NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI
FIRST YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY/ MATERIALS ENGINEERING)
ANNUAL EXAMINATION 2008
BATCH 2007-08

Time: 3 Hours

Dated: 11-10-2008
Max. Marks: 75/80

APPLIED PHYSICS- (MS-121)

Instructions: 1. Attempt any **FIVE** questions.
                2. All questions carry equal marks.

INSTRUCTIONS
i) Attempt five questions in All.
ii) All questions carry equal marks.

Q#1 (a) (i) Can an object accelerate if its speed is constant?   (3/3)
          (ii) Can an object accelerate if its velocity is constant?

     (b) Define uniform circular motion? Drive the relation of centripetal   (7/8)
          acceleration?

     (c) A particle travels with constant acceleration of -3m/s^2 at t=0,its   (5/5)
          velocity is 30m/s.
          i)   How far does the particle moves before turning around?
          ii)   At what time does it turn around.

Q#2 (a) State the following.   (4/4)
             (i) Angular momentum, (ii) Kinematics
     (b) State & prove that work energy theorem for non constant forces.   (7/8)
     (c) The coefficient of static friction between tires of a car & a dry road is   (4/4)
          0.62. The mass of the car is 1500Kg. what maximum braking force is
          obtainable.
          i) On a level road   ii)   On 8.6^o down grade

Q#3 (a) i) If a charge practical moves in a straight line through some region   (4/4)
          of space? Can you say that the magnetic field in that region is zero?
          ii) Find the electric field 40 cm from a charge of 7 x 10^{-5}C.
     (b) Find the electric field due to an infinite line of charge with uniform   (6/7)
          charge per unit length using Gauss's law.
     (c) An alpha particle (q=+e) in a nuclear accelerator moves from one   (5/5)
          terminal at a potential of Va=+6.5 x 10^6 V to another at a potential
          of Vb = o. (i) What is the corresponding change in potential energy
          of the system ? (ii) Assuming the terminals and their charges do not
          move and that no external force act on the system, what is the change
          in kinetic energy of the particle?

Q#4 (a) Define the following.
          i) Coulomb's Law   ii)Magnetic Intensity.   (5/5)
     (b) Explain paramagnetic substance and Ferro-magnetic substance?   (6/7)
     (c) A wire carries a current of 22A from east to west. Assume that at this   (4/4)
          location the magnetic field of the earth is horizontal directed from
          south to north & it has a magnitude of 0.5x10^{-4}T. Find the magnetic
          force on a 36 m length of wire.

P.T.O

Q#5 (a) What does LASER stand for? Discuss the characteristics of LASER. (5/6)

(b) If F= $3xy\mathbf{i} - y^2\mathbf{j}$. Evaluate $\int_c$ F. dr where C is the curve in xy plane, (5/5)
y= $2X^2$ from (0,0) to (1,2).

(c) If $\phi(x,y.z) = xy^2z$ & A=$xz\mathbf{i} - xy^2\mathbf{j} + yz^2\mathbf{k}$. (5/5)

Find $\dfrac{\partial^3(\phi\ A)}{\partial x^2 \partial z}$ At point (2, -1, 1).

Q#6 (a) (i) Is the base region much thinner or much wider than the collector & (4/4)
emitter region in transistor.
(ii) Which is the largest of the three transistor currents?

(b) Derive the relation b/w β_{DC} & α_{DC}? (6/7)

(c) Explain the formation of depletion region? (5/5)

Q#7 (a) In photoelectric effect, explain why the photoelectric current depends (5/5)
on the intensity of the light & stopping potential depends on the
frequency of the light but not on the intensity?

(b) An X – ray photon of wavelength 0.3Å is scattered through an angle (5/5)
45° by a loosely bound electron. Find the wavelength of the scattered
photon.

(c) A 2kg mass is set into a SHM on the end of the spring, with amplitude (5/6)
30 cm. the period is 3sec.
(i) Find the total energy of the spring mass system?
(ii) What is the speed of the mass when it is 20cm form equilibrium?

Q#8 (a) Under what circumstances does a nucleus emit an electron & a (4/4)
positron?

(b) What is Half Life? Find out the relation between Half Life and Decay (7/8)
constant?

(c) The activity of a certain radionuclide decreases to 15 % of its original (4/4)
value in 10 days. Find its half life.

Given Constant:

Planck's constant = h = 6.63×10^{-34}J
Permittivity of free space = ε_0 = 8.85×10^{-12} $C^2/N.m^2$

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Time: 3 Hours

Dated: 11-10-2008
Max. Marks: 80

APPLIED PHYSICS- (MS-154)

Instructions: 1. Attempt any **FIVE** questions.
2. All questions carry equal marks.

1

a) What is vector Triple Product? Show that $\vec{A} \times (\vec{B} \times \vec{C}) = (\vec{A}.\vec{C})\vec{B} - (\vec{A}.\vec{B})\vec{C}$.   8

b) Evaluate grad ϕ if $\phi = \ln |\vec{r}|$ 4

c) Show that $\nabla r^n = n r^{n-2} \vec{r}$ 4

2

a) Define "Line Integral of a vector"   6

b) Find the value of curl curl F.   4

c) If a particle is moving under the influence of force   6

$F = 3x^2 \hat{i} + (2xz - y) \hat{j} + z\hat{k}$ find the workdone $\int_c F.dr$

Where c is straight line from P_1 (0, 0, 0) to P_2 (2, 1, 3).

3

a) What is simple Harmonic Oscillator, what are the conditions and characteristics of S.H.M.   4

b) Prove that the motion of the body executing S.H.M in Mass Spring "Longitudinal Oscillation". Also obtain the expression for velocity and Acceleration in this case.   8

c) An oscillator while oscillating simple harmonically have velocities U_1 and U_2 and distances x_1 and x_2 from the equilibrium positions respectively, show that its frequency   4

$$\upsilon = \sqrt{\frac{U_1^2 - U_2^2}{x_2^2 - x_1^2}}$$

4

a) What are x-rays and how are they produced? explain the Properties and application of x-rays.   10

b) When the pot. difference between the electrodes of an x-rays tube is increased there take place an increase in the   a) Intensity   b) frequency   c) Wavelength   d) speed of the x-rays emitted.   2

c) Calculate the energy in electron volt and velocity of electron beam giving rise to x-rays of wavelength 1 $\overset{\circ}{A}$ 4

5

a) Define Thermal electricity, Thermocouple and Contact potential   4

b) Distinguish between seeback and peltier effect. How would you find the value of peltier coefficient.   8

c) A current of 10 amp flows through a wire of $1mm^2$ cross section, if the density of charge carriers in the wire is 10^{27} /m^3 find the average drift velocity of the electron.   4

P.T.O

Q.6

a) Define Binding Energy? What do you know about the Nuclear forces ?

b) Explain the phenomenon of Nuclear Fission?

c) What is "Nuclear Reactor", explain its essential components?

Q.7

a) What if Laser, Define i) Meta stable state   ii) spontaneous and stimulated emission?

b) What are the requirements for Laser action, Explain?

c) Give any two applications of Laser?

Q.8

a) Explain photoelectric effect. Derive Einstein's photoelectric equation.

b) Briefly outline two application of photoelectric effect in the modern life.

c) When violet light of $\lambda = 4000 \overset{\circ}{A}$ strikes the cathode of a photocell a retarding potential of 0.4V is required to stop emission of electrons calculate.

(i) Light frequency (ii) Photon energy (iii) Work function (iv) threshold frequency and
(v) Net energy after the electron leaves the surface.

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