NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI

FIRST YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY/ MATERIAL & METALLURGY/ CHEMICAL ENGINEERING)

ANNUAL EXAMINATION 2007

BATCH 2006-07

Time: 3 Hours **Dated: 05-10-2007**

Max. Marks: 80

APPLIED PHYSICS– (MS-121)

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

Q#1(a) Define the following terms:
(i) Kinematics (ii) Limiting friction (5)

(b) An alpha particle travels along the inside of a straight hollow tube 2.0 m long which forms part of particles accelerator. (5)
(i) If one assumes uniform acceleration, what is the acceleration of the particle, if it enters at a speed of 1.0×10^4 m/s and leaves at 5×10^6 m/s?
(ii) How long it is in the tube?

(c) Describe Projectile motion and prove that trajectory of projectile is parabolic. (6)

Q#2(a) Write down the dimensions of following quantities:
(i) Centripetal Acceleration (ii) Torque (4)

(b) In Bohr's Model of the hydrogen atom, an electron revolves around a proton in a circular orbit of radius 5.29×10^{-11} m with the speed of 2.18×10^6 m/s. What is the acceleration of the electron in this model of the hydrogen atom? (5)

(c) State and prove work energy theorem for constant forces. (7)

Q#3(a) i) Name as many scalar and vector field as you can.
ii) In electrostatic we associated an electric potential energy with the test charge in an electric field. Is there a magnetic potential energy with the moving electric test charge in a magnetic field. (5)

(b) The plane of a circle of radius 8 cm is at 50° to a uniform 600 N/C electric field. What is the flux through the circle? (5)

(c) A thin ring carrying uniform linear charge density around a circumference is of radius R. Find the electric field at a point P if P is at distance Z from the plane of the ring along its central axis. (6)

Q#4(a) What are paramagnetic materials and ferromagnetic materials? (5)

(b) A plastic rod, whose length is 220 cm and whose radius is 3.6 mm, carries a negative charge of magnitude 3.8×10^{-7} C, spread uniformly over its surface. What is the electric field near the midpoint of the rod, at a point on its surface? (5)

(c) Calculate the electric field of infinite sheet of charge using Gauss's Law. (6)

P.T.O

Q#5(a) Discuss frequency problem. intensity problem and time delay problem of the photoelectric effect in the light of classical wave theory. (6)

(b) State the following laws

(i) Stefen-Boltzmann law (ii) Wien's displacement law (5)

(c) X- Rays of wavelength 10 μm are scattered from a target:

(i) Find the wavelength of x-rays scattered through 45^{o}.

(ii) Find the maximum wavelength present in the scattered x-rays. (5)

Q#6(a) A Sinusoidal transverse wave traveling along the x-axis has the wave function.

$$y(x,t)=(1.50cm)\sin[(15.0cm^{-1}x - (3\pi \text{ rad/sec})t]$$

(i) What are the frequency and wavelength of this wave?

(ii) With what velocity does the wave travel along the x-axis. (6)

(b) What is the nuclear reactor and write down its basic components. (5)

(c) Tritium has a half life of 12.5 years against beta decay. What fraction of a sample of a tritium will remain undecayed after 25 years. (5)

Q#7(a) Define barrier potential and state the values of barrier potential in silicon and germanium. (5)

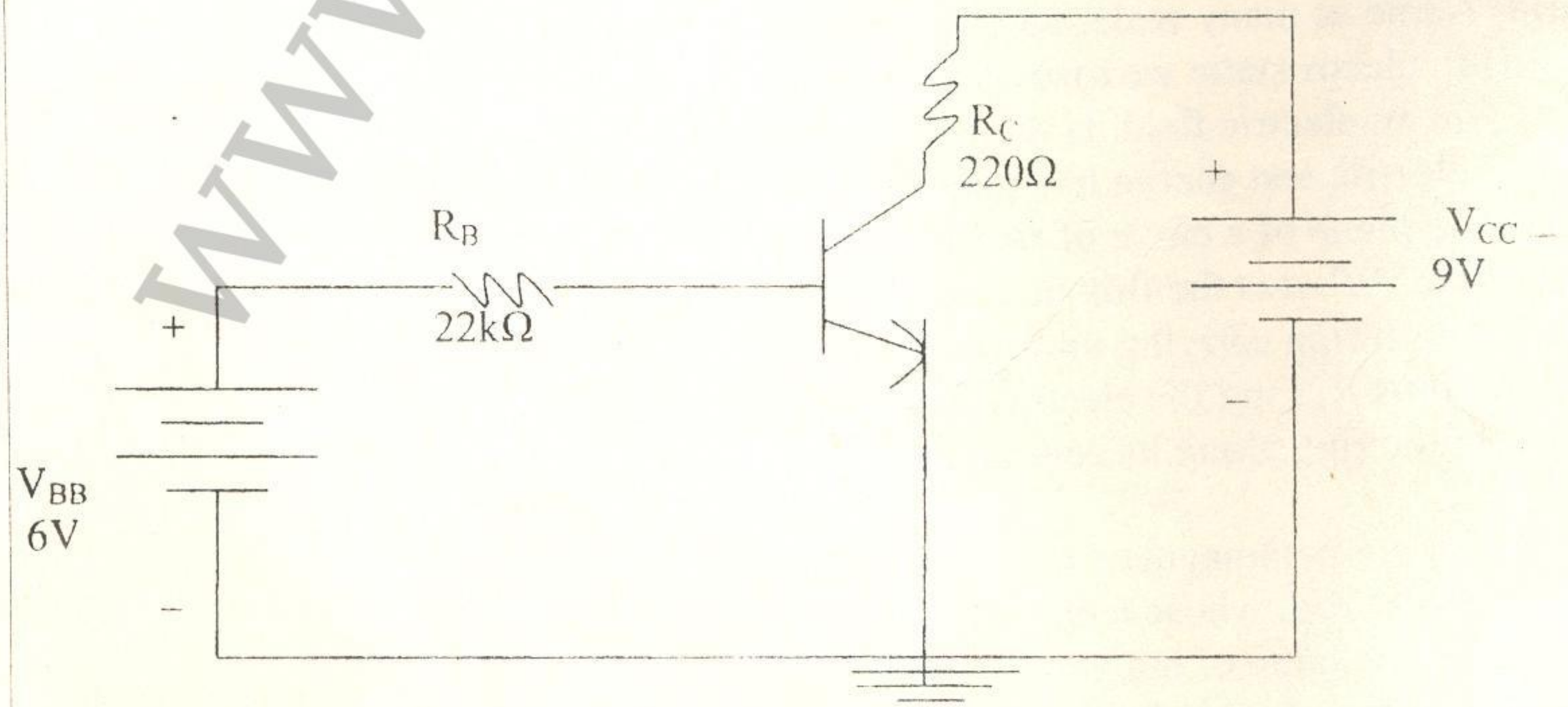
(b) If $\tilde{A} = x^2 z\,\hat{i} - 2y^3z^2\,\hat{j} + xy^2z\,\hat{k}$, find $\nabla \cdot \tilde{A}$ at point (1,-1,1). (5)

(c) Write down the construction and working of Helium-Neon Laser. (6)

Q#8(a) Discuss forward bias and reverse bias with their required conditions. (5)

(b) Find the total work done in moving a particle in a force field given by $F = 3xy\,\hat{i} - 5z\,\hat{j} + 10x\,\hat{k}$, along the curve $x = t^2 + 1$, $y = 2t^2$, $z = t^3$ from t = 1 to t = 2 (6)

(c) If the transistor has a $\beta_{DC} = 90$ determine I_B, I_C, I_E, V_{CE} and V_{CB} of given circuit. (5)



Given constant:

$\epsilon_o = 8.85 \times 10^{-12}\ C^2/N.m^2$

-- X --

NED UNIVERSITY OF ENGINEERING & TECHNOLOGY, KARACHI
FIRST YEAR (COMPUTER SCIENCE AND INFORMATION TECHNOLOGY)
ANNUAL EXAMINATION 2007
FOR REPEATERS

Time: 3 Hours **Dated: 05-10-2007**
Max. Marks: 80

APPLIED PHYSICS- (MS-104)

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

1. (a) State and prove that Gauss's Divergence Theorem? 08

(b) Write in terms of "∇ " 03

(i) *Curl of Grad*ϕ : (ii) *Grad of Divergence* $\vec{F}$: (iii) *Curl of Curl* $\vec{F}$

(c) If a particle is moving under the influence of force 05
$\vec{F}=3x^2\,\hat{i}+(2xz-y)\,\hat{j}+z\,\hat{k}$ find the work done $\int_c \vec{F}.\vec{dr}$ where c is straight line from P_1 (0,0,0) to P_2 (2,1,3).

2. (a) State and prove stoke's theorem? 08

(b) Verify Stoke's theorem for $\vec{F}=4y\,\hat{i}-x\,\hat{j}+3\,\hat{k}$ Where S is a disk of radius one is lying on the z plane Z=1 and c is its boundary. 05

(c) If $\vec{F}=(x^2y^2z)\,\hat{i}+(xyz)\,\hat{j}+(w^2yz^2)\,\hat{z}$ Find $\vec{\nabla}\times\vec{F}$ 03

3. (a) What is simple Harmonic Oscillator? Drive the expression for (i) velocity; (ii) Amplitude ; (iii) Position ; (iv) time period ;(v) frequency. 10

(b) Each piston of a certain car engine has a mass of I Kg and has a Stroke total travel distance of 10cm. When the engine is operating at 3000 rpm find (a) The max. velocity of each piston (b) Its max. acceleration (c) the force on it . 06.

4. (a) Define thermal electricity, thermocouple and contact potential. 04

(b) Explain "Microscopic form of Ohm's law" also obtain the classical expression for conductivity of conductor. 06

(c) An aluminum wire whose diameter is 0.10 inches is welded to end of a copper wire with the diameter 0.064 inches, the steady current in conductor is 10A. What is the current density in each wire. 06

5. (a) Explain the De- Broglie's hypothesis about wave particle, also give the properties of matter waves. 10

(b) Find the ratio of the De- Braglie's wavelength of an electron to that of a proton with the same energy? 06

Find $\frac{\lambda e}{\lambda p}$.

P.T.O

6.	(a)	Explain the phenomenon of "Nuclear Fission" & "Fission Chain Reaction".	04
	(b)	What is Nuclear Reactor? Explain its essential components.	12
7	(a)	Establish Einstein's mass- energy relationship. Mention some important phenomenon in physics explained by these relations.	10
	(b)	An electron is moving with a speed of exactly 0.3c by what % does its K.E and momentum differ from the non relativistic values.	06
8	(a)	What is LASER?	04
	(b)	Explain the following terms in LASER (i) Population inversion (ii) Lasing and Host medium (iii) Optical Resonator (iv) Means of Excitation	12