

VI Semester B.Sc. Examination, May/June 2018

(F + R)

(CBCS – 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) What is a ozone layer ? Mention any two applications of ozone layer.
b) Obtain an expression for the variation of pressure with height. Give its graphical representation. (3+5)
2. a) Explain the emission curves of sun and Earth's atmosphere.
b) Explain the terms 'reflectivity' and 'transmittivity'. (4+4)
3. a) Derive an expression for centrifugal force on a rotating frame of reference, assuming $\frac{dr}{dt}\Big|_{\text{fixed}} = \frac{dr}{dt}\Big|_{\text{rot}} + (\omega \times r)$ where ω is the angular velocity.
b) Write a note on cyclones. (5+3)
4. a) What are the limitations of IC technology ?
b) With a neat circuit diagram obtain an expression for the voltage gain of the non-inverting operational amplifier. (2+6)
5. With a circuit diagram explain the working of Wein-Bridge oscillator. Write expression for its frequency of oscillation. Mention the advantages of this oscillator. 8
6. a) Write the logic symbol, boolean expression and truth table of a NOT gate.
b) What is a half-adder ? Explain the working of a half-adder with a logic diagram and its truth table. (3+5)

P.T.O.



7. Write a C-program to find the roots of a quadratic equation $x^2 + bx + c = 0$. 8
8. Write the algorithm and C-program to solve a differential equation using 2nd order Runge-Kutta method. 8

PART – B

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

9. The saturation vapour pressure at -10°C is 2.88 mb at a place with atmospheric pressure of 1000 mb.
- a) The vapour pressure was measured to be 0.72 mb. What is the relative humidity of that place ?
- b) When the relative humidity becomes 75%, what is the vapour pressure at the same temperature and pressure ?
10. The flux density of solar radiation reaching the earth, F_s is 1368 Wm^{-2} . The distance between earth and sun is $1.5 \times 10^{11} \text{ m}$. If the radius of the sun is $7 \times 10^8 \text{ m}$. Calculate the equivalent black body temperature of the outer surface of the sun. Given $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$.
11. At a certain station, the horizontal gradient of the sea level pressure is 550 Pa per 100 km. Find the pressure gradient per unit mass. Given that the density of air is 1.23 kgm^{-3} .
12. Calculate the output voltage of a three input inverting summing amplifier.
Given : $R_1 = 200 \text{ K}\Omega$, $R_2 = 250 \text{ K}\Omega$, $R_3 = 500 \text{ K}\Omega$, $R_f = 1000 \text{ K}\Omega$, $V_1 = -2\text{V}$, $V_2 = 2\text{V}$, $V_3 = 2\text{V}$.
13. An RC phase shift oscillator has each capacitor of capacitance $0.0047 \mu\text{F}$ and resistors of resistance $10 \text{ K}\Omega$ in the phase shift network. Calculate the frequency of oscillations.
14. Convert the following numbers from decimal to octal
a) 298 and b) 793.
15. Use the bisection method to solve $y = e^x - 3x$ with initial values 0.62000 and 0.60000.
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

17. Answer **any five** of the following questions. **Each** question carries **two** marks. **(5×2=10)**
- a) Does the temperature of troposphere change with height ? Explain.
 - b) Does the presence of water vapour influence density of air ? Explain.
 - c) The ionosphere is called a “radio-mirror”. Justify.
 - d) What is a nibble and byte ?
 - e) What is the difference between monolithic IC and hybrid IC ?
 - f) An AND gate output will always differ from an OR gate output for the same input conditions. Justify.
 - g) What are arrays ? Explain.
 - h) Is bisection method convergent ? Explain.
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