# RUBRICS: HSSC 1st ANNUAL EXAMINATION 2023

## SUBJECT: PHYSICS HSSC-II (HA)

| Q.# /Part # | Criteria | Level 1 (Marks) | Level 2 (Marks) | Level 3 (Marks) | Level 4 (Marks) | Level 5 (Marks) | |
|---|---|---|---|---|---|---|---|
| 2(i) | Explanation of concept of dipole | Correct explanation of dipole e.g. definition, formation of dipole, dipole moment etc. (03) | Partially correct explained any two points mentioned in level 1 (02) | Only one point explained (01) | Wrong answer (0) | | |
| 2(ii) | Factors affecting the force on a current carrying conductor placed in magnetic field | Describing the factors (length of conductor, current in the conductor, magnetic induction B, and angle between length and magnetic field) and their relation with magnetic force on the conductor (03) | Partially correct response e.g. mentioning any three factors given in level 1 (02) | Mentioning any two factors given in level 1 OR writing the correct formula $F=ILBSin\theta$ (01) | Mentioning any one factor given in level 1 (0.5) | Wrong answer (0) | |
| 2(iii) | Explaining the concept of balancing Wheatstone bridge | Correct explanation of balancing of Wheatstone bridge e.g. labelled diagram, writing the condition R1/R2 = R3/R4, loop currents, net current through galvanometer etc.(03) | Partially correct explanation (02) | Some relevant information (01) | Wrong answer (0) | | |
| 2(iv) | Explaining the rise in resistance of conductor due to rise in its temperature | Correct explanation (03) | Partially correct explanation (02) | Some relevant information (01) | Wrong answer (0) | | |
| 2(v) | Explaining the reason that Lenz's law is a deduced from law of conservation of energy | Correctly relating the Lenz's law and law of conservation of energy e.g. explaining the relation with a simple experiment or example (03) | Partially correct response (02) | Some relevant information (01) | Wrong answer (0) | | |
| 2(vi) | Explanation of production of back emf in motors | Correct explanation e.g. change of magnetic flux through the motor coil and discussion of Faraday's law of e.m. induction to produce back emf. (03) | Partially correct response (02) | Some relevant information (01) | Wrong answer (0) | | |

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| 2(vii) | Magnetic field at midway between the current carrying wires | Correct calculation and correct answer and unit (03) | Partially correct calculation (02) | One correct mathematical step (01) | Wrong answer (0) | | |
| 2(viii) | Conversion of galvanometer into voltmeter of range 20V | Correct calculation of Rh and correct labelled figure/ description that Rh of calculated value is connected in series with galvanometer to convert into voltmeter (03) | Partially correct calculation with description OR Correct calculation with partially labelled figure/ partially correct description of conversion (02) | Some relevant mathematical step or only correct description (01) | Wrong answer (0) | | |
| 2(ix) | Calculation of self-inductance of a coil | Correct calculation and correct answer and unit (03) | Partially correct calculation (02) | One correct mathematical step (01) | Wrong answer (0) | | |
| 2(x) | Describing impedance of AC circuit as vector sum of resistance and reactance. | Correct description e.g. description of any AC circuit consisting of R and Xc or R and $X_L$ or all with phasor diagram of any relevant AC circuit, showing vector sum OR calculation of impedance showing R and X as rectangular components (03) | Partially correct description OR partially correct phasor diagram OR partially correct calculation (02) | Some relevant information (01) | Wrong answer (0) | | |
| 2(xi) | Definition of brittle substances | Definitions of brittle substances, give an example and draw stress strain curve (1.5) | Missing anyone thing in level 1 (01) | Anyone thing only given in level 1 (0.5) | Wrong answer (0) | | |
| | Definition of ductile substances | Definitions of ductile substances, give an example and draw stress strain curve (1.5) | Missing anyone thing in level 1 (01) | Anyone thing only given in level 1 (0.5) | Wrong answer (0) | | |
| 2(xii) | Explanation of any use of superconductors | Explaining anyone use of superconductors e.g. in MRI, magnetic levitation train, Super computers, devices without dissipation of heat etc (03) | Partially Correct explanation (02) | Some relevant information (01) | Wrong answer (0) | | |

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| 2(xiii) | Explaining that PN junction as potential barrier | Correct explanation e.g. formation of potential barrier due to charges in depletion region etc. (03) | Partially correct response e.g. only defining potential barrier without explanation etc. (02) | Some relevant information e.g. mentioning potential barrier values OR correct labelled figure etc. (01) | Wrong answer (0) | | |
| 2(xiv) | Calculation of wavelength of an accelerating electron under a potential difference | Correct calculation and correct answer and unit (03) | Partially correct calculation (02) | One correct mathematical step (01) | Wrong answer (0) | | |
| 2(xv) | Describing uncertainty principle | Any one correct statement with equation and short explanation (03) | Partially correct response with one factor mission mentioned in level 1 (02) | Giving only one factor mentioned in level 1 (01) | Wrong answer (0) | | |
| 2(xvi) | Explanation of transistor working as open switch | Correct explanation e.g. base current is zero then collector current zero, resistance between C-E terminals is very high, so transistor acts as open switch OR any other correct explanation (1.5) | Partially correct response e.g. any two correct steps mentioned in level 1 (01) | Some relevant information (0.5) | Wrong answer (0) | | |
| | Explanation of transistor working as close switch | Correct explanation e.g. base current is not zero then large collector current is flowing, resistance between C-E terminals is small, so transistor acts as close switch OR any other correct explanation (1.5) | Partially correct response e.g. any two correct steps mentioned in level 1 (01) | Some relevant information (0.5) | Wrong answer (0) | | |
| 2(xvii) | Description of origin of different types of spectra | Correctly naming three types of spectra and giving their origins e.g. line spectra due to isolated atom, band spectra due to molecules and continuous spectra due to radiation e.g from black body (03) | Correctly naming any two spectra and giving their origins (02) | Correctly naming any one spectrum and giving its origin (01) | Wrong answer (0) | | |

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| 2(xviii) | Stating postulates of Bohr's model of hydrogen atom | Correctly stating three postulates with required mathematical equations (if any) (03) | Correctly stating two postulates with required mathematical equations (if any) (02) | Correctly stating anyone postulate with required mathematical equation (if any) (01) | Wrong answer (0) | | |
| 2(xix) | Comparing fission and fusion based on how difficult it is to produce the reaction | Correctly describing that fusion is difficult to achieve with at least two reasons (03) | Partially correct response (02) | Some relevant information (01) | Wrong answer (0) | | |
| 2(xx) | Calculation of decay constant | Correct calculation and correct answer and unit (03) | Partially correct calculation OR correct calculation with wrong answer (02) | One correct mathematical step (01) | Wrong answer (0) | | |
| 3(a) | Stating Gauss's law | Correct statement with formula (02) | Partially correct e.g. incomplete statement OR only giving correct formula etc.(01) | Wrong answer (0) | | | |
| | Derivation of electric field intensity due to infinite sheet of charge | Correct derivation e.g. finding electric flux through gaussian surface by definition and by gauss's law, calculating electric field intensity (05) | Any two correct mathematical calculation mentioned in level 1 (04) | Any one correct mathematical calculation mentioned in level 1 (03) | Correctly calculating the electric flux through any two faces of gaussian surface by definition (02) | Correctly calculating the electric flux through anyone face of gaussian surface by definition (01) | Wrong answer (0) |
| | Figure | Correct labelled figure (01) | Partially correct figure (0.5) | Wrong answer (0) | | | |
| 3(b) | Data | Correct data (01) | Partially correct data (0.5) | Wrong answer (0) | | | |
| | Calculation of electrical energy supplied to electric heater | Correct calculation and correct answer and unit (04) | Partially correct calculation (03) | Any One correct mathematical step (02) | Some relevant step e.g. calculation of current (01) | Wrong answer (0) | |

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| 4(a) | Principle of AC generator | Correctly stating principle (01) | Partially correct (0.5) | Wrong answer (0) | | | |
| | Construction of AC generator | Correctly stating construction OR Correctly labelled figure (01) | Partially correct (0.5) | Wrong answer (0) | | | |
| | Working of AC generator | Correct description of AC generator (02) | Partially correct (01) | Some relevant information (0.5) | Wrong answer (0) | | |
| | Derivation of induced emf formula | Correctly deriving formula for induced emf (03) | Partially correct derivation (02) | Two correct mathematical steps in derivation (01) | Wrong answer (0) | | |
| 4 (b) | (i) Calculation of current | Correct calculation with correct answer (02) | Partially correct (01) | Only writing correct formula (0.5) | Wrong answer (0) | | |
| | (ii) Calculation of phase angle | Correct calculation with correct answer (02) | Partially correct (01) | Only writing correct formula (0.5) | Wrong answer (0) | | |
| | (iii) Calculation of power consumed | Correct calculation with correct answer (02) | Partially correct (01) | Only writing correct formula (0.5) | Wrong answer (0) | | |
| 5 (a) | Description of LASER | Correctly describing LASER e.g. characteristic of LASER etc. (02) | Partially correct (01) | Some correct relevant information (0.5) | Wrong answer (0) | | |
| | Principle of LASER | Correctly stating principle (02) | Partially correct (01) | Some relevant information (0.5) | Wrong answer (0) | | |
| | Operation of LASER | Correctly describing operation of LASER e.g. explaining population inversion and LASER action with figures etc (04) | correctly description at least one term given in level 1 (03) | Partial correct description of all terms given in level 1 (02) | Some relevant information (01) | Wrong answer (0) | |
| 5 (b) | Calculation of Mass defect of Helium isotope | Correctly calculating Mass defect (02) | Partially correct (01) | Only writing correct formula (0.5) | Wrong answer (0) | | |
| | Calculation of binding energy of Helium isotope | Correctly calculating binding energy (02) | Partially correct (01) | Only writing correct formula (0.5) | Wrong answer (0) | | |
| | Calculation of binding energy per nucleon | Correctly calculating binding energy per nucleon (01) | Partially correct (0.5) | Wrong answer (0) | | | |

**Note: All the markers must know the solutions of all the question items of the question paper before starting marking.**