| a. The extensive use of the calculus (differentiation and integration) and the use of comp equations should not be required to solve the theoretical and practical problems. b. Questions may contain concepts and phenomena not contained in the Syllabus but so the questions on that candidates withou previous knowledge of these topics would not can use of the calculus control to the candidates. c. The original texts of the problems have to be set in the SI units. C. Theoretical Part The first column contains the main entries while the second column contains comments a 1. Mechanics a) Foundation of kinematics of a point mass b) Newton's laws, inertial systems c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Closed and open systems, momentum and energy, work, d) Conservation of energy, conservation of linear momentum, inpulse c) Centripetal acceleration, Kepler's laws c c) Couple b) Accelerated reference systems, inertial forces c c) Couple b) Accelerated reference systems, inertial forces c c) External on themata, kinetic energy of a rotating body around the lined add, momenta, kinetic energy of a rotating body around the effect add, momenta, kinetic energy, absolute c) External engenture c) Accelerated reference systems, inertial forces c) Solved one by an expanding gas limited to isothermal and adiabatic phenomenes c) forcesses c) entropy data baset of a perfect gas, absolute c) Harmonic oscillations c) Harmonic oscillations c) Harmonic oscillat | | | |
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| a. The extensive use of the calculus (differentiation and integration) and the use of comp equations should not be required to solve the theoretical and practical problems. b. Ouseitoms may contain concepts and phenomen not contained in the Syllabus but su the questions so that candidates without previous knowledge of these topics would not are used then careful instructions must be given to the candidates. d. The original texts of the problems have to be set in the SI units. Theoretical Part The first column contains the main entries while the second column contains comments a 1. Mechanics a) Foundation of kinematics of a point mass b) Newton's laws, inertial systems c) Closed and open systems, momentum and energy, work, power d) Conservation of energy, conservation of linear momentum, inpulse c) Elastic forces, frictional forces, the law of gravitation, potential energy and work in a gravitational field d) Centripetal acceleration, rotation, angular velocity, angular cacceleration of systems, inertial systems cacceleration of field Bodies a) Statics, center of mass, torque b) Motion of rigid bodies, translation, rotation, angular velocity, angular cacceleration, orservation of angular momentum cacceleration, conservation of angular momentum cacceleration, conservation of angular momentum cacceleration, conservation of angular momentum c) External and internal forces, equation of motion of a rigid body around the fixed and the continuity law. 4. Thermodynamics and Molecular Physics b) Modio of a perfect gas, pressure and molecular kinetic energy, Avogadros number, equation of state of a perfect gas, absolute chermodynamics b) Model of a perfect gas, pressure and molecular kinetic energy, Avogadros number, equation of state of a perfect gas, absolute chermodynamics and Molecular Physics c) Superposition of harmonic waves, a) Harmonic oscillations, equation of harmonic oscillations, equation of harmonic oscillations, equation of harmonic oscillations, equation of harmonic | | | |
| Theoretical Part The first column contains the main entries while the second column contains comments a Mechanics a) Foundation of kinematics of a point mass Vector description of the p Vector descrip | vlex numbers or solving differential ufficient information must be given in to be at a disadvantage. dominate a problem. If such devices | | |
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| c) Closed and open systems, momentum and energy, work, power d) Conservation of energy, conservation of linear momentum, impulse e) Elastic forces, frictional forces, the law of gravitation, potential energy and work in a gravitational field Hooke's law, coefficient of static and kinetic, choice c f) Centripetal acceleration, Kepler's laws 2. Mechanics of Rigid Bodies a) Statics, center of mass, torque b) Motion of rigid bodies, translation, rotation, angular velocity, angular acceleration, conservation of angular momentum c) External and internal forces, equation of motion of a rigid body around the fixed axis, moment of inertia, kinetic energy of a rotating body d) Accelerated reference systems, inertial forces Knowk require 3. Hydromechanics No specific questions will be set on this but students would be expected to know the eleand the continuity law. 4. Thermodynamics and Molecular Physics a) Internal energy, work and heat, first and second laws of thermodynamics b) Model of a perfect gas, pressure and molecular kinetic energy, Avogadro's number, equation of state of a perfect gas, absolute temperature c) Work done by an expanding gas limited to isothermal and adiabatic phenomene etc. c) Work done by an expanding gas limited to isothermal and adiabatic processes a) Harmonic oscillations, equation of state of a perfect gas, absolute temperature c) Superposition of harmonic waves, interference, beats, isotration, permets in pinciple c) Superposition of harmonic waves, interference, beats, isotration, permets of velocity of sound an only, propagation of waves in homogueous and rays since priorize. c) Superposition of harmonic waves, interference, beats, stransverse and longitudinat waves, interference, beats, stratic | | | |
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| e) Elastic forces, frictional forces, the law of gravitation, potential energy and work in a gravitational field f | | | |
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| b) Motion of rigid bodies, translation, rotation, angular velocity, angular acceleration, conservation of angular momentum Conservation of angular momentum c) External and internal forces, equation of motion of a rigid body around the fixed axis, moment of inertia, kinetic energy of a rotating body Paralle advantage of the second se | es, conditions of equilibrium of bodies | | |
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| d) Accelerated reference systems, inertial forces Knowly require 3. Hydromechanics No specific questions will be set on this but students would be expected to know the ele and the continuity law. 4. Thermodynamics and Molecular Physics Thermal equation and quantities and quantities and quantities and quantities the processes of the processes a) Internal energy, work and heat, first and second laws of thermodynamics Thermal equation of state of a perfect gas, absolute emperature b) Model of a perfect gas, pressure and molecular kinetic energy, Avogadro's number, equation of state of a perfect gas, absolute Also molecular homeme etc. c) Work done by an expanding gas limited to isothermal and adiabatic Proof of the not required g) The Carnot cycle, thermodynamic efficiency, reversible and irreversible processes, entropy (statistical approach), Boltzmann factor Entropy as changes an only, propagation of waves, innear polarization, the classical Doppler effect, sound waves a) Harmonic oscillations, equation of classical Doppler effect, sound waves Displacement in a progressive wave and underst the wave, measurements of velocity of sound and only, propagation of waves in homogeneous and refraction, Fermat's principle c) Superposition of harmonic waves, interference, beats, standing waves Realization that intensity of wave is proportional to avays is not required but candidates should ha waves can be made from addition of simple sinus hardy from addition of simple sinus hardy is is not required but candidates should ha waves can be made from addition of simple sinually as is not required | Parallel axes theorem (Steiner's theorem), additivity of the moment of inertia | | |
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| a) Internal energy, work and heat, first and second laws of thermodynamics Thermal eq and quantit hermodynamics b) Model of a perfect gas, pressure and molecular kinetic energy, Avogadro's number, equation of state of a perfect gas, absolute temperature Also molecc phenomena etc. c) Work done by an expanding gas limited to isothermal and adiabatic processes Proof of the not required d) The Carnot cycle, thermodynamic efficiency, reversible and irreversible processes, entropy (statistical approach), Boltzmann factor Entropy as changes an 6. Oscillations and waves a) Harmonic oscillation, equation of harmonic oscillation Solution of the equation for harmonic motion, attee the waves, transverse and longitudinal waves linear polarization, the classical Doppler effect, sound waves Displacement in a progressive wave and underst the wave, measurements of velocity of sound and only, propagation of waves in homogeneous and refraction, Fermat's principle c) Superposition of harmonic waves, standing waves Realization that intensity of wave is proportional 1 analysis is not required but candidates should ha waves can be made from addition of simple sinus Interference due to thin films and other simple sy superposition of waves from secondary sources (S. Electric Charge and Electric Field a) Conservation of charge, Coulomb's law Counct law sected to viscuity of the sinus films and the simple sinus interference due to thin films and other simple sinus interference due to thin films and other simple sinus interference due to thin films and other simple sinus interference due to thin films and other simple sinus interference due to thin films and other simple sinu | | | |
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| c) Work done by an expanding gas limited to isothermal and adiabatic processes Proof of the not required d) The Carnot cycle, thermodynamic efficiency, reversible and irreversible processes, entropy (statistical approach), Boltzmann factor Entropy as changes ar 5. Oscillations and waves a) Harmonic oscillations, equation of harmonic oscillation Solution of the equation for harmonic motion, atter the waves, transverse and longitudinal waves Displacement in a progressive wave and underst the wave, measurements of velocity of sound and only, propagation of waves in homogeneous and refraction, Fermat's principle c) Superposition of harmonic waves, standing waves Realization that intensity of wave is proportional f analysis is not required but candidates should ha waves can be made from addition of simple sinus standing waves 6. Electric Charge and Electric Field a) Conservation of charge, Coulomb's law | rgy, Also molecular approach to such simple phenomena in liquids and solids as boiling, meltir etc. | | |
| d) The Carnot cycle, thermodynamic efficiency, reversible and irreversible processes, entropy (statistical approach), Boltzmann factor Entropy as changes ar changes are changes ar | adiabatic Proof of the equation of the adiabatic process is not required | | |
| a) Harmonic oscillations, equation of harmonic oscillation Solution of the equation for harmonic motion, atter the maxes, incar polarization, the classical Doppler effect, sound waves b) Harmonic matrix of the equation of waves, incar polarization, the classical Doppler effect, sound waves Displacement in a progressive wave and underst the wave, measurements of velocity of sound and only, propagation of waves in homogeneous and refraction, Fermat's principle c) Superposition of harmonic waves, interference, beats, standing waves Realization that intensity of wave is proportional 1 analysis is not required but candidates should ha waves can be made from addition of simple sinus interference due to thin films and other simple sy superposition of waves from secondary sources in the secondary so | In the second se | | |
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| c) Superposition of harmonic waves, coherent waves, interference, beats, standing waves 6. Electric Charge and Electric Field a) Conservation of charge, Coulomb's law Realization that intensity of wave is proportional I analysis is not required but candidates should ha waves can be made from addition of simple say superposition of waves from secondary sources (Conservation of charge, Coulomb's law Conservation of charge, Coulomb's law Conservation of charge, Coulomb's law Conservation of charge, Coulomb's law | Displacement in a progressive wave and understanding of graphical representation of the wave, measurements of velocity of sound and light, Doppler effect in one dimension only, propagation of waves in homogeneous and isotropic media, reflection and refraction, Fermat's principle | | |
| B. Electric Charge and Electric Field a) Conservation of charge, Coulomb's law | Realization that intensity of wave is proportional to the square of its amplitude. Fourier inalysis is not required but candidates should have some understanding that complex vaves can be made from addition of simple sinusoidal waves of different frequencies. Interference due to thin films and other simple systems (final formulae are not required) superposition of waves from secondary sources (diffraction) | | |
| a) Conservation of charge, Coulomb's law | | | |
| | | | |
| b) Electric field, potential, Gauss' law Gauss iaw contined to simple s plate etc., electric dipole moment | symmetric systems like sphere, cylinde nt | | |
| c) Capacitors, capacitance, dielectric constant, energy density of electric field | | | |
| b) Electric field, potential, Gauss' law Gauss iaw connee to simple s plate etc., electric dipole moment c) Capacitors, capacitance, dielectric constant, energy | symmetric systems like sphere, cylinde nt | | |

| a) Current, resistance, internal resistance of source, Ohm's law, Kirchhoff's laws, work and power of direct and alternating currents, Joule's law | Simple cases of circuits containing non-ohmic devices with known V-I characteristics | | | |
|---|---|--|---|--|
| b) Magnetic field (B) of a current, current in a magnetic field, Lorentz force | Particles in a magnetic field, simple applications like cyclotron, magnetic dipole moment | | | |
| c) Ampere's law | Magnetic field of simple symmetric systems like straigh wire, circular loop and long solenoid | | | |
| d) Law of electromagnetic induction, magnetic flux, Lenz's law, self- induction, inductance, permeability, energy density of magnetic field | | | | |
| e) Alternating current, resistors, inductors and capacitors in AC- circuits, voltage and current (parallel and series) resonances | Simple AC-circuits, time constants, final formulae for parameters of concrete resonance circuits are not required | | | |
| 8. Electromagnetic waves | | | | |
| a) Oscillatory circuit, frequency of oscillations, generation by feedback | and resonance | | | |
| b) Wave optics, diffraction from one and two slits, diffraction grating, regrating, Bragg reflection, | esolving power o | solving power of a | | |
| c) Dispersion and diffraction spectra, line spectra of gases | | | | |
| d) Electromagnetic waves as transverse waves, polarization by reflecti | ion, polarizers | | Superposition of polarized waves | |
| e) Resolving power of imaging systems | | | | |
| f) Black body, Stefan-Boltzmanns law | | | Planck's formula is not required | |
| 9. Quantum Physics | | | | |
| a) Photoelectric effect, energy and impulse of the photon | Einstein's formula is required | | | |
| b) De Broglie wavelength, Heisenberg's uncertainty principle | | | | |
| 11. Matter | | | | |
| a) Simple applications of the Bragg equation | | | | |
| b) Energy levels of atoms and molecules (qualitatively), emission, absorb | orption, spectrur | n of hydrog | en like atoms | |
| c) Energy levels of nuclei (qualitatively), alpha-, beta- and gamma-dec decay, components of nuclei, mass defect, nuclear reactions | ays, absorption | of radiation | , halflife and exponential | |
| 3. Practical Part | | | | |
| Adopted in London-Harrow, United Kingdom, July 1986 | | | | |
| Ine Ineoretical Part of the Syllabus provides the basis for all the expe experimental contest should contain measurements. | erimental probler | ns. The ex | perimental problems given in t | |
| Additional requirements: | | | | |
| Candidates must be aware that instruments affect measurements Knowledge of the most common experimental techniques for meas Knowledge of commonly used simple laboratory instruments and and ammeters, potentiometers, diodes, transistors, simple optical Ability to use, with the help of proper instruction, some soph oscilloscope, counter, ratemeter, signal and function generate amplifier, integrator, differentiator, power supply, universal (analog Proper identification of error sources and estimation of their influe Absolute and relative errors, accuracy of measuring instrume measurements, error of a quantity given as a function of measure Transformation of a dependence to the linear form by appropriate points. | asuring physical devices such a devices and so histicated instru ors, analog-to-d g and digital) vol noce on the final nnts, error of a d quantities. e choice of varial | quantities r s calibers, on. ments and igital convi t-, ohm- an result(s). single me bles and fitt | nentioned in Part A. thermometers, simple volt-, of devices such as double-be arter connected to a comput d ammeters. asurement, error of a series ing a straight line to experimer | |
| Proper use of the graph paper with different scales (for example p Correct rounding off and expressing the final result(s) and error(s Standard knowledge of safety in laboratory work. (Nevertheless, appropriate warnings should be included into the text of the problem) | oolar and logarith) with correct num , if the experime em). | nmic papers mber of sig ntal set-up | s). nificant digits. contains any safety hazards | |