VI Semester B.Sc. Examination, May 2017

(Fresh + Repeaters)

(CBCS – Fresh – 2016 – 17 & Onwards/NS – Repeaters – 2013 – 14 & Onwards)

PHYSICS – VIII

Atmospheric Physics, Electronics and Computational Physics

Time : 3 Hours

Max. Marks : 70

Instruction : *Answer* **five** *questions from* **each** *Part.*

PART – A

Answer **any five** of the following questions. **Each** question carries **eight** marks.

(5×8=40)

1. a) Explain "Relative humidity and Absolute humidity".

   b) What is hydrostatic balance ? Derive hydrostatic equation. **(4+4)**

2. a) Define :
      i) Absorptivity and
      ii) Emissivity of earth's atmosphere.

   b) Derive Beer's law. **(2+6)**

3. a) What is green house effect ?

   b) Derive an expression for pressure gradient force per unit mass in the atmosphere. **(2+6)**

4. a) What is an operational amplifier ? Mention any two characteristics of an ideal op-amp.

   b) Derive an expression for voltage gain of a non-inverting amplifier using op-amp. **(4+4)**

5. a) What is feedback ? State Barkhausen's conditions for sustained oscillations.

   b) Describe the working of Wien bridge oscillator with a diagram using op-amp and write it's frequency of oscillation. **(3+5)**

P.T.O.

6. a) Explain :
    i) NAND gate and
    ii) X OR gate, with their symbols and truth tables.

   b) What is half subtracter ? Give it's logic circuit and truth table.　　　　**(4+4)**

7. a) What is algorithm ?

   b) Define :
    i) Round-off error and
    ii) True error.

   c) Write a C-program to solve linear equation $ax + b = c$.　　　　**(1+2+5)**

8. a) Derive Newton backward difference formula using Taylor's series expansion.

   b) Write the algorithm to evaluate $I = \int_a^b f(x)dx$ using Simpson's $\frac{3}{8}$ rule.　　　　**(3+5)**

PART – B

Solve **any five** of the following problems. **Each** problem carries **four** marks.　**(5×4=20)**

9. The saturation vapour pressure at – 20°C is 4.6 mb at a place with atmospheric pressure of 1500 mb. The vapour pressure was measured to be 1.2 mb. Calculate the relative humidity at that place.

10. A rocket of mass 5000 kg is fired vertically upwards from a place at the equator with a velocity of 1300 ms^{-1}. If the angular velocity of the earth is 7.3×10^{-5} rad s^{-1}, calculate the Coriolis force acting on it.

11. Add the following numbers and verify the results by doing addition in decimal number system.

    $(1010)_2$, $(1011)_2$ and $(1111)_2$

12. Calculate the output voltage of a Summer circuit for the following values :

    $R_1 = 250\ K\Omega$, $R_2 = 500\ K\Omega$, $R_3 = 1M\Omega$, $R_f = 1M\Omega$, $V_1 = -3V$, $V_2 = 3V$ and $V_3 = 2V$

13. In an RC phase shift oscillator $R = 5000\ \Omega$ and $C = 0.1\ \mu F$. Calculate the frequency of oscillation.

14. Using Newton-Raphson method, find the real root of $f(x) = x^3 - x - 1$ correct to 9 decimal places.

15. Use the forward, central and backward difference formula to complete the last row of the table.

x	0.4	0.5	0.6
f(x)	0.393	0.612	0.851
f'(x)			

16. Using Euler's method, obtain the solution of $y' = x - y$ with $y(0) = 1$ at $x = 0 \,(0.2)\, 0.6$.

PART – C

Answer **any five** of the following questions. **Each** question carries **two** marks.

(5×2=10)

17. a) Is water vapour a green house gas ? Explain.

b) Name the sources of radiation in the atmosphere.

c) Why ICs are better compared to discrete circuit technology ?

d) Name the types of ICs.

e) Is 8 an octal number ? Explain.

f) What type of feedback is preferred for amplifiers ? Explain.

g) Is convergence of the bisection method fast ? Explain.

h) While applying Simpson's $\frac{1}{3}$ rule, how many intervals must be selected ? Explain.