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**GS-304**

VI Semester B.Sc. Examination, May/June - 2019

**PHYSICS - VIII**

**Atmospheric Physics, Electronics and Computational Physics**

**NS-(Repeaters-Prior to 2018-19) (2013-14 & Onwards)**

**(CBCS 2016-17 & Onwards)**

Time : 3 Hours

Max. Marks : 70

**Instructions to Candidates :** Answer **any five** questions from each part.

**PART - A**

Answer **any five** of the following questions. Each question carries **eight** marks. **5x8=40**

1. (a) Define absolute humidity and relative humidity. **2+6**  
(b) Obtain an expression for the variation of pressure with height. Give its graphical representation.
2. (a) Explain the terms reflectivity and transmittivity. **4+4**  
(b) Derive Beer's law for the absorption of solar radiation by earth's atmosphere.
3. (a) Mention any two forces that affect atmospheric motion. **2+6**  
(b) Explain the formation of trade winds and the erosion of river banks.
4. (a) What is feedback ? State Barkhausen's conditions for sustained **3+5** oscillations.  
(b) Describe the working of Wien bridge oscillator with a diagram using OP-AMP and write its frequency of oscillation.
5. (a) Mention any two techniques of fabrication of ICs. **2+6**  
(b) With the necessary circuit diagram arrive at an expression for the voltage gain of an inverting amplifier with feedback using OP-AMP.
6. (a) Write the logic symbol and the truth table of NAND gate and XOR gate. **4+4**  
(b) With the necessary truth table and circuit diagram explain the full-adder logic circuit used for binary addition.
7. Write a C programme to find the roots of a Quadratic equation  $ax^2 + bx + c = 0$ . **8**
8. Write the algorithm for free fall of a body with air resistance proportional to velocity by Euler's Method. **8**

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**PART - B**

Solve **any five** of the following problems. Each problem carries **four** marks.

**5x4=20**

9. Calculate the equivalent black body temperature  $T_E$  of the outer visible surface of the sun assuming that the flux density of the solar radiation reaching the earth surface is  $1365 \text{ W/m}^2$ . Radius of the sun  $= 7 \times 10^8 \text{ m}$  and the distance from sun to Earth  $= 1.5 \times 10^{11} \text{ M}$  given  $\sigma = 5.67 \times 10^{-8} \text{ Wm}^{-2}\text{K}^{-4}$
10. The horizontal pressure gradient of the sea level pressure at Nandhi hills is  $2 \text{ Pa per Kilometer}$ . If the air density is  $1.25 \text{ kgm}^{-3}$ . Calculate the pressure gradient force per unit mass.
11. Find the coriolis force/mass at a station at  $30^\circ \text{ N}$  having Zonal wind of  $15 \text{ ms}^{-1}$ . Given  $F_c = 2 \times 7.29 \times 10^{-5} \sin \theta$ .
12. An amplifier has gain of 800. When the feedback is applied, the gain is reduced to 150. Find the feedback ratio.
13. In RC phase shift oscillator  $R = 5 \text{ k}\Omega$  and  $C = 0.1 \mu\text{F}$ . Calculate the frequency of Oscillations.
14. Perform the following conversions :  
11011 to decimal,  $[52]_{10}$  to binary.
15. Use the bisection method to solve  $y = e^x - 3x$  with initial values 0.62000 and 0.60000.
16. If  $f(x) = \sqrt{x}$  find  $f'(2)$  using the difference method with  $h = 0.2$  and  $h = 0.02$ .

**PART - C**

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

**5x2=10**

- (a) Why wind speed is slower over land than over ocean ? Explain.
- (b) Earth atmosphere can be treated as a heat engine. Justify.
- (c) Does temperature of troposphere change with height ? Explain.
- (d) Name the type of ICs.
- (e) Which type of feedback is called regenerative ? Explain.
- (f) NAND and NOR gates are called universal logic gates. Explain.
- (g) What are arrays ? Explain.
- (h) Is bisection method convergent ? Explain.

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