**FEDERAL PUBLIC SERVICE COMMISSION**
**COMPETITIVE EXAMINATION-2018**
**FOR RECRUITMENT TO POSTS IN BS-17**
**UNDER THE FEDERAL GOVERNMENT**

**Roll Number**

# PHYSICS, PAPER-II

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| **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)** Candidate must 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 attempted question will not be considered.
**(vii)** **Use of Calculator is allowed.**

## PART-II

**Q. No. 2.** **(a)** Define and explain Gauss' Law. Deduce Coulomb's Law from Gauss' Law. **(8)**
**(b)** Find the Electric Field Intensity due to an infinite sheet of charge. **(8)**
**(c)** The electric field near an infinite sheet of charge is $3.84\times 10^{5}$ N/C. What is the surface charge density on the sheet? ($\epsilon_0 = 8.85\times 10^{-12}$ $C^2/N.\ m^2$) **(4)**

**Q. No. 3.** **(a)** Derive an expression for capacitance of cylindrical and spherical capacitor. **(8)**
**(b)** Show that the energy consumed in charging a capacitor to charge Q and voltage V can be considered as potential energy stored in the field between the plates. Find expression for energy stored in the field. **(8)**
**(c)** An isolated conducting sphere whose radius R is 6.85 cm has a charge q=1.25 nC. How much potential energy is stored in the electric field of this charged conductor? ($\epsilon_0 = 8.85\times 10^{-12}$ $C^2/N.\ m^2$) **(4)**

**Q. No. 4.** **(a)** Derive an expression for time dependent Schrodinger's wave equation. **(8)**
**(b)** Explain de Broglie's hypothesis of matter wave. **(8)**
**(c)** Determine the de Broglie's wavelength of an electron that has been accelerated through a potential difference of 100V. ($h = 6.63\times 10^{-34}$J.s) **(4)**

**Q. No. 5.** **(a)** What is Transistor? Briefly explain three types of Transistor Circuit Configurations. **(8)**
**(b)** Draw a neat diagram of Transistor Characteristics in Common Emitter Configuration for P-N-P and N-P-N transistor. Also discuss types of characteristic curves for a transistor in Common Emitter Configuration. **(8)**
**(c)** Write a short note on Load line. **(4)**

**Q. No. 6.** **(a)** What do you understand by nuclear fission? How was it explained theoretically on the basis of liquid drop model? **(8)**
**(b)** Briefly describe important uses of radioisotopes. **(8)**
**(c)** A 5.30 MeV alpha particle happens, by chance, to be headed directly towards the nucleus of an atom of gold, which contains 79 protons. How close does the alpha particle get to the centre of the nucleus before coming momentarily to rest and reversing the relatively massive nucleus? **(4)**

**Q. No. 7.** **(a)** Explain construction and working of a Geiger Muller Counter. **(8)**
**(b)** Draw the characteristic of Geiger Muller Counter and also explain it. **(8)**
**(c)** What are the properties of Gamma Rays? **(4)**

**Q. No. 8.** Write short notes on any **TWO** of the following: **(10 each)** **(20)**

**(a)** Poynting Vector

**(b)** Heisenberg's Uncertainty Principle

**(c)** Mass Defect and Binding Energy

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