKS: 68

## SECTION – I

**QUESTION NO. 2   Write short answers any Eight (8) of the following**   16

| i | Summarize the properties of electric field lines. |
|---|---|
| ii | Find electric field intensity inside a hallow charged spheres. |
| iii | The potential is constant throughout a given region of space. Is the electric field zero or non zero in this region ? Explain |
| iv | Define capacitance of a capacitor. Also define its unit. |
| v | Draw circuit diagram of conversion of galvanometer into an Ohm meter. |
| vi | Write down any two uses of C.R.O |
| vii | How can we use a magnetic field to separate isotopes of chemical element ? |
| viii | Why the voltmeter should have a high resistance ? |
| ix | If someone swallow an $\alpha$ - source and a $\beta$- source which would be more dangerous to him ? Explain Why ? |
| x | Why are heavy nuclei unstable ? |
| xi | Comment on some radiations in the environment added by human activities. |
| xii | What is radiography ? Explain briefly. |

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**QUESTION NO. 3   Write short answers any Eight (8) of the following**   16

| i | Describe the circuit which will give a continuously varying potential ? |
|---|---|
| ii | Why does the resistance of a conductor rise with temperature ? |
| iii | What is temperature coefficient of resistance ? Give its mathematical form. |
| iv | What is inductor ? When does it behave as a choke ? |
| v | Write the properties of parallel resonance circuit at resonant frequency. |
| vi | What is meant by A.M and F.M |
| vii | Define crystal lattice. Illustrate yours answer with example. |
| viii | Distinguish between crystalline, amorphous and polymeric substances ? |
| ix | What is coercivity in a ferromagnetic materials ? |
| x | Define rectification. How many types of rectification ? |
| xi | Give the truth table of XOR – Gate ? |
| xii | Why ordinary silicon diodes do not emit light ? |

**QUESTION NO. 4  Write short answers any Six (6) of the following**   12

| i | 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 ? |
|---|---|
| ii | Derive an expression $\varepsilon = - N\dfrac{\Delta\Phi}{\Delta t}$ |
| iii | What is the cause of induced emf ? |
| iv | Photon A has twice the energy of photon B. What is the ratio of the momentum of A to that of B ? |
| v | What advantages an electron microscope has over an optical microscope ? |
| vi | Write some important results of photoelectric effect. |
| vii | An electron is accelerated through a potential difference of 50 V. Calculate its de-Broglie wavelength. |
| viii | What is meant by a line spectrum ? Explain , how line spectrum can be used for the identification of elements ? |
| ix | What do you mean by spectroscopy ? What are the main types of spectra ? |

## SECTION-II

**Note:  Attempt any Three questions from this section    (Part A = 5Marks & Part B=3Marks    8 x 3 = 24)**

| Q.5.(A) | What is Electromotive force and terminal potential difference ? Explain |
|---|---|
| (B) | A capacitor has a capacitance of $2.5 \times 10^{-8}$ F. In the charging process , electrons are removed from one plate and placed on the other one. When potential difference between the plates is 450 V, how many electrons have been transferred ?   ( $e = 1.6 \times 10^{-19}$ C ) |
| Q.6.(A) | State Lenz's law. Explain how energy conserved in case of movement of bar magnet and metal rod placed on parallel metal rails in uniform magnetic field. |
| (B) | How fast must a proton move in magnetic field of $2.50 \times 10^{-3}$ T. Such that the magnetic force is equal to its weight. |
| Q.7.(A) | Define rectification. Explain half wave rectification and full wave rectification in detail. |
| (B) | What is the resonance frequency of a circuit which includes a coil of inductance 2.5 H and a capacitance 40 $\mu$F ? |
| Q.8.(A) | What is Compton effect ? Calculate the Compton wavelength OR Compton shift at an angle $\theta = 90^{\circ}$ |
| (B) | A 1.0 m long copper wire is subjected to stretching force and its length increases by 20 cm. Calculate the tensile strain and the percent elongation which the wire undergoes. |
| Q.9.(A) | What is nuclear reactor ? Describe function of its main parts. |
| (B) | An electron jumps from a level $E_i = -3.5 \times 10^{-19}$ J to $E_f = -1.20 \times 10^{-18}$ J. What is the wavelength of the emitted light ? |

PHYSICS  **OBJECTIVE**  TIME: 20 MINUTES
GROUP : FIRST  MARKS: 17

**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.

**QUESTION NO. 1**

| 1 | SI units of capacitive reactance are |
| | (A) Farad  (B) Ohm  (C) Volt  (D) Ampere |
| 2 | Which of the following does not undergo plastic deformation ? |
| | (A) Glass  (B) Copper  (C) Wrought iron  (D) Lead |
| 3 | For full–wave rectification , number of diodes used in bridge circuit is |
| | (A) 3  (B) 2  (C) 4  (D) 1 |
| 4 | The SI units of current gain are |
| | (A) Volts  (B) Ampere  (C) Weber  (D) No units |
| 5 | The Compton shift $\Delta\lambda$ is equal to Compton wave - length at an angle of |
| | (A) Zero  (B) $90^o$  (C) $45^o$  (D) $120^o$ |
| 6 | A single quantum of electromagnetic radiation is called |
| | (A) Photon  (B) Meson  (C) Positron  (D) Quark |
| 7 | The reverse process of photo electric effect is called |
| | (A) Pair–production  (B) Compton effect |
| | (C) Annihilation of matter  (D) X–rays emission |
| 8 | Two down and one up quarks make |
| | (A) Proton  (B) Photon  (C) Neutron  (D) Deutron |
| 9 | One Joule of energy absorbed per Kilogram of body is |
| | (A) Rem  (B) Roentgens  (C) Grey  (D) Becquerel |
| 10 | The minimum charge on any object cannot be less than |
| | (A) $1.8 \times 10^{-19}$ C  (B) $3.2 \times 10^{-19}$ C  (C) $1.6 \times 10^{-19}$ C  (D) $9.1 \times 10^{-19}$ C |
| 11 | An electric field can deflect |
| | (A) Neutrons  (B) x–rays  (C) Gama–rays  (D) Alpha–rays |
| 12 | The SI units of the temperature coefficient of resistivity of a material are |
| | (A) Ohm–meter  (B) Kelvin  (C) Per Kelvin  (D) Ohm–Kelvin |
| 13 | Which has High resistance ? |
| | (A) Ohm–meter  (B) Ammeter  (C) Galvanometer  (D) Voltmeter |
| 14 | In order to increase the range of an ammeter , the shunt resistance is |
| | (A) Decreased  (B) Increased  (C) Kept constant  (D) Randomly changed |
| 15 | The self inductance is given by the relation |
| | (A) $NL = \emptyset I$  (B) $NI = L\emptyset$  (C) $N = L I \emptyset$  (D) $N \emptyset = L I$ |
| 16 | If speed of a generator is doubled , the output voltage will be |
| | (A) Same  (B) One half  (C) Four times  (D) Double |
| 17 | The device which allows only the flow of D.C through a circuit is |
| | (A) Inductor  (B) Capacitor  (C) Transformer  (D) A.C generator |

16 - (Obj) - 1st Annual 2023  **SEQUENCE – 3**  ( PAPER CODE – 8475)

PHYSICS                    SUBJECTIVE              TIME: 2 HRS 40 MINUTES
GROUP: FIRST              SECTION-I                MARKS: 68

### QUESTION NO. 2   Write short answers any Eight (8) of the following                16

| i | Suppose that you follow an electric field line due to positive point charge. Do electric field and potential increase or decrease ? |
|---|---|
| ii | Why the voltmeter should have very high resistance ? |
| iii | A particle which produce more ionization is less penetrating. Why ? |
| iv | Differentiate between electric potential and electric potential difference. |
| v | State amperes law. Give its significance. |
| vi | Charge particle $\alpha$ , $\beta$ and $\gamma$ – radiation produce fluorescence. Define fluorescence . |
| vii | Do electron tend to go to region of high potential or of law potential ? |
| viii | Give the working of xero – graphy. |
| ix | What do we mean that the term critical mass ? |
| x | How can you use a magnetic field to separate isotopes of chemical elements ? |
| xi | How can you make electronic trajectory visible , when calculating to charge to mass ratio ? |
| xii | Give two advantages and disadvantages of nuclear power. |

### QUESTION NO. 3   Write short answers any Eight (8) of the following                16

| i | Explain why the terminal potential difference of battery decrease when current drawn from it is increased ? |
|---|---|
| ii | Is the filament resistance lower or higher in 500 w , 220 v  light bulb than in 100 w , 220 v bulb ? |
| iii | What are the difficulties in testing whether the filament of a light bulb obeys ohm's law ? |
| iv | How does doubling the frequency affect the reactance of a capacitor ? |
| v | In a R-L circuit , will the current lag or lead the voltage ? Explain with vector diagram. |
| vi | What is resonance condition in R-L-C series circuit ? |
| vii | Distinguish between intrinsic and extrinsic semiconductors ? |
| viii | Discuss the mechanism of electric conduction by holes and electrons in semiconductors ? |
| ix | What are ductile and brittle substances ? Give and example of each. |
| x | What is the net charge on n-type or p-type substance ? |
| xi | Why charge carrier are not present in depletion region ? |
| xii | Define open loop gain of operational amplifier ? |

### QUESTION NO. 4   Write short answers any Six (6) of the following                12

| I | Show that Lenz's law corresponds to law of conservation of energy. |
|---|---|
| ii | Show that $\varepsilon$ and $\frac{\Delta\phi}{\Delta t}$  have the same units. |
| iii | Four unmarked wires emerge from a transformer. What steps would you take to determine the turn ratio ? |
| iv | Why don't we observe a Compton effect with visible light ? |
| v | Can pair production take place in vacuum ? Explain . |
| vi | How the results of special theory of relativity are used in NAVSTAR navigation system ? |
| vii | What is Steffen Boltzmann's law ? Write down the equation of Steffen Boltzmann's law. |
| viii | Can the electron in the ground state of hydrogen absorb a photon of energy 13.6 eV and greater than 13.6 eV ? |
| ix | Draw a graph of wavelength verses intensity showing the spectrum of continuous and characteristics x-rays. |

### SECTION-II

**Note:**   Attempt any Three questions from this section                8 x 3 = 24

| Q.5.(A) | Define electric potential and derive a relation for electric potential at a point due to a point charge. | 5 |
|---|---|---|
| (B) | A rectangular bar of iron is 2.0 cm by 2.0 cm in cross section and 40 cm long. Calculate its resistance if the resistivity of iron is $11 \times 10^{-8}$ $\Omega$m. | 3 |
| Q.6.(A) | Find an expression for a moving charge in the magnetic field. | 5 |
| (B) | The back emf in a motor is 120 V when the motor is turning at 1680 rev per minute. What is the back emf when the motor turns 3360 rev per minute ? | 3 |
| Q.7.(A) | What is rectification ? Explain full wave rectification. How pulsating output voltage is made smooth ? | 5 |
| (B) | A 10 mH, 20$\Omega$ coil is concocted across 240 V and $\frac{180}{\pi}$ Hz source. How much power do it dissipate ? | 3 |
| Q.8.(A) | Explain de Broglie hypothesis. How Davisson and Germer experimentally verified the de-Broglie hypothesis ? | 5 |
| (B) | A 1.0 m long copper wire is subjected to stretching force and its length increase by 20 cm. Calculate the tensile strain and percent elongation which the wire undergoes. | 3 |
| Q.9.(A) | Write the postulate of Bohr's atomic model of Hydrogen atom and show that how de-Broglie's hypothesis confirm one of its postulate. | 2+3 |
| (B) | A 75 kg person receives a whole body radiation dose of 24 m-rad, delivered by $\alpha$-particles for which RBE factor is 12.   Calculate (i) Absorbed energy in joules  (ii) Equivalent dose in rem. | 3 |

PHYSICS

GROUP : SECOND

TIME: 20 MINUTES
MARKS: 17

## OBJECTIVE

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.

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QUESTION NO. 1

| | | |
|---|---|---|
| 1 | The slope of q-t graph at any instant of time gives | (A) Charge (B) Voltage (C) Current (D) Frequency |
| 2 | Which one here is a ductile substance ? | (A) Copper (B) Glass (C) Stone (D) Steel |
| 3 | In p-type semiconductor, the majority charge carrier are | (A) Photons (B) Holes (C) Protons (D) Electrons |
| 4 | In reverse biasing a p-n-junction ideal, offers a resistance | (A) Zero (B) Higher (C) Infinite (D) Medium |
| 5 | All motions are | (A) Absolute (B) Uniform (C) Variable (D) Relative |
| 6 | In 1905, the theory of relativity was proposed by | (A) Maxwell (B) Michelson (C) Einstein (D) de- Broglie |
| 7 | The radius of the 1st. Bohr orbit in hydrogen atom is | (A) $8.8 \times 10^{-12}$ cm (B) $0.53 \times 10^{-10}$ cm (C) $9.1 \times 10^{-31}$ cm (D) $1.6 \times 10^{-31}$ cm |
| 8 | 1 atomic mass unit (amu) is equal to | (A) $1.66 \times 10^{-24}$ kg (B) $1.66 \times 10^{-19}$ kg (C) $1.66 \times 10^{-34}$ kg (D) $1.66 \times 10^{-27}$ kg |
| 9 | In nuclear radiations, the tracks of alpha-particles are | (A) Thin (B) Continuous (C) Discontinuous (D) Eratic |
| 10 | The number of electrons in one coulomb charge is | (A) $6.2 \times 10^{18}$ (B) $1.6 \times 10^{19}$ (C) $6.2 \times 10^{21}$ (D) $1.6 \times 10^{31}$ |
| 11 | The SI unit of relative permittivity of free space is | (A) N/m (B) No units (C) $Nm^2C^{-2}$ (D) $C^2N^{-1}m^{-2}$ |
| 12 | The graphical representation of ohm's law is | (A) Hyperbola (B) Ellipse (C) Parabola (D) Straight line |
| 13 | Energy stored per unit volume inside a solenoid is called as | (A) Energy density (B) Electric flux (C) Charge density (D) Current density |
| 14 | A charge particle enters in a strong magnetic field, its K.E | (A) Remains constant (B) Increases (C) Decreases (D) Increases than decreases |
| 15 | If we make magnetic field stronger, the value of induced current is | (A) Decreased (B) Constant (C) Vanished (D) Increased |
| 16 | An alternating current is converted into direct current by a | (A) Rectifier (B) Motor (C) Generator (D) Transformer |
| 17 | In A.C waveform , negative peak is obtained at the phase angle of | (A) $90^\circ$ (B) $120^\circ$ (C) $270^\circ$ (D) $360^\circ$ |

PHYSICS        **SUBJECTIVE**      TIME: 2 HRS 40 MINUTES

GROUP: SECOND      SECTION-I       MARKS: 68

**QUESTION NO. 2**    Write short answers any Eight (8) of the following      16

| | |
|---|---|
| i | Is it true that Gauss's law states that the total number of field lines crossing a surface in outward direction is proportional to net positive charge enclosed with in surface ? |
| ii | Describe the net force on a positive point charge when placed between parallel plates with opposite and equal charges. |
| iii | Define capacitance. On what factors, does it depend for parallel plate capacitor ? |
| iv | Why electric field lines are called lines of force ? Write any one characteristic of these lines. |
| v | Describe change in magnetic field inside a solenoid when number of turns are doubled without changing length. |
| vi | For what orientation of a flat loop in a magnetic field, is the electric flux   (a) Maximum   (b) Minimum ? |
| vii | What is concept of synchronization in CRO to measure certain parameters of applied wave - form ? |
| viii | Why digital multimeter is preferred over an ordinary Avo meter ? |
| ix | If some accidently swallows an $\alpha$ − source and $\beta$ − source, which would be more dangerous and why ? |
| x | What are isotopes ? What do they have in common ? |
| xi | How many types of radioactive waste are there ? Write each category. |
| xii | Define fission reaction. State any one nuclear reaction indicating fission of $_{92}U^{235}$ |

**QUESTION NO. 3**    Write short answers any Eight (8) of the following      16

| | |
|---|---|
| i | Do bends in a wire affect electrical resistance ? |
| ii | What are the difficulties in testing whether the filament of a lighted blub obeys ohm's law ? |
| iii | Is the principle of energy conservation always applicable to electrical circuits ? |
| iv | How does doubling the frequency affect the reactance of   (a) an inducter   (b) a capacitor |
| v | In a R-L circuit, will the current lag or lead the voltage ? Shows its diagram. |
| vi | Why does capacitor not conduct D.C current ? |
| vii | Which materials obey Hook's law and which do not ? |
| viii | Differentiate between ductile and brittle substances. |
| ix | Why soft iron is better in the construction of transformer ? |
| x | What is the net charge on a n-type and p-type substance. Justify your answer with reason. |
| xi | Why base current in a transistor is very small ? |
| xii | Why does depletion region in diode increases in case of its reverse biasing ? |

**QUESTION NO. 4**    Write short answers any Six (6) of the following      12

| | |
|---|---|
| i | Can a D.C motor be turned into D.C generator ? What changes are required to be done ? |
| ii | When an electric motor, such as and electric drill is being used. Does it also act as a generator ? If so what is the consequences of this ? |
| iii | What happens to total radiation from a blackbody if its absolute temperature is doubled ? |
| iv | Which has lower energy quanta ? Radio-waves or X-rays ? |
| v | Explain why Laser action could not occur without population inversion between atomic level ? |
| vi | What do you mean by root mean square value (rms) of current and write formula. |
| vii | What is Stefan's Boltzmann law ? Give the value of Stefan constant. |
| viii | Define Compton effect. Express Compton shift for scattering angle $\theta$. |
| ix | Distinguish between spontaneous and stimulated emission. |

## SECTION-II

Note:    Attempt any Three questions from this section      8 x 3 = 24

| | | |
|---|---|---|
| Q.5.(A) | What is capacitor ? Derived an expression energy stored in a capacitor and also calculate the energy stored in the electric field ? | 5 |
| (B) | A charge of 90 C passes through a wire in 1 hour and 15 minutes what is current in the wire ? | 3 |
| Q.6.(A) | What is A.C generator ? Give its construction and describe its working. | 5 |
| (B) | A coil of 0.1m x 0.1m and of 200 turns carrying a current of 1.0 mA is placed in uniform magnetic field of 0.1T. Calculate the maximum torque that acts on the coil. | 3 |
| Q.7.(A) | Describe series resonant circuit. Find formula for resonance frequency and write its properties. | 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 $I_C / I_E$, if the value of current gain $\beta$ is 100. | 3 |
| Q.8.(A) | What is de-Broglie hypothesis ? Give an experiment of its proof. | 5 |
| (B) | The length of steel wire is 1.0 m and its cross – sectional area is $0.03 \times 10^{-4}$ m$^2$. Calculate the work done in stretching the wire when force of 100N is applied within the elastic region. Young's modulus of steel is $3.0 \times 10^{11}$ Nm$^{-2}$ | 3 |
| Q.9.(A) | How X-rays are produced ? Explain bremsstrahlung. Write two uses of X-rays. | 5 |
| (B) | If $^{233}_{92}U$ decays twice by $\alpha$ −emission. What is the resultant isotope ? Explain with nuclear reaction. | 3 |

**PHYSICS**
**GROUP : FIRST**

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**OBJECTIVE**

**TIME: 20 MINUTES**
**MARKS: 17**

**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.

## QUESTION NO. 1

| | | | | |
|---|---|---|---|---|
| 1 | $\frac{Second}{Ohm}$ is equal to. | | | |
| | (A) Coulomb | (B) Farad | (C) Joule | (D) Ampere |
| 2 | S.I unit of electric flux is. | | | |
| | (A) $NC^{-1}$ | (B) $N.m^2.C^{-1}$ | (C) $N.m.C^{-1}$ | (D) $N.C^{-1}.m^2$ |
| 3 | If there is a single black colour band around the body of a resistor, then the value of its resistance will be. | | | |
| | (A) Zero ohm | (B) 10 ohm | (C) 100 ohm | (D) Infinity |
| 4 | If 300 turns of wire are wound on 30cm length, then number of turns per unit length is | | | |
| | (A) 10 | (B) 20 | (C) 100 | (D) 1000 |
| 5 | Which of the following is not accurate potential measuring device ? | | | |
| | (A) Voltmeter | (B) C.R.O | (C) Potentiometer | (D) Digital multimeter |
| 6 | The rod of unit length is moving at 30° through a magnetic field of 1T. If the velocity of rod is 1 m/s , then induced emf in the rod will be. | | | |
| | (A) 1 V | (B) 0.25 V | (C) 0.5 V | (D) 0.6 V |
| 7 | In alternating current circuit, inductors behave like. | | | |
| | (A) Semi conductors | (B) Resistors | (C) Insulators | (D) Conductors |
| 8 | Resistance of pure choke is. | | | |
| | (A) Zero | (B) Large | (C) Very small | (D) Infinite |
| 9 | The device which allows only the flow of D.C. is. | | | |
| | (A) Capacitor | (B) Transformer | (C) Inductor | (D) Generator |
| 10 | Curie temperature for iron is. | | | |
| | (A) 1153 K | (B) 1023 K | (C) 750 K | (D) 700 K |
| 11 | If $R_1 = 10 k\Omega$ and $R_2 = 100 k\Omega$ , the gain of inverting amplifier is | | | |
| | (A) -11 | (B) -10 | (C) 10 | (D) 11 |
| 12 | The open loop gain of op-amp is of the order of. | | | |
| | (A) $10^2$ | (B) $10^3$ | (C) $10^4$ | (D) $10^5$ |
| 13 | 0.1 Kg is equivalent to the energy of. | | | |
| | (A) $9 \times 10^{15}$ J | (B) $9 \times 10^{16}$ J | (C) $6 \times 10^{16}$ J | (D) $3 \times 10^8$ J |
| 14 | The rest mass energy of an electron positron pair is. | | | |
| | (A) 0.51 Mev | (B) 1.02 Mev | (C) 0.2 Mev | (D) 1.51 Mev |
| 15 | First spectral series of hydrogen atom was identified by. | | | |
| | (A) Lyman | (B) Rydberg | (C) Balmer | (D) Paschen |
| 16 | Slow neutrons can cause fission in. | | | |
| | (A) Uranium - 235 | (B) Uranium - 238 | (C) Neptonium | (D) Lithium. |
| 17 | Radio therapy is generally done with $\gamma$-rays emitted from. | | | |
| | (A) Sodium - 24 | (B) Cobalt - 60 | (C) Iodine - 131 | (D) Strontium - 90 |

16 (Obj) -12022 - 60000       **SEQUENCE – 1**       ( PAPER CODE – 8471 )

| PHYSICS | SUBJECTIVE | TIME: 2.40 HOURS |
|---|---|---|
| **GROUP : FIRST** | **SECTION-I** | **MARKS: 68** |

**QUESTION NO. 2** Write short answers any Eight (8) parts of the following    16

| i | The potential is constant throughout a given region of space. Is electric field zero or non zero in this region. Explain. |
|---|---|
| ii | Write any two comparisons of electric force and gravitational force. |
| iii | Calculate the electric intensity inside a hollow charged sphere. |
| iv | Electric lines of force never cross. Why ? |
| v | Write any two uses of C.R.O. |
| vi | Define current sensitivity of a galvanometer. |
| vii | Describe the change in magnetic field inside a solenoid carrying a steady current I, if length of solenoid is doubled and number of turns remains same. |
| viii | Why the resistance of ammeter should be very low ? |
| ix | Define nuclear reactor. Also write down its two main types of reactors. |
| x | Define fluorescence. |
| xi | Why are heavy nuclei unstable ? Explain briefly. |
| xii | Discuss the advantages and disadvantages of nuclear power as compared to the use of fossil fuel generated power. |

**QUESTION NO. 3** Write short answers any Eight (8) parts of the following    16

| i | Why does the resistance of a conductor rise with temperature ? |
|---|---|
| ii | Differentiate between ohmic and non-ohmic devices with example. |
| iii | Give statements of Kirchhoff's, 1st rule and 2nd rule. |
| iv | A sinusoidal current has *rms* value of 10A. What is the maximum or peak value ? |
| v | What is Choke ? Why is it used in A.C. circuit ? |
| vi | What is impedance ? Give its SI Units. |
| vii | Distinguish between crystalline and amorphous solids. |
| viii | What is meant by hysteresis loss ? |
| ix | Why ordinary silicon diodes do not emit light ? |
| x | The anode of a diode is 0.2V positive with respect to the cathode. Is it forward biased ? |
| xi | Differentiate between Forward and Reverse Biasing. |
| xii | Define elastic limit and yield point. |

**QUESTION NO. 4** Write short answers any Six (6) parts of the following    12

| i | Define motional emf and write its formula ? |
|---|---|
| ii | Explain the factors responsible for powers loss in transistor ? |
| iii | Four unmarked wires emerge from a transformer. What steps would you take to determine the turn ratio? |
| iv | Does the induced emf in a circuit depend on the resistance of the circuit ? Does the induced current depend upon the resistance of the circuit ? |
| v | Give four applications of photocell ? |
| vi | Define work function and threshold frequency. |
| vii | Define special theory of relativity and write its postulates ? |
| viii | Distinguish between stimulated and spontaneous emission ? |
| ix | What are the advantages of laser over ordinary light ? |

**SECTION-II**

Note: Attempt any Three questions from this section    $8 \times 3 = 24$

| Q.5.(A) | Define capacitance of a capacitor. Derive an expression for the energy stored in the capacitor. | 1+4 |
|---|---|---|
| (B) | The resistance of an iron wire at 0 °C is $1 \times 10^4$ Ω. What is resistance at 500 °C of the temperature coefficient of resistance of iron is $5.2 \times 10^{-3}$ k$^{-1}$. | 3 |
| Q.6.(A) | For a current carrying solenoid, derive expression for magnetic field. How can you explain the direction of magnetic field by right hand grip rule ? | 5 |
| (B) | An ideal step down transformer is connected with main supply of 240 V. It is desired to operate a 12 V, 30 W lamp. Find the current in the primary and the transformer ratio. | 3 |
| Q.7.(A) | What is the operational amplifier ? Derive the relation for gain of an inverting amplifier. | 1+4 |
| (B) | Find the capacitance required to construct a resonance circuit of frequency 1000 KHz with inductor of 5 mH. | 3 |
| Q.8.(A) | What is photoelectric effect ? How its results were explained by Einstein ? | 1+4 |
| (B) | A 2.5m long and cross-section area 10$^{-5}$ m$^2$ is stretched 1.5 mm by a force of 100 N in the elastic region. Calculate (a) Strain (b) Young's modulus. | 3 |
|  | Describe the principle, construction and working of Wilson Cloud Chamber for detection clear radiation. | 5 |
|  | the speed of the electron in the first Bohr orbit. | 3 |

# DG Khan Board-2022

**PAPER CODE - 8472**
**12th CLASS - 12022**

**PHYSICS**
**GROUP: SECOND**

**TIME: 20 MINUTES**
**MARKS: 17**

## OBJECTIVE

**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.

**QUESTION NO. 1**

| 1 | A charge of 4 C is in the field of intensity 4 N/C. the force on charge is |
|---|---|
| | (A) 1 N (B) 4 N (C) 8 N (D) 16 N |
| 2 | $\frac{Second}{ohm}$ is equal to |
| | (A) Farad (B) Coulomb (C) Joule (D) Ampere |
| 3 | 5A current flows through a conductor in 2 minutes, the charge in the conductor is. |
| | (A) 10 C (B) 600 C (C) 400 C (D) 500 C |
| 4 | If current flowing through a solenoid becomes four times, then magnetic field inside it becomes. |
| | (A) Half (B) Two times (C) Three times (D) Four times |
| 5 | A 5m wire carrying current 2A at right angle to uniform magnetic field of 0.5 T. The force on the wire is. |
| | (A) 10 N (B) 5 N (C) 4 N (D) 2.5 N |
| 6 | Henry is equal to |
| | (A) $VSA^{-1}$ (B) $VS^{-1}A$ (C) $V^{-1}SA$ (D) $V S^{-1} A$ |
| 7 | If step up transformer 100 % efficient, the primary and secondary windings would have the same |
| | (A) Current (B) Power (C) Voltage (D) Direction of winding |
| 8 | In R-L-C series circuit, the current at resonance frequency is |
| | (A) Zero (B) Minimum (C) Maximum (D) Infinite |
| 9 | The amplitude modulation transmission waves have frequencies range |
| | (A) 540 Hz to 1600 Hz (B) 540 M Hz to 1600 M Hz |
| | (C) 540 K Hz to 1600 K Hz (D) 540 Hz to 1600 K Hz |
| 10 | The Curi temperature for iron is |
| | (A) 125 °C (B) 163 °C (C) 750 K (D) 750 °C |
| 11 | Gain of inverting op-amplifier, if $R_1 = \infty$ and $R_2 = 1$ |
| | (A) $\infty$ (B) +1 (C) -1 (D) 0 |
| 12 | The p-n junction on forward biasing acts as |
| | (A) Capacitor (B) Inductor (C) High resistor (D) Low resistor |
| 13 | The unit of Plank's constant is |
| | (A) JC (B) J/C (C) JS (D) J/S |
| 14 | If temp. is doubled for a black body then energy radiated per second per unit area becomes. |
| | (A) 4 times (B) $\frac{1}{4}$ times (C) 16 times (D) $\frac{1}{16}$ times |
| 15 | The quantized radius of first Bohr orbit of Hydrogen atom is. |
| | (A) 0.053 nm (B) 0.053 m (C) 0.0053 nm (D) 0.53 nm |
| 16 | The dead time of G.M counter is |
| | (A) $10^{-3}$ second (B) $10^{-4}$ second (C) $10^{-6}$ second (D) $10^{-8}$ second |
| 17 | The temp. of core of sun is about |
| | (A) 50 M °C (B) 40 M °C (C) 20 M °C (D) 10 M °C |

120 (Obj) - 12022 - 60000    SEQUENCE - 1    ( PAPER CODE - 8472 )

PHYSICS **DG Khan Board-2022** SUBJECTIVE | TIME: 2.40 HOURS
GROUP: SECOND | SECTION-I | MARKS: 68

**QUESTION NO. 2** Write short answers any Eight (8) parts of the following     16

| i | Suppose that you follow an electric field line due to a positive point charge. Do electric field and potential increased or decreased ? |
|---|---|
| ii | Do electron tend to go to region of high potential or low potential ? |
| iii | Define electric flux also write down its SI unit. |
| iv | Write down the four properties of electric field lines. |
| v | Is it possible to orient a current loop in a uniform magnetic field such that the loop will not tend to rotate ? Explain |
| vi | How can you use a magnetic field to separate isotopes of chemical element ? |
| vii | What is the function of grid ? |
| viii | Suppose that a charge 'q' is moving in a uniform magnetic field with velocity $\vec{v}$. Why is there no work done by the magnetic force acts on charge q ? |
| ix | Why are heavy nuclei unstable ? |
| x | Explain how $\propto$ and $\beta$– particles may ionize an atom without directly hitting the electron ? |
| xi | What factors make a fusion reaction difficult to achieved ? |
| xii | If someone accidently swallows an $\propto$–source and a $\beta$– source which would be more dangerous to him ? Explain why ? |

**QUESTION NO. 3** Write short answers any Eight (8) parts of the following     16

| i | Colour code of carbon resistors, usually consists of four bands. Starting from left, interpret the different colour bands with example. |
|---|---|
| ii | What is meant by a current source ? Explain with example. |
| iii | Why does the resistance of a conductor rise with temperature ? |
| iv | Write down advantages and disadvantages of A.M. and F.M. |
| v | What is the difference between A.C. and D.C circuits ? |
| vi | A sinusoidal current has *rms* value of 10 A. What is the maximum or peak value ? |
| vii | Distinguish between soft and hard ferromagnetic materials. |
| viii | Describe the terms elasticity and plasticity. |
| ix | What is doping ? Why intrinsic semiconductors are doped ? |
| x | What are Logic gates ? Explain Logic OR – gate. |
| xi | The anode of a diode is 0.2V positive with respect to the cathode. Is it forward biased ? |
| xii | The inputs of a gate are '1' and '0'. Identify the gate if its output is (a) '0', (b) '1'. Verify the results using Boolean expressions or respective gates. |

**QUESTION NO. 4** Write short answers any Six (6) parts of the following     12

| i | Write down any two methods for improving the efficiency of a transformer. |
|---|---|
| ii | On what factors the self inductance of a coil depends ? Explain briefly. |
| iii | Does the induced emf in a circuit depend on the resistance of circuit ? Does the induced current depend on the resistance of circuit ? |
| iv | Four unmarked wires emerge from a transformer. What steps would you take to determine the turns ratio? |
| v | Why can red light be used in a photographic dark room when developing films, but no white or blue light? |
| vi | What advantages an electron microscope has over an optical microscope ? |
| vii | Calculate the wavelength of an electron moving at 40 m/s |
| viii | Explain why laser action cannot occur without population inversion between atomic levels ? |
| ix | Write any two uses of lasers in medicine and industry. |

## SECTION-II

**Note:** Attempt any Three (3) questions from this section     $8 \times 3 = 24$

| Q.5.(A) | Describe Millikan's oil drop method for determination of charge on an electron. | 5 |
|---|---|---|
| (B) | A rectangular bar of iron is 2.0 cm by 2.0 cm in cross section and 40 cm long. Calculate its resistance if resistivity of iron is $11 \times 10^{-8}$ $\Omega$ m. | 3 |
| Q.6.(A) | Define and explain mutual induction. Also derived relation for mutual inductance ? | 5 |
| (B) | A power line 10.0m high carries a current 200 A. Find the magnetic field of the wire at the ground ? | 3 |
| Q.7.(A) | How op-amp can be used as inverting and non inverting amplifier ? Explain. | 5 |
| (B) | Find the value of the current flowing through a capacitance 0.5 $\mu$F when connected to a source of 150 V at 50 Hz. | 3 |
| Q.8.(A) | Explain strain energy in deformed material. Use graphical method to determine work done by force. Does this method suit to linear and non- linear extension ? | 5 |
| (B) | A particle of mass 5.0 mg moves with speed of 8.0 ms$^{-1}$. Calculate its de Broglie wavelength. | 3 |
| 9.(A) | What is the nuclear reactor ? Give its construction and working | 5 |
| (B) | Calculate the longest wave length of radiation for the Paschen series. | 3 |

**PHYSICS**                                                          TIME: 20 MINUTES

**GROUP : FIRST**                                                MARKS: 17

### OBJECTIVE

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

QUESTION NO. 1

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| 1 | A particle of charge 2 e falls through potential difference of 3.0 V will have energy |
| | (A) 1.5 eV    (B) 0.66 eV       (C) 6 eV      (D) 12 eV |
| 2 | The minimum value of charge on free particle is |
| | (A) $\frac{2}{3}$ e       (B) $\frac{1}{3}$ e      (C) $\frac{-2}{3}$ e       (D) e |
| 3 | The SI unit of conductance is |
| | (A) Siemen      (B) Ohm     (C) Henry        (D) Weber |
| 4 | In the expression $\frac{e}{m} = \frac{V}{Br}$ , the radius is measured by making electronic trajectory |
| | (A) Hyperbolic   (B) Ellipse    (C) Dark       (D) Visible |
| 5 | Output waveform of built-in voltage of the CRO is |
| | (A) Sinusoidal       (B) Square      (C) Rectangular     (D) Saw tooth |
| 6 | The Lenz's law is also a statement of law of conservation of |
| | (A) Charge     (B) Parity    (C) Mass     (D) Energy |
| 7 | The principle of A.C generator is |
| | (A) Lenz's law      (B) Faraday's law      (C) Mutual induction     (D) Coulomb's law |
| 8 | In A.C through resistance, current and voltage are |
| | (A) in phase      (B) out of phase          (C) current leads          (D) $90^o$ phase difference |
| 9 | The unit of $\frac{WL}{R}$ in R – L series circuit is |
| | (A) Ohm      (B) Volt      (C) Henry      (D) Unitless |
| 10 | The most suitable metal for making permanent magnet is |
| | (A) Iron      (B) Steel      (C) Silver      (D) Copper |
| 11 | Base of the transistor is very thin of the order of the |
| | (A) $10^{-6}$ m   (B) $10^{-2}$ m   (C) $10^{-1}$ m   (D) $10^{-3}$ m |
| 12 | The operational amplifier, when works as inverting amplifier. The phase change between its input and output is |
| | (A) $90^o$       (B) $120^o$       (C) $150^o$       (D) $180^o$ |
| 13 | The factor $\frac{h}{m_o c}$ has the unit of |
| | (A) Kilogram      (B) Second      (C) Meter      (D) Joule |
| 14 | Which properties of radio waves are predominate ? |
| | (A) Wave     (B) Particle     (C) Partial wave     (D) Partial particle |
| 15 | Finely focused beam of laser has been used to destroy |
| | (A) Crystal structure      (B) Cancerous cells      (C) Weapons      (D) Germs |
| 16 | Baryon with combination of up , up and up quark has charge |
| | (A) 1 e     (B) 2 e      (C) – 1 e      (D) – 2 e |
| 17 | $^2_1H + ^2_1H \longrightarrow ^3_1H + X + 4.0$ Mev.  The particle X is |
| | (A) $^1_0n$    (B) $^1_1H$    (C) $^2_1H$     (D) electron |

**QUESTION NO. 2**   Write short answers any Eight (8) of the following     16

| 1 | Show that : $1\dfrac{\text{volt}}{\text{meter}} = 1\dfrac{\text{newton}}{\text{coulomb}}$ |
|---|---|
| 2 | Two opposite point charges , each of magnitude q are separated by a distance 2d. What is the electric potential at a point P mid-way between them ? |
| 3 | Is E necessarily zero inside a charged rubber balloon if balloon is spherical ? Assume that charge is distributed uniformly over the surface. |
| 4 | Is it true that Gauss's law states that the total number of lines of forces crossing any closed surface in the outward direction is proportional to the net positive charge enclosed within surface ? |
| 5 | The magnetic field in a certain region is given by $\vec{B} = (40\,\hat{\imath} - 18\,\hat{k})$ wbm$^{-2}$. How much flux passes through a 5.0 cm$^2$ area loop in this region if the loop lies flat in the XY-plane ? |
| 6 | Prove that $\vec{F} = q\vec{E} + q\,(\vec{V} \times \vec{B})$ |
| 7 | Why does the picture on a TV screen become distorted when a magnet is brought near the screen ? |
| 8 | How can a current loop be used to determine the presence of a magnetic field in a given region of space ? |
| 9 | How can an induced current be increased ? |
| 10 | Define mutual inductance and write its unit |
| 11 | Does the induced *emf* in a circuit depend on the resistance of the circuit ? Does the induced current depend on the resistance of the circuit ? |
| 12 | In a certain region, the earth's magnetic field point vertically down. When a plane flies due north, which wingtip is positively charged ? |

**QUESTION NO. 3**   Write short answers any Eight (8) of the following     16

| 1 | What are thermistors ? For what they are used for ? |
|---|---|
| 2 | Do bends in a wire affect its electrical resistance ? Explain |
| 3 | Describe a circuit which will give a continuously varying potential |
| 4 | What are the average values of current ' I ' and voltage ' V ' over a cycle of alternating current ? What are the average values of I$^2$ and V$^2$ over a cycle ? |
| 5 | What is impedance ? Give its unit |
| 6 | How does doubling the frequency affect the reactance of (a) an inductor (b) a capacitor ? |
| 7 | What is difference between ductile and brittle substances ? Give example of each |
| 8 | Define modulus of elasticity. Also discuss its three kinds |
| 9 | What is meant by para , dia and ferromagnetic substances ? Give examples for each |
| 10 | What is a light emitting diode ? Give its applications |
| 11 | Describe the variation of size and the difference in concentration of impurity in different parts of a transistor |
| 12 | What is the principle of virtual ground ? |

**QUESTION NO. 4**   Write short answers any Six (6) of the following     12

| 1 | As a solid is heated and begins to glow , why does it first appear red ? |
|---|---|
| 2 | Which has the lower energy quanta ? Radio waves or X-rays ? |
| 3 | A particle of mass 5.0 mg moves with speed of 8.0 m/s. Calculate its de-Broglie wavelength |
| 4 | Can X-rays be reflected , refracted , diffracted and polarized just like any other waves ? Explain |
| 5 | What is difference between spontaneous and stimulated emission ? |
| 6 | If a nucleus has a half life of 1 year , does this mean that it will be completely decayed after 2-years. Explain |
| 7 | What information is revealed by the length and shape of the tracks of an incident particle in Wilson Cloud Chamber ? |
| 8 | Define hadrons. Also differentiate between baryons and mesons |
| 9 | Define Half life and write its mathematical formula |

**SECTION-II**

Note:   Attempt any Three questions from this section     8 x 3 = 24

| Q.5.(A) | By using Millikan oil drop experiment , How can the charge on electron be measured | 5 |
|---|---|---|
| (B) | The resistance of an iron wire at 0 °C is $1.0 \times 10^4$ $\Omega$ . What is the resistance at 500 °C if the temperature coefficient of resistance of iron is $5.2 \times 10^{-3}$ K$^{-1}$ ? | 3 |
| Q.6.(A) | What is cathode Ray Oscilloscope ? Explain the functions of (i) Cathode (ii) Grid (iii) Anodes (iv) Deflecting plates and (v) Sweep generator | 5 |
| (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$^{-1}$ ? | 3 |
| Q.7.(A) | What is p-n junction ? Describe forward and reverse biased p-n junction. Discuss the characteristics curves in short | 5 |
| (B) | Find the value of the current flowing through a capacitance 0.5 $\mu$F when connected to a source of 150 V at 50 Hz | 3 |
| Q.8.(A) | Write a brief note on nuclear fission | 5 |
| (B) | A 1.25 cm diameter is subjected to a load of 2500 kg. Calculate the stress on the bar in mega-Pascals | 3 |
| Q.9.(A) | Explain photoelectric effect on the basis of classical and quantum theory | 5 |
| (B) | The wave length of K X-ray from copper is $1.377 \times 10^{-10}$ m. What is the energy difference between two levels from which this transition results ? | |

PHYSICS
GROUP : SECOND

DGK-II-21
OBJECTIVE

TIME: 20 MINUTES
MARKS: 17

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

QUESTION NO. 1

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| 1 | The core of the transformer is laminated to reduce |
| | (A) Magnetic loss    (B) Electric loss    (C) Eddy current loss    (D) Hysteresis loss |
| 2 | The capacitive reactance to a pure D.C is |
| | (A) Zero    (B) Infinite    (C) 2 Ohm    (D) 3 Ohm |
| 3 | At resonance, the impedance of RLC series circuit is |
| | (A) Zero    (B) Minimum    (C) Maximum    (D) Variable |
| 4 | Glass and high carbon steel are the example of |
| | (A) Ductile substance    (B) Brittle substance    (C) Soft substance    (D) Magnetic substance |
| 5 | The colour of light emitting diode (LED) depends upon |
| | (A) The type of semiconductor material    (B) The amount of forward current    (C) Its forward Biasing |
| | (D) Its reverse Biasing |
| 6 | The voltage gain of an inverting operational amplifier is given by input and output is |
| | (A) $G = 1 - \frac{R_2}{R_1}$    (B) $G = 1 - \frac{R_1}{R_2}$    (C) $G = \frac{R_1}{R_2}$    (D) $G = -\frac{R_2}{R_1}$ |
| 7 | In order to increase the K.E of ejected photo-electron , there should be an increase in |
| | (A) Intensity of light    (B) Wavelength of radiation    (C) Frequency of radiation    (D) Power of radiation |
| 8 | Which of the following phenomena proves the particle nature of light |
| | (A) Diffraction    (B) Interference    (C) Polarization    (D) Photoelectric effect |
| 9 | X-rays has charge |
| | (A) Positive    (B) Negative    (C) Zero    (D) As that of $\alpha$–particle |
| 10 | The building block of protons and neutrons are called |
| | (A) Electron    (B) Ions    (C) Quarks    (D) Positron |
| 11 | In nuclear fission reaction , when the products are $^{140}X_e$ and $^{94}Sr$ , the number of neutrons emitted are |
| | (A) 1    (B) 2    (C) 3    (D) 4 |
| 12 | The charge on the oil droplet in Millikan's oil drop experiment calculated by using formula |
| | (A) $q = \frac{mg}{d}$    (B) $q = \frac{v}{mgd}$    (C) $q = \frac{mgd}{v}$    (D) $q = \frac{d}{mgv}$ |
| 13 | One electron volt is equal to |
| | (A) $6.25 \times 10^{18}$ J    (B) $6.25 \times 10^{-18}$ J    (C) $1.6 \times 10^{-19}$ J    (D) $1.6 \times 10^{19}$ J |
| 14 | The substance having negative temperature co-efficient is |
| | (A) Carbon    (B) Iron    (C) Tungsten    (D) Gold |
| 15 | The SI unit of magnetic flux is given by |
| | (A) $NmA^{-1}$    (B) $NA^{-1}m^{-1}$    (C) $Nm^2A^{-1}$    (D) $Nm^{-1}A$ |
| 16 | When a charge is projected perpendicular to a uniform magnetic field, then its path followed will be |
| | (A) Straight line    (B) Circle    (C) Ellipse    (D) Helix |
| 17 | If 10A current passes through 100 mH inductor, then energy stored is |
| | (A) 100 J    (B) 5 J    (C) 20 J    (D) Zero |

PHYSICS      **DG Khan Board-2021**    **12th CLASS – 12021**
GROUP : SECOND      **SUBJECTIVE**      TIME : 2.40 HOURS
**SECTION-I**      MARKS : 68

**QUESTION NO. 2**   Write short answers any Eight (8) of the following      16

| | |
|---|---|
| 1 | Is $\vec{E}$ necessarily zero inside a changed rubber balloon, if balloon is spherical ? |
| 2 | Do electron tend to go to region of high potential or of low potential ? |
| 3 | Prove that the unit of time and unit of product of resistance and capacitance of capacitor (RC) are same ? |
| 4 | Define electron volt and show that $1\ eV = 1.6 \times 10^{-19} J$ |
| 5 | Why does the picture on a TV screen becomes distorted when a magnet is brought near the screen ? |
| 6 | How can you use a magnetic field to separate isotopes of chemical element ? |
| 7 | What is meant by Lorentz force ? Write down its formula |
| 8 | Write two uses of cathode ray Oscilloscope |
| 9 | Does the induced *emf* always act to decrease the magnetic flux through a circuit ? Explain |
| 10 | Show that $\mathcal{E}$ and $\frac{\Delta\varphi}{\Delta t}$ have the same units ? |
| 11 | Define Faraday's law |
| 12 | Name the factors upon which the self inductance depends |

**QUESTION NO. 3**   Write short answers any Eight (8) of the following      16

| | |
|---|---|
| 1 | A potential difference is applied across the ends of a copper wire. What is the effect on the drift velocity of free electrons by (a) Increasing potential difference (b) Decreasing the length and the temperature of the wire |
| 2 | What are the difficulties in testing whether the filament of light bulb obeys Ohm's law ? |
| 3 | A carbon resistance has red , violet, orange and silver colour. What will be its resistance and tolerance ? |
| 4 | How many times per second will an incandescent lamb reach maximum brilliance when connected to 50 Hz source ? |
| 5 | At frequency of 80 Hz , the reactance of inductor is 500 $\Omega$ . What will be the inductance ? |
| 6 | In a R-L series circuit, will the current lag or lead the voltage ? Illustrate your answer by making vector diagram. |
| 7 | Differentiate between tensile and compressive mode of stress and strain |
| 8 | Define Curie temperature. What is Curie temperature for iron ? |
| 9 | What is meant by hysteresis loss ? |
| 10 | Why charge carriers are not present in the depletion region ? |
| 11 | The anode of a diode is 0.2 V positive with respect to its cathode. Is it forward biased ? |
| 12 | Why the base of transistor is kept small ? |

**QUESTION NO. 4**   Write short answers any Six (6) of the following      12

| | |
|---|---|
| 1 | State Compton effect and write an expression for Compton shift |
| 2 | Why do not we observe a Compton effect with visible light ? |
| 3 | Can pair production take place in vacuum ? Explain |
| 4 | Write postulates of Bohr's model of the hydrogen atom |
| 5 | Explain why laser action cannot occur without population inversion between atomic levels |
| 6 | Write name of two main types of nuclear reactors |
| 7 | What do you understand by back ground radiation ? State two sources of this radiation |
| 8 | What fraction of a radioactive sample decays after two half lives have elapsed ? |
| 9 | Discuss the advantages and disadvantages of fission power from the point of safety, pollution and resources |

**SECTION-II**

Note:   Attempt any Three questions from this section      $8 \times 3 = 24$

| | | |
|---|---|---|
| **Q.5.(A)** | Derive and expression for stored energy density in the electric field of capacitor | 5 |
| (B) | A rectangular bar of iron is 2.0 cm by 2.0 cm in cross-section and 40 cm long. Calculate its resistance if the resistivity of iron is $11 \times 10^{-8}\ \Omega$ m. | 3 |
| **Q.6.(A)** | Prove that magnetic energy stored in an inductor is $U_m = \frac{1}{2}\frac{B^2}{\mu_o}$ (Al) | 5 |
| (B) | How fast must a proton move in a magnetic field of $2.50 \times 10^{-3}$ T such that the magnetic force is equal to its weight | 3 |
| **Q.7.(A)** | Describe series resonance circuit. Find formula for resonance frequency and write its properties | 5 |
| (B) | In a certain circuit, the transistor has a collector current of 10 mA and a base current of 40 $\mu$A What is the current gain of the transistor ? | 3 |
| **Q.8.(A)** | What is energy band theory ? How it can be used to explain different features of electrical conductors, insulators and semiconductors ? | 5 |
| (B) | Find the mass defect and binding energy of the deuteron nucleus. The experimental mass of deuteron is $3.3435 \times 10^{-27}$ kg | 3 |
| **Q.9.(A)** | What is de-Broglie Hypothesis ? Describe Davison and Germer experiment to prove the hypothesis | 5 |
| (B) | The orbital electron of a hydrogen atom moves with a speed of $5.456 \times 10^{5}$ ms$^{-1}$. Find the value of the quantum number 'n' associated with this electron and the energy of the electron in this orbit | 3 |

PHYSICS , GROUP FIRST
NEW COURSE
ACADEMIC SESSION : 2015 - 2017 TO 2017 - 2019

TIME: 20 MINUTES
MARKS: 17

## OBJECTIVE

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

### QUESTION NO. 1

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| 1 | Photocopier and inkjet printer are the application of |
| --- | --- |
| | (A) Electricity (B) Electrostatics (C) Magnetism (D) Electromagnetism |
| 2 | Selenium is |
| | (A) Insulator (B) Photoconductor (C) Conductor (D) First insulator than conductor |
| 3 | Siemen is the unit of |
| | (A) Resistivity (B) Resistance (C) Conductivity (D) Conductance |
| 4 | The sensitivity of Galvanometer can be increased by |
| | (A) Decreasing the area of coil (B) Decreasing the number of turns of coil |
| | (C) Increasing the magnetic field (D) Using a fine suspension |
| 5 | If a charge at rest in a magnetic field then force on charges is |
| | (A) Zero (B) Maximum (C) $q(\overline{V} \times \overline{B})$ (D) $qVB \cos\theta$ |
| 6 | Mutual induction has a practical role in performanse of the |
| | (A) A.C. Generator (B) D.C Generator (C) Transformer (D) Radio choke |
| 7 | Henry is S.I unit of |
| | (A) Current (B) Resistance (C) Flux (D) Self inductance |
| 8 | In three phase voltage across any two lines is about |
| | (A) 220 V (B) 230 V (C) 400 V (D) 430 V |
| 9 | At high frequency ,the value of reactance of the capacitor in A.C. circuit is |
| | (A) Low (B) High (C) Zero (D) Medium |
| 10 | A device used to detect very weak magnetic field produced by brain is named as ? |
| | (A) MRI (B) CAT Scans (C) Squid (D) CRO |
| 11 | The size of base in transistor is |
| | (A) $10^{-9}$ m (B) $10^{-8}$ m (C) $10^{-7}$ m (D) $10^{-6}$ m |
| 12 | The potential barrier for germanium at room temperature is |
| | (A) 0.3 volt (B) 0.5 volt (C) 0.7 volt (D) 0.9 volt |
| 13 | Photo diode can turn its current on and off in |
| | (A) Micro-sec (B) Nano- sec (C) Pico - sec (D) Femto - sec |
| 14 | Joule second is the unit of |
| | (A) Energy (B) Wien's constant (C) Boyles law (D) Plank's constant |
| 15 | Photons emitted in inner shell transition are |
| | (A) Continuous X- rays (B) Discontinuous X- rays (C) Characteristic X- rays (D) Energetic X- rays |
| 16 | 0.1 Kg mass will be equivalent to energy |
| | (A) $5 \times 10^8$ J (B) $9 \times 10^{15}$ J (C) $6 \times 10^{16}$ J (D) $9 \times 10^{16}$ J |
| 17 | S.I unit of absorbed dose is |
| | (A) Gray (B) Roentgen (C) Curie (D) Rem |

16 (Obj) -12019 - 60000       (NEW)       SEQUENCE – 1

| 1 | Electric lines of force never cross. Why? |
|---|---|
| 2 | Is E necessarily zero inside a charged rubber balloon if balloon is spherical? Assume that charge is distributed uniformly over the surface. |
| 3 | Define electron volt (ev) and write its relation with joule. |
| 4 | What is meant by EEG and ERG? |
| 5 | If a charged particle moves in a straight line through some region of space, can to say that the magnetic field in the region is zero. |
| 6 | What should be the orientation of a current carrying coil in a magnetic field so that torque acting upon the coil is (a) Maximum (b) Minimum ? |
| 7 | What is Lorentz force? Write its formula. |
| 8 | What is right hand rule to find the direction of the lines of force? |
| 9 | Can a step-up transformer increase the power level? In a transformer, there is no transfer of charge from the primary to the secondary, How is ,than the power transferred? |
| 10 | 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. |
| 11 | What is back *emf* effect in motors . |
| 12 | Name and define the factors responsible for power loss in transformer |

**QUESTION NO. 3  Write short answers any Eight (8) questions of the following**       16

| 1 | What are the uses of rheostat ? |
|---|---|
| 2 | Do bends in a wire affect its electrical resistance? Explain. |
| 3 | A charge of 90 C passes through a wire in 1 hour and 15 minutes. What is the current in the wire? |
| 4 | What is choke? |
| 5 | 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. |
| 6 | A circuit contains an iron-cored inductor, a switch and a D.C. source arranged in series. The switch is closed and after an interval reopened. Explain why a spark jumps across the switch contacts |
| 7 | Define strain energy in deformed materials. Write its formula. |
| 8 | Differentiate between intrinsic and extrinsic semiconductors. |
| 9 | Define modulus of elasticity. Show that the units of modulus of elasticity and stress are the same. |
| 10 | Write applications of photo diode. |
| 11 | What is the net charge on a n-type or a p-type substance? |
| 12 | Why ordinary silicon diodes do not emit light? |

**QUESTION NO. 4  Write short answers any Six (6) questions of the following**       12

| 1 | What are the measurements on which two observers in the relative motion will always agree upon. |
|---|---|
| 2 | Can pair production take place in vacuum ? Explain. |
| 3 | What is photo cell ? Give its two applications. |
| 4 | Define excitation potential. |
| 5 | What is meant by a line spectrum? Explain how line spectrum can be used for identification of elements? |
| 6 | What do we mean by the term Critical mass? |
| 7 | What are isotopes? What do they have in common and what are their differences? |
| 8 | Differentiate between mass defect and binding energy. |
| 9 | Explain the term absorbed dose and define its unit gray. |

**SECTION-II**

Note:   Attempt any Three questions from this section            $8 \times 3 = 24$

| Q.5.(A) | State and Explain the Ohm's law. | 5 |
|---|---|---|
| (B) | A particle having a charge of 20 electrons on it fall through a potential difference of 100 volts, Calculate the energy acquired by it in electron volts(ev). | 3 |
| Q.6.(A) | How energy is stored in an Inductor? Derive relation for energy stored in an Inductor. | 5 |
| (B) | A Power line 10.0 m high carries a current 200A. Find the magnetic field of the wire at the ground. | 3 |
| Q.7.(A) | What is transistor ? Derive the voltage gain equation of transistor working as an amplifier | 1+4 |
| (B) | An iron core coil of 2.0 H and 50 Ω is placed in series with a resistance of 450 Ω. An AC supply of 100 V ,50 Hz is connected across the circuit. Find the current flowing in the coil. | 3 |
| Q.8.(A) | What is meant by strain energy? Draw force extension graph for a vertically suspended wire stretched by a variable weight at the other end and by its graph derive a relation to calculate its value | 1+4 |
| (B) | What is the de-Broglie wave length of an electron whose kinetic energy is 120 ev? | 3 |
| Q.9.(A) | What are isotopes ? How isotopes are separated by mass spectrograph? Also derive its relation | 5 |
| (B) | Calculate the longest wave length of radiation for the Paschen series. | 3 |

PHYSICS
GROUP SECOND (NEW COURSE)
ACADEMIC SESSION: 2015 - 2017 TO 2017 - 2019

DG Khan Board-2019

TIME: 20 MINUTES
MARKS: 17

## OBJECTIVE

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.

**QUESTION NO. 1**

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| | |
|---|---|
| 1 | Equation $\phi = \overline{E} . \overline{A}$ is applicable to the surface |
| | (A) Cylindrical    (B) Conical    (C) Flat    (D) Spherical |
| 2 | During danger the "eel" turns itself into a living battery then the potential difference between its head and tail can be up to |
| | (A) 160 V    (B) 220 V    (C) 440 V    (D) 600 V |
| 3 | Electric coefficient is represented by |
| | (A) $\epsilon_o$    (B) $\epsilon_r$    (C) $\mu_o$    (D) $\mu_r$ |
| 4 | The SI unit of flux density is |
| | (A) Gauss    (B) Tesla    (C) weber / meter    (D) weber |
| 5 | The brightness of spot on CRO screen is controlled by |
| | (A) Anode    (B) Cathode    (C) Grid    (D) plates |
| 6 | A transformer steps 220 V to 40 V , If the secondary turns are 40 and then primary turns are |
| | (A) 20    (B) 40    (C) 120    (D) 220 |
| 7 | The loss of energy over each A.C.cycle magnetization and demagnetization of transformer core is called as |
| | (A) Electric current    (B) Electronic current    (C) Eddy current    (D) Conventional current |
| 8 | At high frequency, the current through a capacitor of A.C. circuit will |
| | (A) Zero    (B) Small    (C) Large    (D) Infinity |
| 9 | Which of the following waves do not travel at the speed of light |
| | (A) Radio waves    (B) X-rays    (C) Sound waves    (D) Heat waves |
| 10 | Domains contain nearly |
| | (A) $10^8$ to $10^9$ atoms    (B) $10^{12}$ to $10^{16}$ atoms    (C) $10^{15}$ to $10^{20}$ atoms    (D) $10^{25}$ to $10^{30}$ atoms |
| 11 | Photovoltaic cell is formed from |
| | (A) Arsenic    (B) Carbon    (C) Germanium    (D) Silicon |
| 12 | The gain of an inverting amplifier of external resistances $R_1 = 10\,K\Omega$ and $R_2 = 100\,K\Omega$ is |
| | (A) -10    (B) -5    (C) -2    (D) 5 |
| 13 | The wave-length of emitted radiation of maximum intensity is inversely proportional to the absolute temperature. This is known as |
| | (A) Faraday's law    (B) Rayleigh Jean's law    (C) Stefan's law    (D) Wien's displacement law |
| 14 | Photoelectric effect shows |
| | (A) Corpuscular nature of light    (B) Dual nature of light    (C) Electromagnetic nature of light    (D) Wave nature of light |
| 15 | The diameter of an atom is of order of |
| | (A) $10^{-8}$ m    (B) $10^{-10}$ m    (C) $10^{-12}$ m    (D) $10^{-14}$ m |
| 16 | The specially designed solid state detector can be used to detect |
| | (A) $\alpha$-rays only    (B) $\beta$-rays only    (C) $\gamma$-rays only    (D) X-rays only |
| 17 | A pair of quark and antiquark makes a |
| | (A) baryon    (B) lepton    (C) muon    (D) meson |

**QUESTION NO. 2**   Write short answers any Eight (8) questions of the following DG Khan Board-2019   16

| | |
|---|---|
| 1 | Show that : 1 ohm × 1 farad = 1 second |
| 2 | Define electron volt and show that 1 ev = 1.6 x 10⁻¹⁹ J |
| 3 | State Gauss's law ,write its formula. |
| 4 | Electric lines of force never cross why ? |
| 5 | What is Lorentz force .write its formula. |
| 6 | What is meant by Digital multimeter? |
| 7 | Why the volt meter should have a very high resistance? |
| 8 | Why does the picture on a TV screen become distorted when a magnet is brought near the screen? |
| 9 | What is SI unit of mutual inductance and also define it? |
| 10 | What is difference between D.C. generator and D.C. motor? |
| 11 | Does the induced *emf* in a circuit depend on the resistance of the circuit? |
| 12 | Can a DC motor be turned into DC generator? What changes are required to be done? |

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**QUESTION NO. 3**   Write short answers any Eight (8) questions of the following   16

| | |
|---|---|
| 1 | Write down the names of effects of current for its detection. |
| 2 | What are the difficulties in testing whether the filament of lightened bulb obeys Ohm's law? |
| 3 | Describe a circuit which will give a continuously varying potential. |
| 4 | At what frequency will an inductor of 1.0 H have a reactance of 500 Ω ? |
| 5 | How many times per second will an incandescent lamp reach maximum brilliance when connected to a 50 Hz source? |
| 6 | 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. |
| 7 | Differentiate between amorphous and polymeric solids. |
| 8 | What are superconductors? Give example. |
| 9 | Define stress and strain, what are their units? |
| 10 | What are the uses of Photodiode? |
| 11 | Why charge carriers are not present in depletion region? |
| 12 | How does the motion of an electron in a n-type substance differ from the motion of holes in a p-type substance? |

**QUESTION NO. 4**   Write short answers any Six (6) questions of the following   12

| | |
|---|---|
| 1 | Does the brightness of a beam of light primarily depends on the frequency of photon or on the number of photons? |
| 2 | Why we do not observe a Compton effect with visible light? |
| 3 | What is threshold frequency and work function? |
| 4 | Why does laser usually emit only one particular colour of light? |
| 5 | What is meant by a line spectrum? Explain, how line spectrum can be used for the identification of elements? |
| 6 | A particle which produces more ionization is less penetrating. Why? |
| 7 | Why are heavy nuclei unstable? |
| 8 | What will be the change in mass number and charge number during alpha decay? |
| 9 | What are isotopes ? Give an example. |

## SECTION-II

Note:   Attempt any Three (3) questions from this section      8 x 3 = 24

| | | |
|---|---|---|
| Q.5.(A) | State and explain Ohm's law. Also explain the behaviour of ohmic and non-ohmic devices with the help of graph. | 5 |
| (B) | Determine the electric field at the position $\vec{r} = (4\hat{\imath} + 3\hat{\jmath})$ m caused by a point charge $q = 5 \times 10^{-6}$ C placed at origin. | 3 |
| Q.6.(A) | State Faraday's law and derive relation for induced *emf*. | 5 |
| (B) | Alpha particles ranging in speed from 1000m/s to 2000 m/s enter into a velocity selector where the electric intensity is 300 Vm⁻¹ and the magnetic induction 0.20T. Which particle will move un-deviated through the field? | 3 |
| Q.7.(A) | Explain the principle of Generation transmission and reception of electromagnetic waves. | 5 |
| (B) | A current flowing into the base of transistor is 100 μ A . Find its collector current $I_C$ . its emitter current $I_E$ if the value of current gain $\beta$ is 100. | 3 |
| Q.8.(A) | Write down a note on construction ,working and uses of a Photocell. | 5 |
| (B) | A 1.25 cm diameter cylinder is subjected to a load of 2500 kg. Calculate the stress on bar in mega Pascal . | 3 |
| Q.9.(A) | Define and explain Nuclear fission. | 5 |
| (B) | The wavelength of K x-ray from copper is 1.377 x 10⁻¹⁰ m What is the energy difference between the two levels from which this transition results? | 3 |

120 (Sub)-12019-60000     (NEW)

(12th CLASS – 12018)

PHYSICS

GROUP FIRST (NEW COURSE)
ACADEMIC SESSION : 2015-17 to 2016-18

TIME: 20 MINUTES
MARKS: 17

## OBJECTIVE

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

QUESTION NO. 1

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| 1 | If time constant in RC Circuit is small, than the capacitor is charged or discharged. <br> (A) Slowly  (B) Rapidly  (C) At constant rate  (D) intermittently |
|---|---|
| 2 | Gauss's law can only be applied to <br> (A) A curved surface  (B) A flat surface  (C) A surface of any shape  (D) A closed surface |
| 3 | The maximum power is delivered to a load resistance 'R' when the internal resistance of the source is <br> (A) Zero  (B) Infinite  (C) Equal to 'R'  (D) Equal to $\frac{R}{2}$ |
| 4 | The magnetic force on an electron, travelling at $10^6$ m/s parallel to the field of strength 1 Weber /$m^2$ is <br> (A) $10^{-12}$ N  (B) Zero  (C) $10^3$ N  (D) $16 \times 10^{-12}$ N |
| 5 | The sensitivity of a galvanometer can be increased by: <br> (A) Decreasing the area of coil  (B) Decreasing the number of turns <br> (C) Increasing the diameter of suspension wire  (D) Increasing the magnetic field |
| 6 | Lens's law deals with the <br> (A) Magnitude of induced current  (B) Direction of induced current <br> (C) Direction of induced emf  (D) Magnitude of induced emf |
| 7 | Transformer is used to change <br> (A) Electrical power  (B) Electrical energy  (C) Magnetic field  (D) Alternating voltage |
| 8 | In a resonance circuit of frequency 1000 KHz with inductor of 5mH, the capacitance will be <br> (A) 10.1 pF  (B) 8.16 pF  (C) 3.3 pF  (D) 5.09 pF |
| 9 | The most suitable metal for making permanent magnet is <br> (A) Iron  (B) Aluminium  (C) Steel  (D) Copper |
| 10 | Which component of the transistor has greater concentration of impurity? <br> (A) Base  (B) Emitter  (C) Collector  (D) both emitter and collector |
| 11 | $X = \overline{A \cdot B}$ is the mathematical notation for <br> (A) NAND gate  (B) NOR gate  (C) OR gate  (D) AND gate |
| 12 | In Compton scattering ,the value of Compton's shift is equal to Compton's wavelength, when X-rays is scattered at angle of <br> (A) $0°$  (B) $30°$  (C) $60°$  (D) $90°$ |
| 13 | The physical quantity ,related to photon, that does not change in compton scattering is <br> (A) Energy  (B) Speed  (C) Frequency  (D) Wavelength |
| 14 | An electron in H-atom is excited from ground state to n = 4. How many spectral lines are possible in this case ? <br> (A) 6  (B) 5  (C) 4  (D) 3 |
| 15 | The meta-stable state is………… than normal excited state. <br> (A) $10^{-5}$ times larger  (B) $10^{-8}$ times smaller  (C) $10^5$ times larger  (D) $10^{-3}$ times larger |
| 16 | The particles which do not experience strong force are called <br> (A) baryons  (B) hadrons  (C) mesons  (D) leptons |
| 17 | The force which is responsible for the breaking up of the radioactive element, is <br> (A) Weak nuclear force  (B) Strong nuclear force  (C) Electromagnetic force  (D) Gravitational force |

PHYSICS
GROUP FIRST (NEW COURSE)
ACADEMIC SESSION: 2015-17 to 2016-18

TIME : 2.40 HOURS
MARKS : 68

SUBJECTIVE
SECTION-I

QUESTION NO. 2  Write short answers any Eight (8) questions of the following                16

| 1 | The potential is constant throughout a given region of space. Is the electrical field zero or non-zero in region? Explain. |
| 2 | Do electrons tend to go to region of high potential or low potential? Explain. |
| 3 | Define electron field intensity. What is its unit and direction? |
| 4 | Define electric flux. Mention the factors upon which it depends. |
| 5 | Define Lorentz Force. Derive its formula. |
| 6 | What modification is required to covert a Galvanometer into Ammeter |
| 7 | What is Avometer ? Explain. |
| 8 | How can a current loop be used to determine the presence of a magnetic field in a given region of space? |
| 9 | Can a step-up transformer increase the power? |
| 10 | What happens when any meter is overloaded? |
| 11 | Name the factors which cause power loss in transformer. |
| 12 | Name the factors which affect the self induction. |

QUESTION NO. 3  Write short answers any Eight (8) questions of the following                16

| 1 | Define resistivity and electrolysis. |
| 2 | Explain why the terminal potential difference of a battery decreases when the current drawn from it is increased? |
| 3 | Do bends in a wire affect its electrical resistance ? Explain. |
| 4 | What is meant by A.M and F.M? |
| 5 | A sinusoidal current has rms value of 10A .What is the maximum or peak value? |
| 6 | Define choke and electromagnetic waves. |
| 7 | What is meant by Dia and Ferromagnetic substances ? Give examples for each. |
| 8 | Define stress and strain. |
| 9 | What is meant by super-conductors ? |
| 10 | What is the net charge on a n-type or a p-type substance ? |
| 11 | Why ordinary silicon diodes do not emit light ? |
| 12 | Define digital system and logic gates. |

QUESTION NO. 4  Write short answers any Six (6) questions of the following                12

| 1 | As a solid is heated and begins to glow, why does it first appear red? |
| 2 | Which has the lower energy quanta, Radio waves or X-rays ? Explain. |
| 3 | Why do not we observe a Compton effect with visible light ? |
| 4 | What do we mean when we say that the atom is excited? |
| 5 | State postulates of Bohr's Model of Hydrogen atom. |
| 6 | Define half life of radioactive element. How is it related with decay constant $\lambda$ ? |
| 7 | What do you understand by " back ground radiation" ? State two source of the radiation. |
| 8 | What factors make fusion reaction difficult to achieve? |
| 9 | What fraction of a radioactive sample decays after two half lives have collapsed ? |

Note: **Attempt any Three questions from this section**      8 x 3 = 24

| | | |
|---|---|---|
| 5.(A) | Define capacitance of a capacitor .Also derive a relation for capacitance of a parallel plate capacitor for air and dielectric as a medium. | 1+3+1 |
| (B) | The resistance of an iron wire at 0 °C is $1.0 \times 10^4$ Ω. What is the resistance at 500 °C if the temperature co-efficient of resistance of iron is $5.2 \times 10^{-3}$ $K^{-1}$. | 3 |
| 6.(A) | State Ampere's Law and derive the relation for field "B" of current carrying solenoid. | 1+4 |
| (B) | A square coil of side 16 cm has 200 turns and rotates in uniform magnetic field of magnitude 0.05 T. If the peak emf is 12V, what is the angular velocity of the coil? | 3 |
| 7.(A) | What is modulation? Explain its two types | 1+2+2 |
| (B) | In the circuit shown in the figure below, there is negligible potential drop between B and E. Calculate<br>    (i)    Base current<br>    (ii)   Potential drop across $R_C$<br>    (iii)  $V_{CE}$  | 3 |
| 8.(A) | What is de-Broglie hypothesis? How Davisson and Germer verify it ? Explain | 2+3 |
| (B) | A 1.0 m long copper wire is subjected to stretching force and its length increases by 20cm.Calculate the tensile strain and the percent elongation which the wire under goes? | 3 |
| 9.(A) | What are postulates of Bohr's model of Hydrogen atom? Show that atomic radii in this atom are quantized? | 2+3 |
| (B) | If $^{233}_{92}U$ decays twice by $\alpha$ – emission, what is the resulting isotope ? | 3 |

PHYSICS
SECOND GROUP (NEW COURSE)
ACADEMIC SESSION: 2015-17 to 2016-18

TIME: 20 MINUTES
MARKS: 17

## OBJECTIVE

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.

QUESTION NO. 1

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| | | | | |
|---|---|---|---|---|
| 1 | Identify the practical application of electrostatic force is | | | |
| | (A) Inkjet printer | (B) X - rays | (C) Laser | (D) A.C. generator |
| 2 | Product of resistance and capacitance is | | | |
| | (A) Velocity | (B) Force | (C) Acceleration | (D) Time |
| 3 | Kirchhoff's second rule is based on | | | |
| | (A) Energy conservation | (B) Mass conservation | | |
| | (C) Charge conservation | (D) Momentum conservation | | |
| 4 | Two parallel wires carrying current in the same direction | | | |
| | (A) Repel each other | (B) Have no effect upon each other | | |
| | (C) Attract each other | (D) Cancel each other effect | | |
| 5 | If the motor is overloaded then magnitude of back emf | | | |
| | (A) Increase | (B) decrease | (C) Zero | (D) Remains constant |
| 6 | Choke consumes extremely small | | | |
| | (A) Current | (B) Charge | (C) Power | (D) Potential |
| 7 | Metal detector consists of | | | |
| | (A) L C circuit | (B) R L circuit | (C) R C circuit | (D) R L C series circuit |
| 8 | Good conductor have Conductivities of the order of | | | |
| | (A) $10^{-7}$ $(\Omega\,m)^{-1}$ | (B) $10^{7}$ $(\Omega\,m)^{-1}$ | (C) $10^{2}$ $(\Omega\,m)^{-1}$ | (D) $10^{-2}$ $(\Omega\,m)^{-1}$ |
| 9 | The Curi temperature of iron is | | | |
| | (A) 125 °C | (B) 163 °C | (C) 750 K | (D) 750 °C |
| 10 | The Boolean equation for exclusive NOR gate is given by | | | |
| | (A) $X = AB + BA$ | (B) $X = A\overline{B} + \overline{B}A$ | (C) $X = \overline{A\overline{B} + \overline{B}A}$ | (D) $X = \overline{A\overline{B} + \overline{A}B}$ |
| 11 | The potential barrier for silicon at room temperature | | | |
| | (A) 0.7 volt | (B) 0.3 volt | (C) 5 volt | (D) 1 volt |
| 12 | When platinum wire is heated it becomes orange at | | | |
| | (A) 500 °C | (B) 900 °C | (C) 1100 °C | (D) 1300 °C |
| 13 | 1 Kg mass will be equivalent to energy | | | |
| | (A) $9 \times 10^{12}$ j | (B) $9 \times 10^{16}$ j | (C) $9 \times 10^{20}$ j | (D) $9 \times 10^{8}$ j |
| 14 | The value of Rydbergs constant is | | | |
| | (A) $1.0974 \times 10^{7}$ m | (B) $1.0974 \times 10^{-7}$ m⁻¹ | (C) $1.0974 \times 10^{7}$ m⁻¹ | (D) $1.0974 \times 10^{8}$ m⁻¹ |
| 15 | Balmer series lies in | | | |
| | (A) Infrared region | (B) Visible region | | |
| | (C) Ultraviolet region | (D) Far ultraviolet region | | |
| 16 | The Y-rays emitted from radioactive element have speed | | | |
| | (A) $1 \times 10^{7}$ m s⁻¹ | (B) $1 \times 10^{8}$ m s⁻¹ | (C) $3 \times 10^{8}$ m s⁻¹ | (D) $4 \times 10^{9}$ m s⁻¹ |
| 17 | The dead time for G.M Counter is of the order of | | | |
| | (A) $10^{-1}$ S | (B) $10^{-2}$ S | (C) $10^{-3}$ S | (D) $10^{-4}$ S |

**QUESTION NO. 2   Write short answers any Eight (8) questions of the following    16**

| 1 | Define electric flux, Gaussian surface. |
|---|---|
| 2 | Show $\frac{1V}{1m} = \frac{1N}{1C}$ |
| 3 | If a point charge q of mass m released in a non-uniform electric field with field lines pointing in same direction, will it make a rectilinear motion? |
| 4 | Electric lines of force never cross .Why? |
| 5 | Define magnetic flux and solenoid. |
| 6 | What is the use of C.R,O. ? |
| 7 | How can you use a magnetic field to separate isotopes of chemical elements? |
| 8 | How can a current loop be used to determine the presence of a magnetic field in a region of space? |
| 9 | Show that $\varepsilon$ and $\frac{\Delta\phi}{\Delta t}$ have the same units. |
| 10 | Can a D.C. motor be turned into a D.C. generator ? What changes are required to be done ? |
| 11 | State Lenz's law. |
| 12 | What are the factors on which mutual inductance of two coils depend ? |

**QUESTION NO. 3   Write short answers any Eight (8) questions of the following    16**

| 1 | Do bends in a wire affects its electrical resistance? Explain. |
|---|---|
| 2 | Why does the resistance of a conductor rise with temperature? |
| 3 | What is difference between *emf* and terminal potential difference? |
| 4 | An alternating current is represented by equation $I = 20 \sin 100 \pi t$. Compute its frequency and *rms* value of current |
| 5 | What is meant by A.M. and F.M.? |
| 6 | How does doubling the frequency affect the reactance of (i) an inductor (ii) a capacitor? |
| 7 | Distinguish between crystalline and polymeric solids. |
| 8 | What is difference between Intrinsic and Extrinsic Semi-conductors? |
| 9 | A 1cm diameter cylinder is subjected to a load of 2500 gm. Calculate the stress on the bar in megapascals |
| 10 | What is the net charge on a n-type or a p-type substance? Explain. |
| 11 | Why charge carriers are not present in the depletion region? |
| 12 | What is meant by forward and reverse biasing of a semi-conductor diode? |

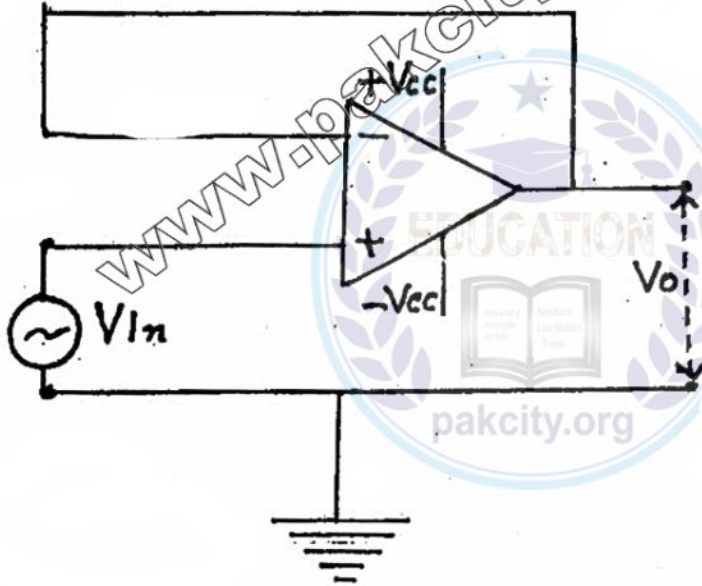**QUESTION NO. 4   Write short answers any Six (6) questions of the following    12**

| 1 | A particle produces more ionization is less penetrating. Why? |
|---|---|
| 2 | Explain how $\propto$ and $\beta$ particles may ionize an atom without hitting directly the electrons. What is difference in action of two particles for producing ionization? |
| 3 | What is meant by dose of radiation? What is its S.I. unit? |
| 4 | Write down two expected nuclear reactions for fission to indicate daughter nuclei? |
| 5 | An electron is placed in a box of an atom that is about $1.0 \times 10^{-10}$m. What is the velocity of that electron? |
| 6 | If an electron and proton have the same de-Broglie wavelength which particle has greater speed ? Explain |
| 7 | Write at least two justifications for light to behave as wave and as particle. |
| 8 | Bohr's theory of Hydrogen atom is based upon several assumptions. Do any of these contradict classical physics? |
| 9 | Write two uses of X- rays. |

| 5.(A) | Define capacitance. Derive an expression for capacitance of parallel plate capacitor when a dielectric material is inserted between the plates. | 5 |
|---|---|---|
| (B) | A platinum wire has a resistance of $10\Omega$ at $0\,^{\circ}C$ and $20\Omega$ at $273\,^{\circ}C$. Find the value of temperature co-efficient of resistance of platinum. | 3 |
| 6.(A) | Define Lenz's law. On its basis prove the law of conservation of energy in case of movement of (i) bar magnet towards the coil. (ii) Metal rod placed on parallel metal rails in a uniform magnetic field. | 1+2+2 |
| (B) | A power line 10.0 m high carries a current of 200 A. Find the magnetic field of the wire at the ground | 3 |
| 7.(A) | Draw the circuit diagram for R-L-C series resonating circuit. Discus the behavior of this circuit for A.C and also write down its properties. | 1+2+2 |
| (B) | Find the gain of the circuit as shown in given figure  | 3 |
| 8.(A) | What is meant by strain energy? How can it be determined from the force-extension graph? | 1+4 |
| (B) | A 90 Kev X-rays photon is fired at a carbon target and Compton scattering occurs. Find the wavelength of the incident photon and the wavelength of the scattered photon for scattering angle of $60^{\circ}$ | 3 |
| 9.(A) | What are isotopes? How isotopes are separated by mass spectrograph? On which factor abundance of isotopes depends? | 1+3+1 |
| (B) | Calculate the longest wavelength of radiation for the Paschen series. | 3 |