



Note: All the symbols have their usual meanings.

Que.-1 To answer the MCQs choose the correct option.

[10]

- (1) The rectified output dc voltage pulsation removed by ____ circuit.
(a) filter (b) transformer (c) amplifier (d) regulator
- (2) What is the value of ripple factor in Center Tap FWR?
(a) 0.482 (b) 1.82 (c) 1.21 (d) 0.423
- (3) In a reverse bias, PN junction diode offers ____ resistance.
(a) high (b) low (c) infinite (d) zero
- (4) Which part of the transistor is largest in size?
(a) base (b) collector (c) emitter (d) battery
- (5) Which of the following diodes is used in display unit?
(a) Zener (b) power (c) LED (d) signal
- (6) In nuclear physics, energy equivalent to a mass of $1u =$ ____.
(a) 913.48Mev (b) 931.48Mev (c) 948.31Mev (d) 938.41Mev
- (7) The radius of atomic nuclei is proportional to $\frac{1}{3}$ power of its ____.
(a) atomic mass (c) no of electron
(b) Atomic number (d) none of these
- (8) The de-Broglie wave length of a particle with momentum P is given by
(a) $\lambda = \frac{p}{2\pi}$ (b) $\lambda = \frac{h}{2\pi}$ (c) $\lambda = \frac{p}{h}$ (d) $\lambda = \frac{h}{p}$
- (9) The unit of Planck's constant is similar to the unit of ____.
(a) Angular momentum (c) Magnetic momentum
(b) Energy (d) Torque
- (10) The black body radiation gives ____.
(a) Line spectrum (c) Absorption spectrum
(b) Band spectrum (d) continuous spectrum

Que.-2

Do as directed.

[08]

(A) Fill in the blank

- (1) Power diodes are used in ____ circuit.
- (2) In a PNP transistor, the base region is of ____ material.
- (3) 1fm (fermi) = ____ meter.
- (4) The half-life of a radioactive element with decay constant λ is ____.

(B) State TRUE or FALSE

- (5) In a bridge full wave rectifier, circuit four diodes are used.
- (6) Light Emitting diode is used in TV remote.
- (7) According to Somerfield atomic model, electron revolves around nucleus in circular orbit.
- (8) The nature of graph $\lambda \rightarrow T_{1/2}$ for different radionuclides is hyperbola.

Que.-3 Answer briefly Any Ten of the following questions.

[20]

- (1) What is Rectifier? Why we need it?
- (2) Give the block diagram of a power supply with brief note.
- (3) What is peak inverse voltage[PIV]? Explain for full wave bridge rectifier.
- (4) Define α_{dc} and β_{dc} of a transistor and derive relation between them.
- (5) For a transistor $\alpha_{dc} = 0.98$ determine the collector current [I_c] if $I_E = 5\text{mA}$.
- (6) What are semiconductor diodes? State its important characteristics.
- (7) Define nuclear magnetic resonance (NMR).
- (8) Find density of ${}^6\text{C}^{12}$ nucleus. (Given $R_0 = 1.2 \times 10^{-15}$ m and $1u = 1.66 \times 10^{-27}$ Kg).
- (9) ${}^5\text{B}^{15}$ nuclei is unstable, why?
- (10) Derive Wein's law from Planck's law.
- (11) State limitations of Bohr atom model.
- (12) Explain in brief "Nuclear Radius".

Que.-4 Answer the following questions in detail. (Attempt any Four)

[32]

- (1) Draw circuit diagram of shunt capacitor filter with full wave rectifier and explain its working.
- (2) What is a half wave rectifier ? Draw half wave rectifier circuit diagram and explain its working.
- (3) What is a Zener diode? Explain use of Zener diode as a voltage regulator with proper circuit diagram.
- (4) Draw circuit diagram of CE NPN transistor, obtain its output characteristics curve and explain it.
- (5) For liquid drop model of nucleus, obtain the formula for binding energy of nucleus.
- (6) Explain radio metric dating with proper example.
- (7) Explain Compton effect; derive expression for change in wavelength of photon in it. Define Compton shift also.
- (8) State Planck's assumption and derive an expression for Planck's law of radiation.

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