TDC (CBCS) Odd Semester Exam., 2019

PHYSICS

(3rd Semester)

Course No. : PHSSEC-301T

(Workshop Skill)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *three* questions : 1×3=3

(a) Give the SI unit of temperature.

(b) The density of wood in CGS system is $0{\cdot}5\ g\ cm^{-3}$. Find its value in SI.

(c) Write down the expression for volume of a cylindrical beaker of length L and radius R.

(d) What is back-lash error in a screw gauge?

2. Answer any *one* question : 2

(a) Explain instrumental error in Vernier Calipers.

(b) What are meant by pitch and least count?

3. Answer any *one* question : 5

(a) How can you measure the diameter of a thin wire by screw gauge?

(b) Describe the use of sextant to measure the height of a building.

UNIT—II

4. Answer any *three* questions : 1×3=3

(a) What is machining?

(b) Name any one type of electrical furnace used in foundry.

(c) What is meant by cast iron?

(d) Name any important joining process used in workshop.

5. Answer any *one* question : 2

(a) What is stainless steel?

(b) Name one alloy of copper and mention its any two useful properties.

6. Answer any *one* question : 5

(a) Explain metal casting.

(b) What is welding? Briefly explain any one type of welding. 1+4=5

UNIT—III

7. Answer any *three* questions : 1×3=3

(a) Name any two materials used for making cutting tools.

(b) What is the effective length of a file?

(c) Name any one tool used in fitting operation.

(d) What is a shaper related to workshop?

8. Answer any *one* question : 2

(a) What is milling?

(b) What is bench vise?

9. Answer any *one* question : 5

(a) What is lathe? Give a list of types of lathe used for manufacturing machine parts. 1+4=5

(b) Explain drilling process.

UNIT—IV

10. Answer any *three* questions : 1×3=3

(a) Explain the term 'soldering'.

(b) Mention one application of CRO.

(c) Name one device which is used as a voltage regulator in power supply.

(d) Why is transformer used in power supply?

11. Answer any *one* question : 2

(a) State various electrical quantities that can be measured with a multimeter.

(b) What is the difference between regulated and unregulated power supply?

12. Answer any *one* question : 5

(a) Draw the block diagram of a CRO and explain briefly the function of each block. 2+3=5

(b) Describe in detail the working of a timer circuit.

UNIT—V

13. Answer any *three* questions : 1×3=3

(a) What is the utility of gear system?

(b) Mention any two types of braking system.

(c) What are three types of lever?

(d) What is a pulley?

14. Answer any *one* question : 2

(a) Explain the working principle of a power generation system.

(b) Explain how a wheel is connected to a gear system.

15. Answer any *one* question : 5

(a) What do you understand by *(i)* fixed, *(ii)* movable and *(iii)* compound pulleys? Explain with example of each.

(b) Explain briefly the mechanism of lifting of heavy weight using lever.

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2019/TDC/ODD/SEM/PHSDSC/
PHSGE-301T/075

TDC (CBCS) Odd Semester Exam., 2019

PHYSICS

(3rd Semester)

Course No. : PHSDSC/PHSGE-301T

(Thermal Physics and Statistical Mechanics)

Full Marks : 50
Pass Marks : 20

Time : 3 hours

The figures in the margin indicate full marks for the questions

UNIT—I

1. Answer any *three* of the following questions : 1×3=3

(a) Name the thermodynamic process in which no heat enters or leaves the system.

(b) For which thermodynamic process $dU + dW = 0$ is valid?

(c) Temperature is a measurement of coldness or hotness of an object. This definition is based on which law of thermodynamics?

(d) For maximum efficiency of an engine with a given source of heat, what should be the temperature of the sink?

2. Answer any *one* of the following questions : 2

(a) Why is C_p greater than C_v?

(b) What are the limitations of first law of thermodynamics?

3. Answer any *one* of the following questions : 5

(a) Prove PV^{γ} = constant, for an adiabatic process.

(b) Define entropy. Show that the entropy remains constant in a reversible process.

1+4=5

UNIT—II

4. Answer any *three* of the following as directed : 1×3=3

(a) Which of the following is not a thermodynamical function?

(i) Enthalpy

(ii) Work done

(iii) Gibb's energy

(iv) Internal energy

(Choose the correct option)

(b) Define enthalpy.

(c) What is Joule-Thomson effect?

(d) Write the second TdS equation.

5. Answer any *one* of the following questions : 2

(a) "There is no change in the Gibb's function at constant pressure and temperature." Justify.

(b) Deduce first TdS equation.

6. Answer any *one* of the following questions : 5

(a) Using Maxwell's equation, show that for a perfect gas $\left(\frac{\partial U}{\partial V}\right)_T = 0$.

(b) Using Maxwell's equation, show that

$$C_p - C_v = T\left(\frac{\partial P}{\partial T}\right)_V \left(\frac{\partial V}{\partial T}\right)_P$$

where symbols have their usual meaning.

UNIT—III

7. Answer any *three* of the following questions : 1×3=3

(a) Define mean free path.

(b) State the law of equipartition of energy.

(c) Define coefficient of viscosity.

(d) What do you mean by transport phenomena of gases?

8. Answer any *one* of the following questions : 2

(a) How does viscosity of a gas varies with temperature and pressure? 1+1=2

(b) Explain the process of diffusion.

9. Answer any *one* of the following questions : 5

(a) Derive Maxwell's velocity distribution formula for a gas.

(b) Derive the relation

$$\gamma = \frac{C_p}{C_v} = 1 + \frac{2}{f}$$

where f is the degrees of freedom.

UNIT—IV

10. Answer any *three* of the following questions : 1×3=3

(a) What is a blackbody?

(b) Define energy density in the context of radiation.

(c) Which law states that λ_m is inversely proportional to absolute temperature?

(d) Wein's law is valid in which region of wavelength?

11. Answer any *one* of the following questions : 2

(a) Write a short note on Wein's law.

(b) What is ultraviolet catastrophe?

12. Answer any *one* of the following questions : 5

(a) Derive Planck's radiation formula.

(b) Explain the blackbody radiation curve in detail.

UNIT—V

13. Answer any *three* of the following questions : 1×3=3

(a) Define phase space.

(b) Define microstate.

(c) What is meant by thermodynamic probability?

(d) Name one particle that follows BE statistics.

14. Answer any *one* of the following questions : 2

(a) What are the fundamental postulates of MB-distribution?

(b) What are the limitations of MB statistics?

15. Answer any *one* of the following questions : 5

(a) What are the postulates of BE statistics? Deduce the relation $S = k \log \Omega$. 2+3=5

(b) Distinguish between MB, BE and FD statistics in detail.

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