Jain College, Jayanagar
I PUC MOCK PAPER
Sub: Physics

Duration: 3 Hrs 15 mins **Max.Marks: 70**

General Instructions:

1. **All parts are compulsory.**
2. **Answers without relevant diagram/figure/circuit wherever necessary will not carry any marks.**
3. **Direct answers to numerical problems without detailed solutions will not carry marks.**

Part A

I. Answer all the following questions. **10x1=10**

1. Mention the SI unit of solid angle.
2. Calculate the magnitude of $3\hat{i}+8\hat{j}-\hat{k}$.
3. Give an example for impulsive force.
4. What is the work done by a conservative force around a closed path?
5. What is isochoric process?
6. State Hooke's law.
7. What is regelation?
8. Define the degrees of freedom of a molecule?
9. Will a pendulum clock gain or lose time when taken to the top of a mountain?
10. What is the frequency of a wave whose period is 0.02s?

Part B

II. Answer <u>any five</u> of the following questions. **5x2=10**

11. A bus travels a certain distance with an average speed of $30 kmh^{-1}$.if the total time taken by the bus to complete the distance is 30 minutes, find the distance travelled.
12. Friction is a necessary evil. Justify?
13. A gun recoils on firing. Explain why?
14. When is torque acting on a body maximum and minimum?
15. State and explain Bernoulli's principle.
16. Write the expression for thermal conductivity and explain the terms.
17. Why all oscillatory motions are periodic and not vice versa.
18. A flute has several holes in it. Explain why?

Part C

III. Answer <u>any five</u> of the following questions. **5x3=15**

19. Write the limitations of dimensional analysis
20. A stone weighing 3 kg and tied to a string is being rotated in a horizontal circle of radius 120 cm with a velocity of $500 cms^{-1}$. Calculate the centrifugal force that ties to break the string.
21. State and prove work-energy theorem for constant force.
22. Define center of gravity. Give any 2 sets of differences between center of gravity and center of mass.
23. Explain land breeze.
24. State and explain Kepler's laws of planetary motion.
25. Draw schematic diagram of the refrigerator. Define its co-efficient of performance.
26. Write any 3 sets of differences between transverse and longitudinal waves.

Part D

IV. Answer <u>any two</u> of the following questions. 2x5=10

27. What is a projectile? Derive the expression for the maximum height of flight and maximum range for a projectile.
28. State and prove the law of conservation of linear momentum from Newton's III law of motion.
29. State and explain parallel and perpendicular axes theorem.

V. Answer <u>any two</u> of the following questions. 2x5=10

30. State and prove Newton's law of cooling.
31. What are overtones? Compare first 3 harmonics produced in a closed pipe.
32. Derive an expression for pressure exerted by a gas molecule on the walls of a container.

Part E

VI. Answer <u>any three</u> of the following questions. 3x5=15

33. A jet airplane travelling at the speed of 500kmh^{-1} ejects its products of combustion at the speed of 1500kmh^{-1} relative to the jet plane. What is the speed of the ejection with respect to an observer on the ground?
34. A pump on the ground floor of a building can pump up water to fill a tank of volume 30m^3 in 15 minutes. If the tank is 40m above the ground, and the efficiency of the pump is 30%, how much electric power is consumed by the pump. (g=10ms^{-2}, density of water=1000kgm^3)
35. A copper plate has an area of 250cm^2 at 0˚ C. calculate the area of this plate at 60˚ C. Given the co-efficient of linear expansion of copper=1.7x10^{-5}/ ˚ C.
36. An earth satellite is a circular orbit at a height of 200km above the earth's surface has period of 80 minutes. Calculate the mass of the earth from this data. Radius of the earth is 6400km.
37. The acceleration due to gravity on the surface of the moon is 1.7ms^{-2}. What is the time period of a simple pendulum on the surface of moon if its time period on the surface of the earth is 3.5s. (take g=9.8ms^{-2})

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