

17656

16117

3 Hours / 100 Marks

Seat No.

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- Instructions* – (1) All Questions are *Compulsory*.
(2) Answer each next main Question on a new page.
(3) Assume suitable data, if necessary.
(4) Use of Non-programmable Electronic Pocket Calculator is permissible.
(5) Mobile Phone, Pager and any other Electronic communication devices are not permissible in Examination Hall.

Marks

1. a) Attempt any THREE of the following: 12
- (i) Define the terms w.r.t. waveguide
 - (1) Cutoff frequency
 - (2) Group velocity
 - (ii) Draw well labeled constructional diagram of TWT. State any two specifications.
 - (iii) Write radar range equation. State factors influencing maximum range of radar.
 - (iv) Define following terms w.r.t. satellite -
 - (i) Azimuth angle
 - (ii) Elevation angle.

P.T.O.

b) **Attempt any ONE of the following:****6**

- (i) Justify TE_{110} mode in rectangular waveguide is the dominant mode. Draw the field pattern for TE_{110} and TE_{210} mode.
- (ii) With suitable. Sketch and waveforms, explain the working of IMPATT diode.

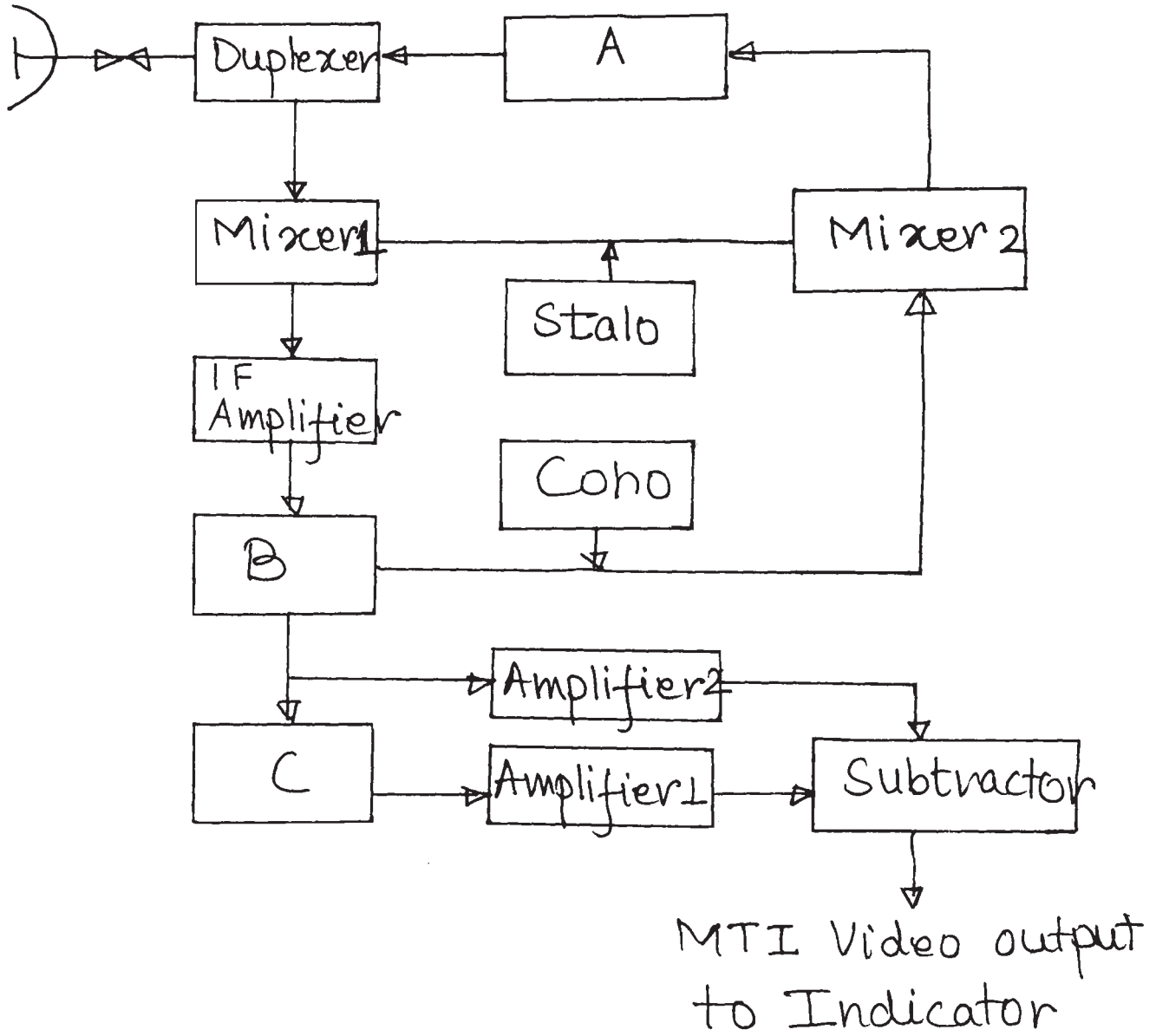
2. Attempt any FOUR of the following:**16**

- a) A rectangular waveguide measures 3×4.5 cm internally and has a 9 GHz signal propagated in it. Calculate the cut off wave length, the guide wavelength, phase velocity and the characteristic wave impedance for TE_{110} mode.
- b) Why do practical Klystron amplifiers generally have more than two cavities ? How can broad band operation be achieved in multicavity Klystrons.
- c) Write the operation of pulsed radar to detect the object.
- d) What is uplink and downlink frequency. Give reason for difference in uplink and downlink frequency.
- e) Draw the frequency for optical communication with band name and its range.
- f) Compare SMSI and MMGI fibers based on
 - (i) Mode
 - (ii) Refractive index profile
 - (iii) Data rate
 - (iv) Application

- 3. Attempt any FOUR of the following:** **16**
- a) State any three advantages and one disadvantage of circular waveguide.
 - b) With neat diagram, illustrate the working of the Quenn diode.
 - c) With the aid of a sketch, explain the PPI Radar indicator.
 - d) Compare Non synchronous and synchronous satellite based on
 - (i) Orbit
 - (ii) Visibility
 - (iii) Altitude
 - (iv) Footprint
 - e) State any six advantages and two disadvantages of fiber optics cable.
- 4. a) Attempt any THREE of the following:** **12**
- (i) Calculate the cut off wavelength, guide wavelength, characteristic wave impedance of a wave guide whose internal diameter is 4cm for a 12 GHz signal propagated in it in the TE_{111} mode.
 - (ii) Sketch the construction of tunnel diode and write its operation.
 - (iii) What is doppler effect. How doppler effect is used to calculate the relative velocity.
 - (iv) Illustrate how telemetry tracking and command system used in satellite communication.

b) Attempt any ONE of the following:

(i) Identify the given diagram, label the block A, B and C and illustrate why those blocks are needed.



(ii) Draw the block diagram of fiber optics communication system and illustrate the function of each block.

5. Attempt any FOUR of the following:**16**

- a) Draw the constructional diagram of Isolator and illustrate its operation.
- b) With the aid of neat diagram, illustrate phase focussing effect in the cavity magnetron.
- c) How amplification takes place in Avalanche photodiode (APD) used as optical detectors ?
- d) Draw and explain the block diagram of transponder/communication channel subsystem.
- e) Calculate critical angle of incidence between two material with different refractive indices $n_1 = 1.4$ and $n_2 = 1.36$. Also calculate numerical aperture and acceptance cone angle.
- f) When the optical power launched into an 8km length of fiber is $120 \mu\text{W}$, the mean optical power at the fiber output is $3 \mu\text{W}$. Determine -
 - (i) the overall signal attenuation or loss, in decibels through the fiber assuming there is no connector or splicer.
 - (ii) The signal attenuation per kilometer for the fibers.

6. Attempt any FOUR of the following:**16**

- a) Draw the neat sketch of hybrid junction, illustrate its properties.
 - b) Illustrate modal dispersion loss. Where it occurs and how it can be controlled ?
 - c) Illustrate elastic tube splicing with neat diagram.
 - d) How power is generated in satellite. Describe how it is distributed to other subsystem of satellite.
 - e) Distinguish between LED and LASER diode on the basis of -
 - (i) Operating principle
 - (ii) Switching time
 - (iii) Spectral width
 - (iv) Life
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