



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

<b>Roll Number</b>
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**PHYSICS, PAPER-I**

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

**PART-II**

- Q. No. 2.** (a) State and prove Stoke's theorem. **(8)**  
 (b) Prove that if the vector is the gradient of a scalar function then its line integral around a closed curve is zero. **(4)**  
 (c) A particle moves along the curve  $x = 2t^2$ ,  $y = t^2 - 4t$ ,  $z = 3t - 5$  where  $t$  is the time. Find the components of its velocity and acceleration at time  $t=1$  in the direction  $2i-3j+2k$  **(8)**
- Q. No. 3.** (a) What is moment of inertia? State and prove parallel axis theorem. **(12)**  
 (b) Calculate rotational inertia of a hollow cylinder about cylindrical axis. **(8)**
- Q. No. 4.** (a) State and prove the Kepler's law of areas and Kepler's law of periods of planetary motion. **(8)**  
 (b) A satellite orbits at a height of 230km above the Earth surface. What is the period of satellite? **(6)**  
 (c) At what altitude above the earth surface the value of 'g' is three quarters of its value at the surface of the earth. **(6)**
- Q. No. 5.** (a) What is diffraction grating? Explain how grating diffracts light. Derive relation for resolving power of grating. **(12)**  
 (b) What is meant by polarization of light? How can we get a plane polarized light by a polarizing sheet? **(8)**
- Q. No. 6.** (a) Derive equation of Lorentz velocity transformations and show that speed of light is independent of the relative motion between the frames of reference. **(12)**  
 (b) The siren of a police car emits a source tone at a frequency of 1125 Hz. Find the frequency that would you receive in your car under the following circumstances. **(8)**  
 (i) Your car at rest, police car moving towards you at 29 m/s.  
 (ii) Police car at rest, your car moving towards it at 29 m/s.  
 (iii) Your and police car are moving towards one another at 14.5 m/s.  
 (iv) Your car moving at 9 m/s, police car chasing behind you at 38 m/s.
- Q. No. 7.** (a) Define Entropy. State Second law of thermodynamics in terms of Entropy. **(8)**  
 (b) Discuss applications of First Law of thermodynamics. **(6)**  
 (c) Discuss briefly the Lissajous patterns. **(6)**
- Q. No. 8.** Explain any FOUR of the following terms. **(05 each) (20)**  
 (a) Doppler's Effect  
 (b) Bernoulli's theorem  
 (c) Newton's rings  
 (d) He-Ne Gas LASER  
 (e) Brownian motion