

(3 Hours)

Max Marks: 80



1. Question No. 1 is compulsory.
2. Out of remaining questions, attempt any three questions.
3. Assume suitable additional data if required.
4. Figures in brackets on the right hand side indicate full marks.

- Q.1. (A) Write a short note on TRAPATT. (05)  
 (B) Write a short note on high electron mobility transistors. (05)  
 (C) Match a load impedance  $Z_L = 60 - j80$  to a  $50 \Omega$  line using a double stub tuner. The stubs are open circuited and are spaced  $\lambda/8$  apart. The match frequency is 2 GHz. (10)
- Q.2. (A) With a neat functional diagram explain the working principle of Cylindrical Magnetron. (10)  
 (B) Derive equation for phase velocity, cutoff frequency, cutoff wavelength and field equations for rectangular waveguide. (10)
- Q.3. (A) Explain any one bio-medical application using microwave. (10)  
 (B) Explain the working of a negative resistance parametric amplifier. (10)
- Q.4. (A) What is the importance of beam coupling coefficient? Derive the equation of velocity modulation in klystron. (10)  
 (B) Given the circuit shown in Fig. 4(B), design a lumped element matching network at 60 MHz that would transform Load impedance  $Z_L = 100 - j25 \Omega$  into an input impedance of  $Z = 25 + j15 \Omega$ . Take  $Z_0 = 50 \Omega$ . (10)

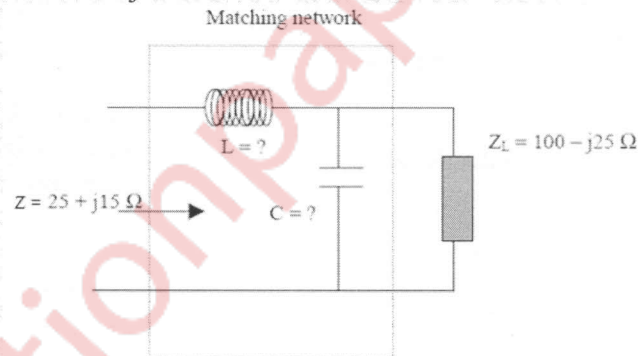


Fig. 4(B)

- Q.5. (A) What is meant by RADAR range? Derive the equation for Radar range in terms of the noise figure. (10)  
 (B) Radar operating at 1.5 GHz uses a peak pulse power of 2.5 MW and has a range of 100 nmi for objects whose radar cross section is  $1 \text{ m}^2$ . If the minimum receivable power of the receiver is  $2 \times 10^{-13}$  Watt, what is the smallest diameter of the antenna reflector could have assuming it to be a full paraboloid with  $\eta = 0.65$ . (10)
- Q.6. Write a short note on following:  
 (A) Gunn diode. (07)  
 (B) Hybrid Ring. (07)  
 (C) Instrument landing system. (06)

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