Reg. No. : ....

Code No. : 40306 E   Sub. Code : JMPH 21

B.Sc. (CBCS) DEGREE EXAMINATION,
NOVEMBER 2019.

Second Semester

Physics — Main

MECHANICS AND RELATIVITY

(For those who joined in July 2016 only)

Time : Three hours   Maximum : 75 marks

PART A — (10 × 1 = 10 marks)

Answer ALL questions.

Choose the correct answer :

1. The line integral is

    (a) scalar   (b) vector

    (c) conserved   (d) none.

2. Grad is equal to

    (a) $\left(\dfrac{\partial}{\partial x} + \dfrac{\partial}{\partial y} + \dfrac{\partial}{\partial z} \right)$ (b) $\left(i\dfrac{\partial}{\partial x} + j\dfrac{\partial}{\partial y} + k\dfrac{\partial}{\partial z} \right)\phi$

    (c) Both (a) and (b)   (d) None.

3. The equation of velocity of the sphere after impact is

    (a) $\sin^2 \alpha + \cos^2 \alpha$

    (b) $V^2 = U^2 \left(\sin^2 \alpha + e^2 \cos^2 \alpha \right)$

    (c) $V^2 = U^2 \sin \alpha$

    (d) None

4. Product of mass and velocity called

    (a) momentum   (b) work

    (c) acceleration   (d) speed

5. If force is applied at center of mass then torque is

    (a) maximum   (b) zero

    (c) 1   (d) unity

6. Unit of torque is

    (a) N – m   (b) N/m

    (c) V   (d) N/m^2

7. Kinetic energy per unit mass of liquid is

   (a) $\dfrac{V}{2}$

   (b) $2V$

   (c) $\dfrac{V^2}{2}$

   (d) none.

8. Unit of pressure is

   (a) N/m^2

   (b) $\dfrac{m^2}{N}$

   (c) Nm^2

   (d) Nm

9. The length of the moving body is contracted by factor

   (a) $\sqrt{1 - \dfrac{V^2}{C^2}}$

   (b) $\sqrt{\dfrac{C^2 - V^2}{l}}$

   (c) $l_0 \sqrt{1 - \dfrac{V^2}{C^2}}$

   (d) None.

10. Mass of electron increase with

   (a) time

   (b) velocity

   (c) acceleration

   (d) none.

PART B — (5 × 5 = 25 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 250 words.

11. (a) Discuss briefly components of a vector.

Or

(b) Derive expression for surface integrals.

12. (a) Obtain an expression for work done by gravitational force.

Or

(b) Discuss briefly central field motion.

13. (a) Derive an expression for moment of inertia of diatomic molecules.

Or

(b) Derive expression for power during rotation.

14. (a) Determine the position of centre of pressure in a triangular lamina.

Or

(b) Discuss briefly Venturimeter.

15. (a) Write a note on frames of reference.

Or

(b) Discuss about Relativistic mass.

PART C — (5 × 8 = 40 marks)

Answer ALL questions, choosing either (a) or (b).

Each answer should not exceed 600 words.

16. (a) Deduce the expression for work and power.

Or

(b) State and prove Gauss divergence theorem.

17. (a) Explain Angular momentum.

Or

(b) State and explain Kepler's II and III laws.

18. (a) Discuss Moment of Inertia and Radius of Gyration.

Or

(b) Explain the Gyroscopic top.

19. (a) State and explain laws of floatation.

Or

(b) Obtain an expression for equation of continuity.

20. (a) Explain Lorentz fitzgerald contraction.

Or

(b) Derive velocity addition theorem.

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