

FEDERAL PUBLIC SERVICE COMMISSION



COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2013

PHYSICS, PAPER-II

TIME ALLOWED:	(PART-I MCQs)	30 MINUTES	MAXIMUM MARKS: 20
THREE HOURS	(PART-II)	2 HOURS & 30 MINUTES	MAXIMUM MARKS: 80
NOTE: (i) First attempt PART-I (MCQs) on separate OMR Answer Sheet which shall be taken back after 30 minutes.			
(ii) Overwriting/cutting of the options/answers will not be given credit.			
(iii) Use of calculator is allowed.			

PART-I ((MCQs) (COMPULSORY))

Q.1. (i) Select the best option/answer and fill in the appropriate Circle \bigcirc on the OMR Answer Sheet. (20x1=20)
(ii) Answers given anywhere, other than OMR Answer Sheet, shall not be considered.

- If whole charge is concentrated at a point then the volume charge density outside the point is:
(a) 1 (b) Zero (c) Infinity (d) None of these
- Potential due to point charge is:
(a) Symmetric (b) Anti-symmetric (c) Radially symmetric
(d) Spherically symmetric (e) None of these
- Pointing Vector represents:
(a) Current (b) Current density (c) Energy flux (d) Magnetic induction (e) None of these
- Boundary conditions are used for solution of:
(a) Homogenous Eq. (b) Inhomogeneous Eq. (c) Both of these (d) None of these
- The direction of the induced e.m.f. is given by:
(a) The induced e.m.f. rule (b) The Cockscrew rule (c) Ampere's swimming rule
(d) Fleming's right-hand rule (e) None of these
- How many valence electrons are in every semiconductor material?
(a) 1 (b) 2 (c) 3 (d) 4 (e) None of these
- Minority carriers are many times activated by:
(a) Heat (b) Pressure (c) Dopants (d) None of these
- If conductance increases as temperature increases, this is known as a:
(a) Positive coefficient (b) Negative current flow (c) Negative coefficient
(d) Positive resistance (e) None of these
- Three different points are shown on a dc load line. The upper point represents the:
(a) Minimum current gain (b) Quiescent point (c) Saturation point
(d) Cutoff point (e) None of these
- The Solid-State Detector is basically:
(a) A forward biased p n-junction (b) A reversed biased p n-junction (c) A forward biased transistor
(d) A photocell (e) None of these
- The signal voltage gain of an amplifier, A_v , is defined as:
(a) $A_v = V_{in}/V_{out}$ (b) $A_v = I_c * R_c$ (c) $A_v = R_c/R_E$ (d) $A_v = R_c/R_L$ (e) None of these
- The total number of electron around the nucleus is called:
(a) Atomic number (b) Mass number (c) Avogadro's number (d) Gram mole (e) None of these
- Nuclei of the same element having the same Z but different values of N are called:
(a) Isotopes (b) Isobars (c) Isomers (d) Allotropes (e) None of these

PHYSICS, PAPER-II

14. Charge on each α -particle is equal to:
(a) The charge on proton (b) Twice the charge on proton (c) Three times the charge on proton
(d) Four times the charge on proton (e) None of these
15. Which of the following particles move with velocity of light:
(a) α -particle (b) β -particle (c) γ -particle (d) None of these
16. How many neutrons are in the nuclide ^{66}Zn ?
(a) 66 (b) 36 (c) 30 (d) 26 (e) None of these
17. Which particle is considered as an ideal projectile for induced nuclear reactions:
(a) Electron (b) Proton (c) Neutron (d) γ -particle (e) None of these
18. The function of the moderator in a nuclear reactor is:
(a) To slow down the neutrons (b) To absorb the neutrons (c) To cool the reactor
(d) To control the energy released (e) None of these
19. Which of the following process is responsible for energy emission in Sun?
(a) Alpha decay (b) Beta decay (c) Fission (d) Fusion (e) None of these
20. The half life of a radioactive substance is 10 days. This means that:
(a) Completely disintegrates in 20 days (b) Completely disintegrates in 40 days
(c) $1/8$ will be left after 40 days (d) $7/8$ part disintegrates in 30 days (e) None of these

PART-II

- NOTE:** (i) **Part-II** is to be attempted on the separate **Answer Book**.
(ii) Candidate must write **Q. No.** in the **Answer Book** in accordance with **Q. No.** in the **Q. Paper**.
(iii) Attempt **ONLY FOUR** questions from **PART-II**. **ALL questions carry EQUAL marks**.
(iv) Extra attempt of any question or any part of the attempted question will not be considered.
(v) **Use of calculator is allowed.**

- Q.No.2.** (a) State and explain Gauss's Law in electrostatics and express it in differential form. (10)
(b) Find the electric intensity at a point outside a volume distribution of charge confined in a region of radius R. (10)
- Q.No.3.** (a) State and explain Faraday's Law of electromagnetic induction. (10)
(b) How Maxwell's equations are derived from fundamental relations for electrostatic and magnetostatic models? Explain these equations. (10)
- Q.No.4.** (a) Explain P-N junction as rectifier. (6)
(b) How a transistor is formed. Give construction and symbol of a PNP transistor? (8)
(c) How resistivity of semiconductors change with temperature. (6)
- Q.No.5.** (a) Explain Compton Effect and Photoelectric Effect. How they support photon theory of light? (10)
(b) Discuss De-Broglie's Hypothesis. (10)
- Q.No.6.** (a) Discuss Bohr's atomic model and its success. How Rutherford's orbital motion violate classical physics? (10)
(b) Describe Schrodinger's wave equation. (10)
- Q.No.7.** (a) What is Radioactive decay? Define half life and average life and relate half life to the disintegration constant. (10)
(b) Discuss elementary particles and their properties. (10)
- Q.No.8.** Write note on any **TWO** of the following: (10 each) (20)
(a) Pointing Theorem and Pointing Vector (b) Nuclear Fission and Fusion
(c) Band theory of Solids
