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

**Roll Number**

## PHYSICS, PAPER-I

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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)  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

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