

INTERNAL ASSESMENT
KANDI RAJ COLLEGE
DEPARTMENT OF PHYSICS

SEMESTER: 3rd **STREAM: Honours (Core)**

**Paper: [Mathematical Physics-II + Thermal Physics + Digital Systems and
Applications]**

Time: 6 Hrs.

PAPER CODE: PHY-H-CC-T-05

Full marks: 10

Answer any five questions

5X2 =10

1. What are Dirichlet conditions in Fourier Series Transform?
 2. Find the Fourier Series of $f(x) = x^3$ for $0 < x \leq 2$.
 3. From Ampere's law, derive Maxwell's equation in the case where the currents are steady, i.e. $\vec{\nabla} \times \vec{B} - \mu_0 \vec{J} = 0$.
 4. Write the general form of Legendre's differential equation. Also Write the recurrence relation.
 5. Show that if n is a positive integer, then show that : $\Gamma(n, x) = \sum_{k=0}^{n-1} \frac{x^k}{k!}$.
 6. Derive the equation satisfied by the temperature $u(r, t)$ at time t for a material of uniform thermal conductivity κ , specific heat capacity s and density ρ . Express the equation in Cartesian coordinates.
 7. Find the general solution of $x \frac{\partial u}{\partial x} + 2 \frac{\partial u}{\partial y} - 2u = 0$.
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PAPER CODE: PHY-H-CC-T-06

Full Marks: 10

Answer all the following questions:

[2 +2 +2+1+1+1+1]

1. At a constant temperature, an ideal gas is compressed from 6.0 liters to 4.0 liters by a constant external pressure of 5.0 atm. How much work is done on the gas?

(a) $w = +10$ liter atm. (b) $w = -10$ liter atm. (c) $w = +30$ liter atm. (d) None of the above

2. Which statement is **incorrect**?

(a) At constant pressure, $\Delta H = \Delta E + P\Delta V$ (b) The thermodynamic symbol for entropy is S.

(c) Gibbs free energy is a state function. (d) For an endothermic process, ΔH is negative.

3. Match the Column :

Column A

Column B

a. Isothermal process

A. $\Delta U = \Delta Q$

b. Adiabatic Process

B. $\Delta U = \Delta Q - \Delta W$

c. Isobaric process

C. $\Delta U = -\Delta W$

d. Isochoric process

D. $\Delta Q = \Delta W$

4. Viscosity of a gas is due to the transport of

(i) momentum

(ii) energy

(iii) mass

(iv) none of these

5. Which one of the following thermodynamic quantities is not a state function?

(a) Gibbs free energy

(b) enthalpy

(c) entropy

(d) work

6. Out of N particles in a gas, the number of particles having exactly the most probable velocity is-

(a) N

(b) N/2

(c) Zero

(d) 1

7. Which of the following is not a symbol for thermodynamic potential ?

(i) F

(ii) E

(iii) G

(iv) H

PHY-H -CC-T-07

Full Marks: 10

(5x2=10)

Answer any five questions.

1. Organize a 96-bit memory in three different ways.
 2. Draw the pin-out diagram of an 8085 microprocessor. What is the function of address latch enable?
 3. Describe with example the function of chip select \overline{CS} in memory mapping. Why is it represented with a bar over it?
 4. Calculate the number of address lines required for an 8 k-byte memory chip.
 5. What is meant by tri-state configuration? Give its truth table.
 6. Write down the names and functions of various flags in an 8085 microprocessor.
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PHY-H-GE-T-01: MECHANICS

Full Marks: 10

Answer any Five Questions of the following:

(5x2=10)

1. A rocket has a velocity $0.6c$. Find the velocity of light with respect to rocket.
 2. Show that the work done in stretching a wire is $\frac{1}{2} \times$ stretching force \times elongation produced.
 3. Find the potential due to a point mass.
 4. Does a particle moving along a circular path with uniform speed possess acceleration? Explain.
 5. Write down the differential equation of SHM explaining the every terms.
 6. Show that when no external force acts on a body acceleration of the centre of mass is zero.
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Paper Code - PHY-H-SEC-T-01

Full Marks: 5

Answer any Five Questions:

5×1=5

1. What is Ohm's law?
 2. What is a parallel resonant circuit?
 3. What is a transformer?
 4. Write down the basic principle of DC motor.
 5. What is a circuit breaker and how it works?
 6. What are the differences between Star and delta connection?
 7. What is power factor in AC circuits?
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