



MS – 301

VI Semester B.Sc. Examination, May 2016

(2013-14 and Onwards) (New Scheme)

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 are variable gases in the earth's atmosphere ? Explain.
b) Write a note on land and sea breeze. (4+4)
2. a) Obtain an expression for the variation of pressure with height. Show it graphically.
b) Explain the emission curves from earth's and sun's atmosphere. (4+4)
3. a) Explain the different forces that affect the atmospheric motion.
b) Explain any two applications of Coriolis force. (4+4)
4. a) Mention any two techniques of fabrication of IC.
b) With a neat circuit diagram explain the working of an Op-Amp as a summing amplifier. Obtain an expression for the output voltage. (2+6)
5. a) What is an oscillator ? Explain with a neat circuit diagram the working of phase shift oscillator. Write the expression for its frequency of oscillations.
b) Mention any two limitations of phase shift oscillator. (6+2)
6. a) Write the logic symbol and truth table for the logic gates :
i) NOT and ii) NAND.
b) What is a Half-Adder ? Explain the functioning of a Half-Adder with logic diagram and write its truth table. (4+4)
7. a) Give the syntax and an example of the 'for' statement in C.
b) Write a C-program to find the roots of a quadratic equation considering all the different cases. (2+6)
8. a) Write the algorithm to evaluate a definite integral using Simpson's $3/8^{\text{th}}$ rule.
b) Write the general formula and algorithm for solving a first order ordinary differential equation using the Runge-Kutta method of second order. (4+4)

P.T.O.



PART - B

Answer **any five** of the following questions. **Each** question carries **four** marks. **(5×4=20)**

9. If the surface pressure at a place is 200 hectopascal and at another place is 199 hectopascal which are 100 km apart, calculate the pressure gradient force per unit mass given $\rho = 1.29 \text{ kgm}^{-3}$.
10. Estimate the equivalent blackbody temperature of the outer surface of sun assuming the flux density of the solar radiation reaching the earth's surface is 1.568 kWm^{-2} , radius of sun is $7 \times 10^8 \text{ m}$ and earth orbit radius is $1.5 \times 10^{11} \text{ m}$. Given Stefan's constant $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2} \text{ K}^{-4}$.
11. Calculate the magnitude and direction of Coriolis acceleration at a station at 60°N latitude having a zonal wind of 15 ms^{-1} , given the angular velocity of rotation of the earth is $7.27 \times 10^{-5} \text{ rad s}^{-1}$.
12. A Wein Bridge Oscillator is to cover a frequency range of 20 Hz to 20 kHz. The variable capacitance has a value from 30 pF to 300 pF. Calculate the resistance values required to cover the frequency range.
13. Convert the following numbers from decimal to octal :
a) 298 and b) 793.
14. Use the bisection method to solve $y = e^x - 3x$ with initial values 0.62000 and 0.60000.
15. Apply Newton - Raphson method to solve the equation $x = \sqrt{N}$ and hence obtain the value of $\sqrt{5}$ up to third approximation.
16. Using Euler's method solve $(dy/dx) + xy = 0$ with $y(0) = 1$ from $x = 0$ to $x = 1$ in steps of 0.25.

PART - C

17. Answer **any five** of the following questions. **Each** question carries **two** marks. **(5×2=10)**
 - a) Troposphere which is only about 12 km in height contains 75% of total earth's atmosphere. Explain the reason.
 - b) Which force is responsible for erosion of one side of river banks ? Explain.
 - c) Colour of a star depends on its surface temperature, but not so for a planet. Explain the reason.
 - d) Why are integrated circuits called so ?
 - e) What are the values of input and output impedances of an ideal Op-Amp ?
 - f) Among the inverting and the non-inverting amplifiers, which one has higher voltage gain for a given R_1 and R_f ? Justify.
 - g) With $x = 3.8$, what is the output if %i is used as the format specifier in printf() to print x ?
 - h) Can the numerical integration using Simpson's rule be more accurate if we use more number of steps ?