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Q.P. Code No. 41221

Second Semester B.Sc., Degree Examinations

May / June 2026

(CBCS - SEP Scheme)

PHYSICS

SSB0210 : Paper II : Thermal Physics, Oscillations, Waves & Sound

Time: 3 hrs.] *[Max.Marks:80*

Instruction to the Candidates :

1. *The student should legibly write Section number along with question numbers within the margin only.*
2. *The answers without Section number and question numbers will not be valued.*
3. *Do not write anything (except register number) on the question paper.*
4. *The question paper consists of Three sections A, B & C. All sections are compulsory.*
5. *Answer ALL the questions in Section - A, any SIX questions in Section-B, any THREE questions in Section-C.*
6. *Draw neat and labeled diagrams wherever necessary.*
7. *Take necessary data from tables.*
8. *Symbols used have their usual meaning.*
9. *Use of Scientific Calculator is allowed.*

SECTION – A

I. Answer ALL the following questions. **(10X2=20)**

1.

a) What is a cyclic process? Explain.

b) State and explain Wein's displacement law.

c) Mention the applications of Lissajous figures.

d) Write differential equation for a progressive wave and explain its terms.

e) Write the expression for Gibb's function and Helmholtz functions in terms of thermodynamic variables.

f) Give the statement of third law of thermodynamics with an explanation.

g) Calculate the specific heat ratio for a monoatomic gas molecule.

h) Write a note on Doppler effect.

Contd...2

i) Define group velocity. Give the relation between group velocity and phase velocity.

j) Determine the beat frequency of two waves travelling in the same direction if the frequency of these waves are 298 Hz & 292 Hz respectively.

SECTION – B

II. Answer any SIX of the following questions. **(6X5=30)**

2. Derive the equation of state for an adiabatic process of an ideal gas.

3. Obtain Clausius - Clapeyron equation using Maxwell's relation.

4. Give the theory of forced vibrations.

5. State and derive law of equipartition of energy.

6. Find the change in entropy of 0.5 kg of water which is heated from 10° C to 95° C at atmospheric pressure. (given specific heat of water $C = 4.2KJ\ kg^{-1}\ k^{-1}$)

7. Derive the Newton's formula and give the Laplace's correction for speed of sound in air.

8. Calculate The work done on the gas, when two mole of it is compressed from 4 litre to one litre at constant temperature of 0^0 C.

9. Obtain an expression for velocity of transverse waves on a stretched string.

SECTION – C

III. Answer any THREE of the following questions. **(3X10=30)**

10. a) State and Prove Carnot's theorem.

    b) Write the difference between reversible and irreversible process **(7+3)**

11. Discuss the theory of superposition of two mutually perpendicular simple harmonic oscillation. **(10)**

12. Derive Stefan-Boltzmann's law and Wein's displacement law from Planck's distribution law.

13. a) Obtain the expression for intensity of progressive wave.

    b) Calculate velocity of sound at 50^0 C. given $V_0 = 331$ m/s **(8+2)**

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