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SARDAR PATEL UNIVERSITY

F.Y. B.Sc. SECOND SEMESTER EXAMINATION (CBCS)

Friday, 29TH APRIL 2011 Time: 03:00 to 05:00 pm

Electronics, Nuclear and Modern Physics:

US02CPHY02 (PHYSICS)

Total Marks: 70

Q.-1 Multiple Choice Questions (Each of One Mark) (10)

- 1 What is the maximum rectification efficiency of a Half-wave rectifier?
(a) 100% (b) 90% (c) 81.2 % (d) 40.6%
- 2 The PIV of centre-tap rectifier circuit is.....to that of a bridge rectifier.
(a) equal (b) double (c) half (d) triple
- 3 The Gallium Arsenide (GaAs) LEDs are used to emit
(a) red light (b) green light (c) infrared radiation (d) blue light.
- 4 The zener breakdown (effect) is predominant for breakdown voltages
(a) greater than 6V (b) less than 4V (c) greater than 9V (d) greater than 12V.
- 5 The elements with same number of protons are called as
(a) isotones (b) isotopes (c) isobars (d) isomer.
- 6 The number of neutron in ${}_{10}\text{Ne}^{22}$ is
(a) 10 (b) 22 (c) 12 (d) 32.
- 7 Wien's displacement law states that as the temperature of the body increases the value of wavelength with maximum energy
(a) also increases (b) decreases (c) remains constant (d) becomes infinite.
- 8 Which atom model suggests elliptical orbits of electron in an atom?
(a) Sommerfeld (b) Bohr (c) Rutherford (d) Einstein.
- 9 The ripple factor of a full-wave rectifier is
(a) 1.21 (b) 40.6 (c) 0.482 (d) 81.2
- 10 Which of these diodes is used in rectifier circuits?
(a) power diode (b) varactor diode (c) zener diode (d) LEDs.

Q-2 Answer any TEN questions in short (Each of two Mark) (20)

- 1 Define: (i) ripple factor and (ii) rectification efficiency.
- 2 What is a filter circuit? Why it is required?
- 3 What is a semiconductor diode? State its important characteristics.
- 4 What is Light Emitting Diode (LED)? Draw its symbol and state its applications.
- 5 Derive expression for nuclear radius.
- 6 What are stable nuclei? Explain.
- 7 State Planck's assumptions used to derive law for black body radiation.
- 8 State limitations of Bohr atom model.
- 9 A zener diode is having a breakdown voltage of 10 volt and maximum power dissipation of 400 mW. Find the maximum current the diode can handle safely.
- 10 Draw V-I characteristics of a PN junction diode and discuss any two features.
- 11 Find binding energy per nucleon of alpha particle. [Given mass of helium nucleus = 4.001265 u, mass of proton = 1.007277 u and mass of neutron = 1.00866 u.
- 12 State the equation for de Broglie wavelength and discuss it.

- Q-3 (a) What is a rectifier? Explain construction and working of a Half wave rectifier. (05)
(b) Show that ripple factor of a Half wave rectifier is 1.21 (05)

OR

- Q-3 (a) What is rectification? Derive expression for (i) ripple factor and (ii) rectification efficiency of a full wave rectifier. (05)
(b) Explain construction and filtering action of a LC filter. (05)

- Q-4 (a) What is a Zener diode? Explain Zener diode as voltage regulator. (05)
(b) Write a note on varactor diode. (05)

OR

- Q-4 (a) With necessary circuit diagram discuss the input and output characteristics of a NPN transistor in CE mode. (05)
(b) What is a dc load line? With proper diagram explain how it is obtained for a NPN transistor in CE mode. (05)

- Q-5 (a) What is nuclear decay? Discuss various nuclear decay processes. (05)
(b) Write a note on Nuclear Magnetic Resonance (NMR) (05)

OR

- Q-5 (a) Write a note on liquid drop model. (05)
(b) Define binding energy per nucleon. Draw the curve for binding energy per nucleon and discuss its outcomes. (05)

- Q-6 (a) Derive expression for change in wavelength of a photon in a Compton effect. (05)
(b) With proper diagrams explain Davission-Germar experiment. (05)

OR

- Q-6 (a) Derive Planck's law for black body radiation. (05)
(b) What is a vector atom model? Explain it with different quantum numbers. (05)
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