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ORIGINAL SYLLABUS 2020-21	REVISED SYLLABUS 2020-21	DELETED PORTIONS
Unit I: Electrostatics 24 Periods **Chapter–1: Electric Charges and Fields** Electric Charges; Conservation of charge, Coulomb's law-force between two point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet and uniformly charged thin spherical shell (field inside and outside). **Chapter–2: Electrostatic Potential and Capacitance** Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor. **Unit II: Current Electricity** **18 Periods** **Chapter–3: Current Electricity** Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation	**Unit I: Electrostatics 23 Periods** **Chapter–1: Electric Charges and Fields** Electric Charges; Conservation of charge, Coulomb's law-force between two-point charges, forces between multiple charges; superposition principle and continuous charge distribution. Electric field, electric field due to a point charge, electric field lines, electric dipole, electric field due to a dipole, torque on a dipole in uniform electric field. Electric flux, statement of Gauss's theorem and its applications to find field due to infinitely long straight wire, uniformly charged infinite plane sheet **Chapter–2: Electrostatic Potential and Capacitance** Electric potential, potential difference, electric potential due to a point charge, a dipole and system of charges; equipotential surfaces, electrical potential energy of a system of two point charges and of electric dipole in an electrostatic field. Conductors and insulators, free charges and bound charges inside a conductor. Dielectrics and electric polarisation, capacitors and capacitance, combination of capacitors in series and in parallel, capacitance of a parallel plate capacitor with and without dielectric medium between the plates, energy stored in a capacitor. **Unit II: Current Electricity** **15 Periods** **Chapter–3: Current Electricity** Electric current, flow of electric charges in a metallic conductor, drift velocity, mobility and their relation	**Chapter-1 Electric charges and fields** uniformly charged thin spherical shell (field inside and outside). **Chapter-3 Current Electricity**

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with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity, Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors; temperature dependence of resistance. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel, Kirchhoff's laws and simple applications, Wheatstone bridge, metre bridge. Potentiometer - principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell.	with electric current; Ohm's law, electrical resistance, V-I characteristics (linear and non-linear), electrical energy and power, electrical resistivity and conductivity; temperature dependence of resistance. Internal resistance of a cell, potential difference and emf of a cell, combination of cells in series and in parallel, Kirchhoff's laws and simple applications, Wheatstone bridge, metre bridge(qualitative ideas only) Potentiometer - principle and its applications to measure potential difference and for comparing EMF of two cells; measurement of internal resistance of a cell(qualitative ideas only)	Carbon resistors, colour code for carbon resistors; series and parallel combinations of resistors
Unit III: Magnetic Effects of Current and Magnetism 22 Periods	**Unit III: Magnetic Effects of Current and Magnetism 16 Periods**	
Chapter–4: Moving Charges and Magnetism	**Chapter–4: Moving Charges and Magnetism**	**Chapter-4 Moving Charges and Magnetism**
Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to current carrying circular loop.	Concept of magnetic field, Oersted's experiment. Biot - Savart law and its application to current carrying circular loop.	
Ampere's law and its applications to infinitely long straight wire. Straight and toroidal solenoids (only qualitative treatment), force on a moving charge in uniform magnetic and electric fields, Cyclotron.	Ampere's law and its applications to infinitely long straight wire. Straight and toroidal solenoids (only qualitative treatment), force on a moving charge in uniform magnetic and electric fields	Cyclotron
Force on a current-carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere, torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.	Force on a current-carrying conductor in a uniform magnetic field, force between two parallel current-carrying conductors-definition of ampere, torque experienced by a current loop in uniform magnetic field; moving coil galvanometer-its current sensitivity and conversion to ammeter and voltmeter.	
Chapter–5: Magnetism and Matter	**Chapter–5: Magnetism and Matter**	
Current loop as a magnetic dipole and its magnetic dipole moment, magnetic dipole moment of a	Current loop as a magnetic dipole and its magnetic dipole moment,	**Chapter-5 Magnetism and Matter**

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revolving electron, magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field; bar magnet as an equivalent solenoid, magnetic field lines; earth's magnetic field and magnetic elements. Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths, permanent magnets.	magnetic dipole moment of a revolving electron, bar magnet as an equivalent solenoid, magnetic field lines; earth's magnetic field and magnetic elements.	magnetic field intensity due to a magnetic dipole (bar magnet) along its axis and perpendicular to its axis, torque on a magnetic dipole (bar magnet) in a uniform magnetic field; Para-, dia- and ferro - magnetic substances, with examples. Electromagnets and factors affecting their strengths, permanent magnets.
Unit IV: Electromagnetic Induction and Alternating Currents 20 Periods **Chapter–6: Electromagnetic Induction** Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz's Law, Eddy currents. Self and mutual induction. **Chapter–7: Alternating Current** Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits, power factor, wattless current. AC generator and transformer.	**Unit IV: Electromagnetic Induction and Alternating Currents 19 Periods** **Chapter–6: Electromagnetic Induction** Electromagnetic induction; Faraday's laws, induced EMF and current; Lenz's Law, Eddy currents. Self and mutual induction. **Chapter–7: Alternating Current** Alternating currents, peak and RMS value of alternating current/voltage; reactance and impedance; LC oscillations (qualitative treatment only), LCR series circuit, resonance; power in AC circuits AC generator and transformer.	**Chapter-7 Alternating Current** power factor, wattless current.
Unit V: Electromagnetic waves 04 Periods **Chapter–8: Electromagnetic Waves** Basic idea of displacement current, Electromagnetic waves, their characteristics, their Transverse nature (qualitative ideas only). Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.	**Unit V: Electromagnetic waves 2 Periods** **Chapter–8: Electromagnetic Waves** Electromagnetic waves, their characteristics, their Transverse nature (qualitative ideas only). Electromagnetic spectrum (radio waves, microwaves, infrared, visible, ultraviolet, X-rays, gamma rays) including elementary facts about their uses.	**Chapter 8 Electromagnetic Waves** Basic idea of displacement current,
Unit VI: Optics 27 Periods **Chapter–9: Ray Optics and Optical Instruments** Ray Optics: Reflection of light, spherical mirrors, mirror formula,	**Unit VI: Optics 18 Periods** **Chapter–9: Ray Optics and Optical Instruments** Ray Optics:	**Chapter 9 Ray Optics and Optical Instruments** Reflection of light, spherical mirrors,

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refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lensmaker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction of light through a prism. Scattering of light - blue colour of sky and reddish apprearance of the sun at sunrise and sunset. Optical instruments: Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. **Chapter–10: Wave Optics** Wave optics: Wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, diffraction due to a single slit, width of central maximum, resolving power of microscope and astronomical telescope, polarisation, plane polarised light, Brewster's law, uses of plane polarised light and Polaroids. **Unit VII: Dual Nature of Radiation and Matter 08 Periods** **Chapter–11: Dual Nature of Radiation and Matter** Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light. Experimental study of photoelectric effect Matter waves-wave nature of particles, de-Broglie relation, Davisson-Germer experiment (experimental details should be omitted; only conclusion should be explained).	Refraction of light, total internal reflection and its applications, optical fibres, refraction at spherical surfaces, lenses, thin lens formula, lensmaker's formula, magnification, power of a lens, combination of thin lenses in contact, refraction of light through a prism. Optical instruments: Microscopes and astronomical telescopes (reflecting and refracting) and their magnifying powers. **Chapter–10: Wave Optics** Wave optics: Wave front and Huygen's principle, reflection and refraction of plane wave at a plane surface using wave fronts. Proof of laws of reflection and refraction using Huygen's principle. Interference, Young's double slit experiment and expression for fringe width, coherent sources and sustained interference of light, diffraction due to a single slit, width of central maximum **Unit VII: Dual Nature of Radiation and Matter 7 Periods** **Chapter–11: Dual Nature of Radiation and Matter** Dual nature of radiation, Photoelectric effect, Hertz and Lenard's observations; Einstein's photoelectric equation-particle nature of light. Experimental study of photoelectric effect Matter waves-wave nature of particles, de-Broglie relation	(recapitulation) mirror formula , Scattering of light - blue colour of sky and reddish appearance of the sun at sunrise and sunset. resolving power of microscope and astronomical telescope, polarisation, plane polarised light, Brewster's law, uses of plane polarised light and Polaroids. **Chapter-11 Dual Nature of radiation and matter** Davisson-Germer experiment

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Unit VIII: Atoms and Nuclei 15 Periods	**Unit VIII: Atoms and Nuclei 11 Periods**	
Chapter–12: Atoms	**Chapter–12: Atoms**	
Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.	Alpha-particle scattering experiment; Rutherford's model of atom; Bohr model, energy levels, hydrogen spectrum.	
Chapter–13: Nuclei	**Chapter–13: Nuclei**	**Chapter 13 Nuclei**
Composition and size of nucleus, Radioactivity, alpha, beta and gamma particles/rays and their properties; radioactive decay law, half life and mean life.	Composition and size of nucleus Nuclear force	Radioactivity, alpha, beta and gamma particles/rays and their properties; radioactive decay law, half life and mean life binding energy per nucleon and its variation with mass number
Mass-energy relation, mass defect; binding energy per nucleon and its variation with mass number;	Mass-energy relation, mass defect,	
nuclear fission, nuclear fusion.	nuclear fission, nuclear fusion.	
Unit IX: Electronic Devices 12 Periods	**Unit IX: Electronic Devices 7 Periods**	
Chapter–14: Semiconductor Electronics: Materials, Devices and Simple Circuits	**Chapter–14: Semiconductor Electronics: Materials, Devices and Simple Circuits**	**Chapter 14 Semiconductor Electronics: Materials, Devices and Simple Circuits**
Energy bands in conductors, semiconductors and insulators (qualitative ideas only)	Energy bands in conductors, semiconductors and insulators (qualitative ideas only)	
Semiconductor diode - I-V characteristics in forward and reverse bias, diode as a rectifier; Special purpose p-n junction diodes: LED, photodiode, solar cell and Zener diode and their characteristics, zener diode as a voltage regulator.	Semiconductor diode - I-V characteristics in forward and reverse bias, diode as a rectifier; Special purpose p-n junction diodes: LED, photodiode, solar cell.	Zener diode and their characteristics, zener diode as a voltage regulator.
PRACTICALS (Total Periods 60)	**PRACTICALS Total Periods: 32**	**Practicals:**
The record to be submitted by the students at the time of their annual examination has to include:	The record to be submitted by the students at the time of their annual examination has to include:	
□ Record of at least 12 Experiments [with 6 from each section], to be performed by the students.	□ Record of at least 8 Experiments [with 4 from each section], to be performed by the students.	
□ Record of at least 6 Activities [with 3 each from section A and section B], to be performed by the students.	□ Record of at least 6 Activities [with 3 each from section A and section B], to be demonstrated by teacher	
□ The Report of the project to be carried out by the students.		No investigatory project and Activity to be demonstrated
Evaluation Scheme	**Evaluation Scheme**	
Time Allowed: Three hours Max. Marks: 30	Time Allowed: Three hours Max. Marks: 30	8 experiments (clubbed based on skills) in place of 12

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Two experiments one from each section 7+7 Marks Practical record [experiments and activities] 5 Marks One activity from any section 3 Marks Investigatory Project 3 Marks Viva on experiments, activities and project 5 Marks Total 30 marks Experiments SECTION–A 1. To determine resistivity of two / three wires by plotting a graph for potential difference versus current. 2. To find resistance of a given wire / standard resistor using metre bridge. 3. To verify the laws of combination (series) of resistances using a metre bridge. OR To verify the laws of combination (parallel) of resistances using a metre bridge. 4. To compare the EMF of two given primary cells using potentiometer. 5. To determine the internal resistance of given primary cell using potentiometer. 6. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit. 7. To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter of desired range and to verify the same. OR To convert the given galvanometer (of known resistance and figure of merit) into an ammeter of desired range and to verify the same. 8. To find the frequency of AC mains with a sonometer.	Two experiments one from each section 8+8 marks Practical record [experiments and activities] 7 marks Viva on experiments, and activities 7 marks Total 30 marks Experiments SECTION–A 1. To determine resistivity of two / three wires by plotting a graph for potential difference versus current. 2. To find resistance of a given wire / standard resistor using metre bridge. OR To verify the laws of combination (series) of resistances using a metre bridge. OR To verify the laws of combination (parallel) of resistances using a metre bridge. 3. To compare the EMF of two given primary cells using potentiometer. OR To determine the internal resistance of given primary cell using potentiometer. 4. To determine resistance of a galvanometer by half-deflection method and to find its figure of merit. 5. To convert the given galvanometer (of known resistance and figure of merit) into a voltmeter of desired range and to verify the same. OR To convert the given galvanometer (of known resistance and figure of merit) into an ammeter of desired range and to verify the same. 6. To find the frequency of AC mains with a sonometer.	

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Activities 1. To measure the resistance and impedance of an inductor with or without iron core. 2. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter. 3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source. 4. To assemble the components of a given electrical circuit. 5. To study the variation in potential drop with length of a wire for a steady current. 6. To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.	**Activities** 1. To measure the resistance and impedance of an inductor with or without iron core. 2. To measure resistance, voltage (AC/DC), current (AC) and check continuity of a given circuit using multimeter. 3. To assemble a household circuit comprising three bulbs, three (on/off) switches, a fuse and a power source. 4. To assemble the components of a given electrical circuit. 5. To study the variation in potential drop with length of a wire for a steady current. 6. To draw the diagram of a given open circuit comprising at least a battery, resistor/rheostat, key, ammeter and voltmeter. Mark the components that are not connected in proper order and correct the circuit and also the circuit diagram.	
Experiments SECTION-B 1. To find the value of v for different values of u in case of a concave mirror and to find the focal length. 2. To find the focal length of a convex mirror, using a convex lens. 3. To find the focal length of a convex lens by plotting graphs between u and v or between 1/u and 1/v. 4. To find the focal length of a concave lens, using a convex lens. 5. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation. 6. To determine refractive index of a glass slab using a travelling microscope. 7. To find refractive index of a liquid by using convex lens and plane mirror.	**Experiments SECTION-B** 1. To find the focal length of a convex lens by plotting graphs between u and v or between 1/u and 1/v. 2. To find the focal length of a convex mirror, using a convex lens. OR To find the focal length of a concave lens, using a convex lens. 3. To determine angle of minimum deviation for a given prism by plotting a graph between angle of incidence and angle of deviation. 4. To determine refractive index of a glass slab using a travelling microscope. 5. To find refractive index of a liquid by using convex lens and plane mirror.	**Experiments SECTION-B** To find the value of v for different values of u in case of a concave mirror and to find the focal length.

8. To draw the I-V characteristic curve for a p-n junction diode in forward bias and reverse bias. 9. To draw the characteristic curve of a zener diode and to determine its reverse breaks down voltage. **Activities** 1. To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items. 2. Use of multimeter to see the unidirectional flow of current in case of a diode and an LED and check whether a given electronic component (e.g., diode) is in working order. 3. To study effect of intensity of light (by varying distance of the source) on an LDR. 4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab. 5. To observe polarization of light using two Polaroids. 6. To observe diffraction of light due to a thin slit. 7. To study the nature and size of the image formed by a (i) convex lens, (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror). 8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses. Suggested Investigatory Projects 1. To study various factors on which the internal resistance/EMF of a cell depends. 2. To study the variations in current flowing in a circuit containing an LDR because of a variation in (a) the power of the incandescent lamp, used to 'illuminate' the LDR (keeping all the lamps at a fixed distance).	6. To draw the I-V characteristic curve for a p-n junction diode in forward bias and reverse bias. **Activities** 1. To identify a diode, an LED, a resistor and a capacitor from a mixed collection of such items. 2. Use of multimeter to see the unidirectional flow of current in case of a diode and an LED and check whether a given electronic component (e.g., diode) is in working order. 3. To study effect of intensity of light (by varying distance of the source) on an LDR. 4. To observe refraction and lateral deviation of a beam of light incident obliquely on a glass slab. 5. To observe polarization of light using two Polaroids. 6. To observe diffraction of light due to a thin slit. 7. To study the nature and size of the image formed by a (i) convex lens, (ii) concave mirror, on a screen by using a candle and a screen (for different distances of the candle from the lens/mirror). 8. To obtain a lens combination with the specified focal length by using two lenses from the given set of lenses.	To draw the characteristic curve of a zener diode and to determine its reverse breaks down voltage.

(b) the distance of a incandescent lamp (of fixed power) used to 'illuminate' the LDR. 3. To find the refractive indices of (a) water (b) oil (transparent) using a plane mirror, an equi convex lens (made from a glass of known refractive index) and an adjustable object needle. 4. To design an appropriate logic gate combination for a given truth table. 5. To investigate the relation between the ratio of (i) output and input voltage and (ii) number of turns in the secondary coil and primary coil of a self-designed transformer. 6. To investigate the dependence of the angle of deviation on the angle of incidence using a hollow prism filled one by one, with different transparent fluids. 7. To estimate the charge induced on each one of the two identical styrofoam (or pith) balls suspended in a vertical plane by making use of Coulomb's law. 8. To study the factor on which the self-inductance of a coil depends by observing the effect of this coil, when put in series with a resistor/(bulb) in a circuit fed up by an A.C. source of adjustable frequency. 9. To study the earth's magnetic field using a tangent galvanometer.		