FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION-2016
FOR RECRUITMENT TO POSTS IN BS-17
UNDER THE FEDERAL GOVERNMENT

Roll Number

PHYSICS, PAPER-II

TIME ALLOWED: THREE HOURS **PART-I(MCQS): MAXIMUM 30 MINUTES**	**PART-I (MCQS)** **PART-II**	**MAXIMUM MARKS = 20** **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 electric field intensity $\vec{E}$. State its value for a point charge and give its units. **(8)**
(b) State differential form of Gauss's law and from there develops the poisson's & Laplace's equations. **(8)**
(c) A charge of $10\sqrt{2}$ Coulomb is located at $(3\hat{i} + 4\hat{j} + 5\hat{k})m$. Calculate the electric field intensity at a point having position vector $(5\hat{i} + 4\hat{j} + 3\hat{k})m$. **(4)**

Q. No. 3.
(a) Differentiate between a series and parallel resonant circuits. **(6)**
(b) Explain the construction and operation of a transformer. What are energy losses in a transformer and how are they reduced to a minimum. **(10)**
(c) A series *LCR* circuit contains a coil with L=2.25H, a capacitor having C=16μF and a resistor with R=50Ω. Calculate the impedance and the phase difference between current and voltage. (Take frequency f = 50Hz) **(4)**

Q. No. 4.
(a) State and explain the basic postulates of Quantum Physics. **(5)**
(b) Briefly explain with examples what do you mean by Eigen function and Eigen values. **(5)**
(c) Derive the time-dependent Schrodinger Wave Equation for a free particle. **(10)**

Q. No. 5.
(a) Why the resistivity of metals increases with temperature but that of semiconductor decreases? **(6)**
(b) In the process of making semiconductor devices, why silicon is preferred over Germanium? **(4)**
(c) Briefly explain the construction and operation of a Bipolar Junction Transistor (BJT). How it can be used as an Amplifier? **(10)**

Q. No. 6.
(a) What do <111>, [010], (111), and {100} represents for a cubic crystal lattice. **(5)**
(b) What is packing factor? Determine the Atomic Packing factor of FCC lattice. **(5)**
(c) With neat diagram showing X-ray diffraction, derive an expression for Bragg's Law. **(10)**

Q. No. 7.
Define Curie and Becquerel. Establish the relation between them. **(6)**
Calculate the Decay Constant for ^{14}C which has half-life of 5730 years. **(4)**
State and explain Half-life and Mean life of a radioactive element. Show that $< T >$ is greater than $T_{1/2}$. **(10)**