

FINAL YEAR B.Sc. DEGREE EXAMINATION, MARCH/APRIL 2005

Part III—Group II—Physics

Paper VII—APPLIED PHYSICS

Time : Three Hours

Maximum : 50 Marks

Section A

*Answer any two questions.
Each question carries 6 marks.*

1. Describe the fundamentals of EEG. Explain the various modes of recording.
2. Explain the interior structure of the earth with neat diagram.
3. Give the basic principles of microwave antenna and the design of a microwave link.
4. Describe briefly the construction and working details of a wind mill.

(2 × 6 = 12 marks)

Section B

*Answer any four questions.
Each question carries 3 marks.*

5. Explain endoscopy.
6. Explain the principle of C.T. scanner and their applications.
7. What are solar ponds ? How is power extracted from them ?
8. What are the basic principles of fibre optic communication ?
9. What is the advantage of multiple access system for satellite communication ?
10. Distinguish between Thunderstorms, Tornadoes and Hurricanes.

(4 × 3 = 12 marks)

Section C

*Answer any seven questions.
Each question carries 2 marks.*

11. Distinguish between Surface water and Ground water.
12. What is meant by ISON ?
13. How is the wave energy converted into electricity ?
14. What is meant by propagation delay ?
15. What do you mean by climate engineering physics ?

16. Distinguish between Absorption and Emission spectra.
17. What are the effects of interaction of radiation with matter ?
18. What is the principle of NMR ?
19. What is meant by orbital spacing of a satellite ?
20. What are microwave repeaters ?
21. How can wind energy be made useful ?

(7 × 2 = 14 marks)

Section D

*Answer any four questions.
Each question carries 3 marks.*

22. A "standard gain horn" designed for use in the 1.7 – 2.6 GHz frequency range, has a gain of 16.5 dB with reference to an isotropic radiator. To what power ratio does the gain correspond ?
23. Estimate the size of a rocky sphere with a density 3.0 gm./cm.³ from the surface of which you could just barely throw away a gold ball and have it never return. (Assume your best throw is 40 m/s.).
24. Find the ratio of a systolic blood pressure of 120 (in mm. Hg.) to atmospheric pressure. Standard atmospheric pressure is 1.01×10^5 Pa.
25. A beam of gamma rays has a cross-sectional area of 2 cm.² and carries 7×10^8 photons through the cross-section each second. Each photon has an energy of 1.25 MeV. The beam passes through a 0.75 cm. thickness of flesh ($\rho = 0.95$ g/cm.³) and loses 5 % of its intensity in the process. What is the average dose (in rad) applied to the flesh each second ?
26. Imagine a source emitting 100 W of green light at a wavelength of 500 nm. How many photons per second are emerging from the source ?
27. Calculate the numerical aperture and hence the acceptance angle for an optical fibre given that refractive indices of the core and cladding are 1.45 and 1.40 respectively.
28. The vertical component of earth's magnetic field at a place is $0.16 \sqrt{3} \times 10^{-4}$ T. Calculate the value of horizontal component of earth's magnetic field, if angle of dip at the place is 30°.

(4 × 3 = 12 marks)