FEDERAL PUBLIC SERVICE COMMISSION
COMPETITIVE EXAMINATION FOR RECRUITMENT TO POSTS IN BS-17 UNDER THE FEDERAL GOVERNMENT, 2014

Roll Number

PHYSICS, PAPER-I

TIME ALLOWED:	**(PART-I MCQs)**	**30 MINUTES**	**MAXIMUM MARKS: 20**
THREE HOURS	**(PART-II)**	**2 HOURS & 30 MINUTES**	**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) Candidate must write **Q. No.** in the **Answer Book** in accordance with **Q. No.** in the **Q. Paper.**

(iv) No Page/Space be left blank between the answers. All the blank pages of Answer Book must be crossed.

(v) Extra attempt of any question or any part of the attempted question will not be considered.

PART-II

Q. No. 2. **(a)** Define a Scalar field. Obtain an expression for the Gradient of a Scalar field. Why the Gradient of a Scalar field is vector? **(11)**

(b) Given $¤(x, y, z) = x^2 y z^3$, Find grand ¤ at (1, 2, 1). **(5)**

(c) For what value of 'a' the vector A=*2i+aj+k* and B=*4i-2j-2k* are perpendicular. **(4)**

Q. No. 3. **(a)** Distinguish between Linear and Angular momentum. Explain the laws of conservation of Angular momentum. Prove that the angular momentum is constant in the absence of external torque. **(13)**

(b) The angular momentum of a particle is given as: **(7)**
J=$8t^4i-2t^2j+12t^3k$
Find the torque ² at t=1

Q. No. 4. **(a)** Show that the work done by a constant force is equal to the difference of initial and final kinetic energies of the body. **(10)**

(b) Prove that the total Work done by a conservative force around a closed path is ZERO and is independent of the path. **(10)**

Q. No. 5. **(a)** Describe Einstein's postulates of special theory of Relativity. **(10)**

(b) Establish the Mass-Energy relationship. **(6)**

(c) What is the speed of the air craft whose clock runs one second slow per hour, relative to a clock on the earth [C=$3x10^8$m/sec] **(4)**

Q. No. 6. **(a)** Distinguish between streamline and turbulent motion of a liquid. **(3)**

(b) What is "Coefficient of Viscosity"? Explain in detail the Stoke's law applicable in determining the coefficient of viscosity of a viscous liquid experimentally. **(14)**

(c) Why do automanufacturers recommend using different viscosities of Engine oil in cold and hot climate? **(3)**

Q. No. 7. **(a)** Define Entropy. State second law of thermodynamics in terms of entropy. **(13)**

(b) Show that the entropy remains constant in a reversible process but increases in an irreversible one. **(3)**

(c) Distinguish between Isothermal and Adiabatic process. **(4)**

Q. No. 8. **(a)** Explain the phenomenon of diffraction from a Single Slit and a diffraction grating. Discuss conditions for maxima and minima in both cases. **(16)**

(b) Differentiate between Fresnel and Fraun hoffer's diffraction. **(4)**

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