(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 Ω line using a double stub tuner. The stubs are open circuited and are spaced $\lambda/8$ apart. The match frequency is 2 GHz.
- Q.2. (A) With a neat functional diagram explain the working principle of Cylindrical (10) Magnetron.
 - (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 $Z_0 = 50 \Omega$.

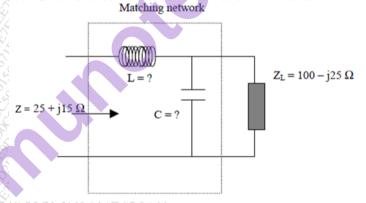


Fig. 4(B)

- Q.5. (A) What is meant by RADAR range? Derive the equation for Radar range in terms (10) of the noise figure.
 - (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 m². If the minimum receivable power of the receiver is $2x10^{-13}$ Watt, what is the smallest diameter of the antenna reflector could have assuming it to be a full paraboloid with n=0.65.
- Q.6. Write a short note on following:
 - (A) Gunn diode: (07)

(10)

- (B) Hybrid Ring. (07)
- (C) Instrument landing system. (06)

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