

2008

ELECTRONICS

[1st Semester]

PAPER—EL-1102

Full Marks : 50

Time : 2 hours

Answer Q. No. 1 and any three other questions from the rest

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

[University written examination : 40 Marks
& Internal Assessment : 10 Marks]

1. Answer all questions : 2 × 5

(a) What are the reflection coefficients for the transmission line if the lines are

(i) terminated by its characteristic impedance, and

(ii) open-circuited ?

(Turn Over)

(b) What type of waveguide we will prefer square or rectangular, and why ?

(c) What do you mean by resonant antenna and non-resonant antenna ?

(d) How is space wave affected by atmospheric condition ?

(e) What is meant by dc break down ?

2. (a) Define reflection coefficient and standing wave ratio of a transmission line and establish the relationship between them.

(b) Explain how a section of a transmission line can be used as lumped circuit elements.

(c) A $\lambda/8$ section of a lossless transmission line is terminated in a load $(50 + j 50)\Omega$. If the characteristic impedance of the line is 50Ω , determine (i) the input impedance of the line and (ii) the reflection coefficient at the load.

4 + 2 + 4

3. (a) What are the degenerate modes ? Name different types of power losses in a rectangular waveguide. State the methods of exciting various modes in rectangular waveguides.

(b) Derive the TE_{mn} field equations in circular waveguides. (1 + 1 + 3) + 5

4. (a) What is an elemental antenna ? Derive the expression for radiation resistance of the elemental antenna.

(b) Mention some of the special features of a microwave antenna.

(c) Write some of the advantages of a helical antenna and mention its uses. (1+4)+2+(1 $\frac{1}{2}$ +1 $\frac{1}{2}$)

5. (a) Explain the term skip distance.

(b) Deduce the expression for the range of line of sight communication of space wave propagation if the transmitter and receiver heights are h_1 and h_2 respectively.

(c) An HF radio communication is to be established between two points on the earth's surface. The points are at a distance of 2000 km. The height of the ionospheric layer is 220 km and the critical frequency is 5 MHz. Find the maximum usable frequency. 2 + 5 + 3

6. (a) Explain quasi-neutrality of plasma. How is it maintained ?
- (b) Describe with a diagram one of the laboratory methods used for producing plasma.
- (c) What is the meaning of cut-off frequency of a plasma ? (2 + 2) + 4 + 2
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