V Semester B.Sc. Examination, November/December 2014
(OS) (Semester Scheme) (Prior to 2013-14)
PHYSICS – V
Gravitation, Space Physics and Electronics

Time : 3 Hours

Max. Marks : 60

Instruction : *Answer* **five** *questions from Part* **A**, **four** *questions from Part* **B** *and* **five** *questions from Part* **C**.

PART – A

Answer **any five** questions. **Each** question carries **six** marks.   (5×6=30)

1. a) State Kepler's law of planetary motion.

   b) Distinguish between inertial mass and gravitational mass.   (3+3)

2. a) What is an atmospheric window ? Explain.

   b) Derive an expression for the time period of the satellite.   (3+3)

3. Discuss thermodynamics of dry and moist air and hence obtain an expression for the virtual temperature.   6

4. Draw the ac equivalent circuit of CE transistor amplifier using h-parameters and hence obtain an expression for the input impedance and output impedance.   6

5. Explain with a circuit diagram how the JFET parameters can be found from the characteristics.   6

6. Explain how an op-amp can be used as Adder at the inverting mode. Derive an expression for its output. Discuss any two special cases of the connection.   6

7. Explain with a circuit diagram the action of phase shift oscillator. Write the expression for its frequency of oscillation.   6

8. a) Write a note on exclusive- OR gate.

   b) What is full adder ? Draw its block diagram using Half adder and write its truth table.   (3+3)

PART – B

Solve **any four** problems. **Each** problem carries **five** marks.   (4×5=2

9. Calculate the earths surface potential from the given data :

   Radius of the earth $= 6.4×10^3$ Km

   Mean density $= 5.5×10^3$ Kg m^{-3} and

   Gravitational constant $= 6.66×10^{-11}$ Nm^2 Kg^{-2}.

10. The moon takes 27.3 days to go once round the earth in an orbit of radius $3.9×10^5$ Km. Assuming the mass of the earth to be $6.3×10^{24}$ Kg, calculate the constant of gravitation.

11. For a zener shunt regulator if $V_Z = 10$ V, $R_S = 1$ K Ω, $R_L = 2$ K Ω and the input voltage varies from 22 to 36 V, find the maximum and minimum values of zener current.

12. The vertical gain control of a CRO is set at a deflection sensitivity 2V Cm^{-1}. An unknown ac voltage applied to it produces a trace which is 8 cm long. Find the value of the voltage.

13. A 5 mv, 1 KHz sinusoidal signal is applied to the input of an op-amp integrator for which R = 100 K Ω and C = 1 μ F. Find the output voltage.

14. Simplify the following Boolean expression.

    a) $Y = (A + B) (A + \bar{B}) (\bar{A} + C)$

    b) $Y = ABC + A\bar{B}C + AB\bar{C}$.

PART – C

15. Answer **any five** questions. **Each** question carries **two** marks.   (5×2=1

    a) What is a Parking orbit ? Explain.

    b) Is the Green house effect beneficial ? Explain.

    c) Does a p-n junction possess capacitance ? Explain.

    d) In what way thick film IC's are different from thin film IC's ? Explain.

    e) Can an op-amp be used as a voltage multiplier ? Explain.

    f) Does XOR gate be called an exclusively – OR ? Justify.