FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2020
FOR RECRUITMENT TO POSTS IN BS-17
UNDER THE FEDERAL GOVERNMENT

Roll Number

PHYSICS, PAPER-II

TIME ALLOWED: THREE HOURS	**PART-I (MCQS) MAXIMUM MARKS = 20**
PART-I(MCQS): MAXIMUM 30 MINUTES	**PART-II MAXIMUM MARKS = 80**

NOTE: (i) **Part-II** is to be attempted on the separate **Answer Book.**
(ii) Attempt **ONLY FOUR** questions from **PART-II**. **ALL** questions carry **EQUAL** marks.
(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.
(iv) Write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.
(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.
(vi) Extra attempt of any question or any part of the question will not be considered.
(vii) **Use of Calculator is allowed.**

PART – II

Q. 2. **(a)** Discuss electric field of point charges, keeping in view the magnitude of force acting on test charge according to Coulomb's Law. (8)
(b) Derive Poisson's equation from Gauss's Law. Also write the expression for Laplace's equation. (8)
(c) Find out the electric field due to charge of 2e at a distance of 26.5×10^{-12} m. ($\varepsilon_o = 8.85 \times 10^{-12}$ $C^2/N.m^2$ and $e = 1.60 \times 10^{-19}$ C) (4) **(20)**

Q. 3. **(a)** Discuss in details the Energy Transport and the Poynting Vector. (8)
(b) Write the four Maxwell's Equations both in integral and differential forms. (8)
(c) Explain vector potential. (4) **(20)**

Q. 4. **(a)** State and explain Heisenberg's Uncertainty Principle. (8)
(b) Discuss the phenomenon Barrier Tunneling. (8)
(c) Find the momentum of an electron moving with a speed of 1.88×10^6 m/s. where mass of electron is 9.11×10^{-31} kg. (4) **(20)**

Q. 5. **(a)** What do you understand by the term Dopping? How we can make semiconductors as n-type or p-type with the dopping? (8)
(b) Discuss in details the N-P-N and P-N-P transistors. (8)
(c) Explain MOFET. (4) **(20)**

Q. 6. **(a)** Discuss in detail the process of Natural Radioactivity. (8)
(b) Discuss in detail the radioactive decay. (8)
(c) Find the energy released during the alpha-decay of 238 U. Where the needed atomic masses are ^{238}U 238.050785 *u*, ^{234}Th 234.043539 *u* and ^{4}He 4.002603 *u*. (4) **(20)**

Q. 7. **(a)** Discuss in detail the phenomenon of Fission. (8)
(b) Explain the basic principles of Nuclear Reactors. (8)
(c) Briefly write about the methods of detection of nuclear radiation. (4) **(20)**

Q. 8. Write notes on any **TWO** of the following: **(10 each)** **(20)**
(a) Dielectric medium and Electric Polarization
(b) Ampere's Law
(c) Accelerators

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