Model Paper

Roll No. …….

GOVERNMENT COLLEGE UNIVERSITY, FAISALABAD

QUESTION PAPER FOR EXTERNAL EXAMINATIONS

B Sc (Composite) Annual -2012: Subject: Physics

Course Title: Mechanics, Waves, Oscilliation & optics Paper: A

Maximum Marks: 50 Time Allowed: 03:00 Hours Pass Marks: 33 %(16.5)

Note:- *Attempt FIVE questions in all, at least TWO questions from each section*

All question carry equal marks.

SECTION-I

Q-1 a) Explain the vector triple product and show that

$$\vec{A} \times (\vec{B} \times \vec{C}) = (\vec{A}.\vec{C})\,\vec{B} - (\vec{A}.\vec{B})\,\vec{C}$$

b) b) if sc afar funckion $v = 1$ where $\vec{r} = x\,\mathbf{i} + y\,\mathbf{j} + z\,\mathbf{k}$

show that grad v= grad $\frac{(1)}{r} = -\frac{\mathbf{r}}{\mathbf{r}^3}$

Q-2 a) What is conical pendulum? Derive relation for its time period.

b) What is the greatest acceleration can be generated by a runner if the coefficient of static friction between the shoes and the roads is .95.

Q-3 a) State and prove Parallel Axis Theorem.

b) Find the rotational inertia of a solid rectangular plate about an axis passing through its centre and and perpendicular to its surface.

Q-4 a) Show that force exerted by a uniform thin spherical sheet of mass ‘M’ on a point mass ‘m’ when it is outside, is the same as if all the mass of the spherical shell were concentrated at its center.

b) At what altitude above the Earth’s surface the value of g is $3/4^{th}$ of its value at the surface of the earth?

Q-5 a) State the basic postulates of special theory of relativity and discuss relativity of time.

b) Derive Einstein’s Mass Energy equivalence.

Q-6 Write note any Two of the following:

1) Stock’s Theorem 2) Rocket Equation 3) Center of mass of a system of particles.

SECTION-II

Q-7 a) Prove that simple harmonic motion can be described as the projection of uniform circular motion along the diameter of a circle. Find the equation of displacement and velocity of the projection.

b) Prove that the circular motion can be regarded as combination of two identical simple harmonic motions with same amplitude but different in phase by 90°.

Q-8 a) Find the intensity resultant to by analytical treatment in double slit interface experiment and hence workout the conditions for maxima and minima.

b) A double slit experiment is performed with blue light of wavelength 512nm. The slits are 1.2 nm apart and the screen is 5.4m from the slits. How far apart are the bright fringes as seen on the screen?

Q-9 a) What is diffraction grating? Discuss about its dispersion and resolving power.

b) A certain grating has (10)4 slits with a spacing of d= 2.1 μm. It is illuminated with sodium light of Lemda=589 nm. Find the angular position of second and third order maxima.

Q-10 Write notes on any TWO of the following.

1) Physical Pendulum 2) Newton's Ring

3) Circular Polarization

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QUESTION PAPER FOR EXTERNAL EXAMINATIONS

B Sc (Composite) Annual -2012: Subject: Physics

Course Code: Phy-302 Course Title: Thermodynamics, Electricity& magnetisms

Time Allowed: 03:00 Hours Paper: B

Maximum Marks: 50 Pass Marks: 33 %(16.5)

Note:- *Attempt FIVE questions in all, Selecting One question from Section-I and FOUR* Question from Section – II.

SECTION-I

Q-1 a) State FIRST LAW OF THERMODYNAMICS and apply it to prove PVr = Constant for an ADIABTIC PROCESS.

b) A measured of amount of heat is added to $2x10^{-3}$ moles of particular ideal gas. As a result, Its volume changes from 63 to 113 cm^3 at constant pressure of 1 atmosphere. Calculate the changes In temperature which has taken place.

c) Explain why a thermo flask is double walled, evacuated and silvered?

Q-2 a) Discuss connection between Entropy and Second law of Thermodynamics in a comprehensive manner and state second law in terms of entropy.

b) Calculate efficiency of fossil fuels power plant that is run by the heat supplied by coal at the rate of 2968 MW to produce useful work at the rate of 755 MW.

c) What factors reduce the efficiency of a heat engine from its ideal value?

SECTION-II

Q-3 a) State the SHELL THEOREMS for a shell of charge having uniform surface charge density and total charge q. Prove these theorems by using Gauss's Law.

b) A hypothetical closed cylinder of radius R is immersed in a uniform electric field E, the cylinder axis being parallel to the field. Find $Ø_E$ for this closed surface.

c) How will you calculate the total charge on a spherical body if ð and R of the sphere are given?

Q-4 a) Discuss the electric potential energy and derive an expression for the change in potential energy between two points.

b) Consider a point charge q = 15 nC and take V=0 at infinity. What is the radius of an equipotent Surface having a potential of 30 V due to charge q alone.

c) What is the effect on measured values of potential difference if we assume that potential of earth Is +100 V instead of zero?

Q-5 a) A potential difference V is applied across the length L of a conductor (with usual parameters R, p, E And J).Define current density J and relate. π (Ω ho)

1) J with p and E 2) E with V and L. Hence prove that p=R (A/l).

b) You are given a Nichrome wire of resistance 14.4. Ω (ohm). The wire is cut into
. half and the two halves are connected in parallel across 240-V line. Calculate power dissipated.

c) What type of temperature coefficient of resistivity is possessed by?

1. Carbon and 2. Copper. Explain your answer.

Q-6 a) Discuss Growth of charge in RC series circuit and derive an expression for
. current, charging the Capacitor.

b) The capacitor C charges through a resistance R. After how many time constant
. does the charge

drop to half of its initial value?

c) Explain why a resistance of a voltmeter should be very large as compared to the
. resistance across which the potential difference is to be measured.

Q-7 a) A loop of width D and resistance R is dragged with velocity v inside and perpendicular to magnetic Field B. As a result, an emf $\sum$ = BDv is induced in the loop. Show that the rate at which mechanical work will be done is $P= B^2D^2V^2/R$

b) A uniform magnetic field is normal to the plane of a circular loop 10.4 cm in diameter made of copper wire ($R=1.12\ 10_{\times 10}^{-3}\ \Omega$ .At what rate must the magnetic field change with time if an induced Current of 9.66 A is to appear in the loop.

c) Which quantities are measured in the units of 1) Weber 2) tesla-m^2.

How are these quantities related with each other?

Q-8 a) By using Biot-Savert law, derive an expression of magnetic field (intensity) at the center of a current Carrying circular loop.

b) A solenoid of certain diameter is 3.14 m long. It has five layers of windings of 850 turns each and Carries and carries a current of i= 5 A. What is B at its center?

c) What do the symbols E_o μ_o stand for? How are they related with some constant in free space?

Q-9 a) Derive an expression to calculate inductance per unit length of an air-cored solenoid of lengthe and having n turns per unit length.

b) What must be the magnitude of a uniform electric field if it is to have the same energy density as that possessed by a 0.50 T magnetic field.

c) Show that the unit of the expression N Φ_B /1s i comes out to be joule /amp².

Q-10 Write a note on any TWO of the followings.

a) Lines of force fields b) capacitors with Dielectric

c) Transformers d) Electromagnetic Waves Spectrum

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QUESTION PAPER FOR EXTERNAL EXAMINATIONS

B Sc (Composite) Annual -2012: Subject: Physics

Course Code: Phy-303 Course Title: Electronics, Modern physics & nuclear Physics

Time Allowed: 03:00 Hours Paper: C

Maximum Marks: 50 Pass Marks: 33 %(16.5)

Note:- *Attempt FIVE questions in all, selecting at least one question from Section-I and Three Question from Section – II.*

SECTION-I

Q-1 a) Describe the qualitatively the formation of energy bands in solid and their classification into metal, semiconductor, and insulator.

b) Give the use of P-N Junction diode as a full wave rectifier.

Q-2 a) Describe the input and output characteristics of an NPN transistor in common emitter configuration.

b) Draw the load line and show how it is used to select the optimum quiescent operating point?

Q-3 a) Draw the circuit diagram of a BISTABLE MULTIVIBRATOR and explain its working.

b) Write the mathematical notation, symbol, and truth table of NAND gate.

SECTION-II

Q-4 a) What is Compton Effect? Darien an expression for the change in wavelength of the scattered radiation in the in the Compton Effect.

b) X-Rays with ---- =100pm are scattered from carbon target. Determine the maximum shift in the wavelength -------- of the scattered radiation.

Given data: h=6.63*(10)-34 j.s c= .3*(10)8 (ms) - 1 M_e=9.11*(10)-31 kg

Q-5 a) What is de Broglie's hypothesis? Describe the Davison – Germer experiment to verify this hypothesis.

b) Calculate the de Broglie wavelength of an electron whose kinetic energy is 120eV.Given data: h=6.63*(10)-34 j.s M_e=9.11*(10)-31 kg

Q-6 a) State the Bohr postulates as applied to hydrogen atom. Derive relation for the total energy of electron orbiting around the nucleus in a hydrogen atom.

b) Calculate the ground state energy of electron in the hydrogen atom.

Given data: h=6.63*(10)-34 j.s c= .3*(10)8 (ms) - 1 R= 1.097*10)-7 m)-1

Q-7 a) How are X-Rays produced? Discuss the emission of continuous X-rays and characteristics X-rays from a metal.

b) Calculate the wavelength ---- for the continuous spectrum of X-Rays emitted When 35 keV electron beam fall on a molybdenum target. Given data: h=6.63*(10)-34 j.s c = .3*(10)8 (ms) - 1

Q-8 a) what is natural radioactivity? Define half life of a radioactive material and determine an expression For the half life relating it to decay constant.

b) The radionuclide $1x^{40}$ k decay at an absolute rate 'R' of 1600 counts per second. If there are 9.49*10)^{19} $_{40}$k atoms in a sample of potassium, calculate the half life in years of this nuclide.

Q-9 a) Discuss the stability of the nucleus. Describe the basic processes for the thermonuclear fusion reaction to occur.

b) Calculate the energy released by conversion completely of C^{12} into energy.

Given data: 1.a.m.u= 1.6605*10)^{27} - kg

Q-10 Write notes on the following:

1) He-Ne gas laser

2) Radioactive dating