



**FEDERAL PUBLIC SERVICE COMMISSION**  
**COMPETITIVE EXAMINATION-2021**  
**FOR RECRUITMENT TO POSTS IN BS-17**  
**UNDER THE FEDERAL GOVERNMENT**

Roll Number

**PHYSICS, PAPER-I**

<b>TIME ALLOWED: THREE HOURS</b> <b>PART-I(MCQS): MAXIMUM 30 MINUTES</b>	<b>PART-I (MCQS)</b> <b>PART-II</b>	<b>MAXIMUM MARKS = 20</b> <b>MAXIMUM MARKS = 80</b>
<b>NOTE: (i) Part-II is to be attempted on the separate Answer Book.</b> <b>(ii) Attempt ONLY FOUR questions from PART-II. ALL questions carry EQUAL marks.</b> <b>(iii) All the parts (if any) of each Question must be attempted at one place instead of at different places.</b> <b>(iv) Write Q. No. in the Answer Book in accordance with Q. No. in the Q.Paper.</b> <b>(v) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.</b> <b>(vi) Extra attempt of any question or any part of the question will not be considered.</b> <b>(vii) Use of Calculator is allowed.</b>		

**PART – II**

- Q. 2.** (a) Describe Einstein postulates of special theory of Relativity. Express the difference between the special and the general theories of Relativity. (10)
- (b) Establish the energy-mass relationship and give its significance. (10) **(20)**
- Q. 3.** (a) Differentiate between Fermi-Dirac, Bose-Einstein and Maxwell Statistics. Give application of each. (10)
- (b) Draw a labelled diagram of a nuclear reactor and give significance of each part. (10) **(20)**
- Q. 4.** (a) Distinguish between the linear and angular momentum. Express Newton's second law in terms of the linear and angular motion. (10)
- (b) Discuss the acceptor and rejecter electronic circuits. (10) **(20)**
- Q. 5.** (a) Describe and explain the Miller indices. Recognize the symbols  $\langle 111 \rangle$ ,  $[010]$ ,  $(111)$ . (10)
- (b) Discuss the closest packed crystal structures. (10) **(20)**
- Q. 6.** (a) Can you imagine a three dimensional diffraction grating? Describe in detail. (10)
- (b) Justify the dual nature of light with elaborative examples. (10) **(20)**
- Q. 7.** (a) State and explain the three laws of Thermodynamics. (10)
- (b) What is a heat engine? Determine the efficiency of the engine if it takes 10,000 J of heat and delivers 2000 J of work per cycle. (10) **(20)**
- Q. 8.** Write notes on any **TWO** of the following: **(10 each) (20)**
- (a) Mickelson-Morley experiment and its latest usage in a recent Nobel award.
- (b) Unification of forces and Abdus Salam contribution.
- (c) An essay on Large Hadron Partical Accelerator.

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