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**UG/II/ELECT/H/IV/17(Old)**

**2017**

**ELECTRONICS**

**[ Honours ]**

**( Theory )**

**PAPER – IV**

**Full Marks : 100**

**Time : 4 hours**

*The figures in the right hand margin indicate marks*

*Candidates are required to give their answers in their own words as far as practicable*

*Illustrate the answers wherever necessary*

**[ OLD SYLLABUS ]**

**GROUP – A**

**Answer any two questions :**

**15 × 2**

1. (a) Define the characteristics impedance of a transmission line and derive an expression for it.

*( Turn Over )*

(b) Find out the condition of minimum attenuation in transmission line.

(c) A low loss co-axial cable of characteristic impedance of  $50 \Omega$  is terminated in a resistive load of  $75 \Omega$ . Calculate the VSWR. If the minimum voltage in the SWR is 30 V, calculate the minimum voltage.

4 + 7 + 4

2. (a) What are the different layers of the ionosphere ?

(b) Derive the expression for the field strength of space wave propagation in tropospheric condition.

(c) At any instant of time the  $F_2$  layer of ionosphere has a height of 400 km and electron density of  $10^{11} \text{ m}^{-3}$  (i) Find the critical frequency (ii) Determine the maximum possible angle of incidence for a 10 MHz radiation to get reflected from the layer. (iii) Calculate the skip distance.

3 + 6 + (2 + 2 + 2)

3. (a) With the help of a neat sketch describe the TOKENBUS ARCHITECTURE.
- (b) Write a program in BASIC to read real value of  $x$  and do the following sum.

$$x - \frac{x^3}{3!} + \frac{x^5}{5!} - \dots \text{ up to 10 terms.} \quad 8 + 7$$

GROUP - B

Answer any five questions : 8 × 5

4. (a) Using Maxwell's field equations obtain the expressions for the electric and magnetic fields of an electromagnetic travelling wave in a non-conducting dielectric medium.
- (b) Show also that electric and magnetic fields of the wave are mutually perpendicular. 6 + 2
5. Prove that the energy associated with a continuous charge distribution is given by,

$$W = \frac{\epsilon_0}{2} \int E^2 dr. \quad 8$$

6. What is *p-i-n* photo diode ? Explain the principle of operation of *p-i-n* photo diode with the help of energy band diagram. 2 + 6
7. Derive the expression for the field strength of space wave propagation in tropospheric condition. What is skip distance ? 6 + 2
8. (a) Obtain an expression for numerical aperture of an optical fiber and discuss its significance. 5
- (b) Consider a fiber with  $n_1 = 1.48$ ,  $n_2 = 1.46$  and with its end point immersed in water ( $n_0 = 1.33$ ). What is the maximum angle of incidence for guidance ? 3
9. Write a program in BASIC to read a real value of  $x$  and do the following sum
- $$1 + x + \frac{x^2}{2!} + \frac{x^3}{3!} + \frac{x^4}{4!} + \dots \text{ up to 20 terms.} \quad 8$$
10. How many network layer are there in a network system ? Explain the function of physical, data link and network layers. 2 + 6

( 5 )

11. Starting from the equation of motion of an electron in a dilute gas, obtain the dispersion relation for electromagnetic wave in the medium. When the dispersion is called normal and when is it anomalous ? 6 + 1 + 1

GROUP - C

Answer any five questions : 4 × 5

12. Draw a flow chart to calculate the sum 1 to 10. 4
13. Write down the Maxwell's equations in phaser from considering sinusoidal time variation. 4
14. Obtain the differential form of Ampere's law. 4
15. What is LDR ? How does it work ? 1 + 3
16. What do you mean assembly language and machine language ? 2 + 2

( 6 )

17. Write the characteristic feature of 'Ethernet protocol'. 4
18. What is compiler? What are the functions of compiler? 2 + 2
19. What are the ground waves? Where are they used and what are their advantages? 1 + 3

[ *Internal Assessment* : 10 Marks ]

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