Tribhuvan University
Institute of Science and Technology
2069

Bachelor Level/ First Year/ First Semester/ Science — Full Marks: 60
Computer Science and Information Technology (CSc. 113) — Pass Marks: 24
(physics) — Time: 3 hours.

Candidates are required to give their answers in their own words as for as practicable.
The figures in the margin indicate full marks.

Set A

Attempt all questions:

1. Discuss the motion of a charged of a charged particle in an alternating electric field. (7)
2. What do you mean by non-conservative forces? Also state an explain general law of conservation of energy. (2+2+3)
3. State and explain Gausses' law. Apply it to find the field the field outside a uniformly changed sphere of radius a. (1+3+3)
4. What do you mean by displacement current ?Prove $\nabla \times \underset{H}{\rightarrow} = \underset{J}{\rightarrow} + \frac{d\underset{D}{\rightarrow}}{dt}$. (3.5+3.5)
5. Explain the term power and power factors .further discussion the phenomena of resonance and hence obtain quality factor. (2+2+2+1)

Set B

Attempt any eight questions:

6. Show the path of one projectile as seen from another projectile will always be a straight line. (4)
7. A rocket is moving upwards with acceleration 3g. Calculate the effective weight of astronaut sitting in the rocket when his actual weight is 75 Kg. (4)
8. A particle of mass m is moving along a circular path in a plane show that force action on it is conservative. (4)
9. The differential equation for a certain system is $\frac{d^2x}{dt^2} + 2y\frac{dx}{dt} + \omega_0^2 x = 0. if\ \frac{\omega_0}{r} \gg 1$, find the time in which energy of the system falls to $(1/e)$ times the initial value .(4)
10. A water drop is observed to fall through gas of density 0.001 gm/cc with a constant velocity of 980 cm/rec .What is the radius of the drop?($\eta\ for\ the\ gas = 2 \times 10^{-4} poise$) (4)
11. Find the electric field at distance Z above the midpoint of a straight line segment of length 2L, which carries a uniform line chargeλ. (4)
12. Two parallel conducting plates are separated by the distance d and p.d.$\Delta\emptyset$. A dielectric slab of dialectics constant K is and of uniform thickness is tightly fitted between the plates .find the electric filed in the dielectric.(4)
13. Find the vector potential of an infinite solenoid with N turns per unit length ,radius R and current I.(4)

14. The series combination of a resistance R and an inductance L is put in parallel with the series combination of resistance R and capacitance C. Show that if $R^2 = L|C$ the impedance is independent of frequency.(4)

15. Consider a simple RL circuit in which a sudden voltage V is applied .Discuss its transient behavior and find the current as a function of time. (4)