Registration No.: | | | | | | | | | | |

Total Number of Pages: 02

Course: B.Tech
Sub Code: REC7D006

7th Semester Regular/Back Examination: 2025-26
SUBJECT: Radar and TV Engineering
BRANCH(S): ECE, ETC
Time: 3 Hours
Max Marks: 100
Q.Code: U167

Answer Question No.1 (Part-I) which is compulsory, any eight from Part-II and any two from Part-III.
The figures in the right-hand margin indicate marks.

Part-I

Q1 **Answer the following questions:** **(2 x 10)**

a) What does the acronym RADAR stand for?
b) Why is isolation between the transmitter and receiver required in a CW (Continuous Wave) Radar?
c) What is the difference between an MTI and a Pulse Doppler Radar?
d) What is a Duplexer, and what is its purpose in a Radar System?
e) A Radar has a power of 1 KW and is operating at a frequency of 10 GHz. It is located on a mountain top, at a height of 500 m. The maximum distance up to which it can detect an object located on the surface of the Earth is _____ km.
f) What is the role of a CCD (Charge Coupled Device) in a Camera?
g) Define the terms: Luminance and Chrominance.
h) Why is the Discrete Cosine Transform used in Video encoding?
i) In analogue TV transmission, why is amplitude modulation used for the video carrier and frequency modulation used for the audio carrier?
j) What is CCTV? How does it differ from CATV?

Part-II

Q2 **Only Focused-Short Answer Type Questions- (Answer Any Eight out of Twelve)** **(6 x 8)**

a) With neat sketches, draw the block diagram of a basic pulse Radar system and explain the function of each block.
b) Derive the Radar range equation and identify the factors it depends on with justification.
c) Define unambiguous range and explain its relationship to the pulse repetition frequency (PRF).
d) What is MTI Radar? Explain its use in distinguishing moving targets from clutter.
e) A police Radar operating at 8 GHz measures the Doppler frequency "f_d" of 1788 Hz from a car approaching a stationary police vehicle in an 80 Km/h speed limit zone. What could the police officer do?

f) Explain the use of Vestigial Sideband Transmission in TV. How much is the saving in spectrum effected by the use of the vestigial sideband system?

g) What are the differences found in MPEG-2 and MPEG-4 video compression techniques? Compare in terms of Quality, Bandwidth and Applications.

h) With a neat sketch, show the various blocks of a monochrome TV receiver and explain the functions of each block in brief.

i) What do you understand by the Yagi-Yuda Antenna in a Television System? Specify the relative lengths and distances between the various elements.

j) How do you differentiate the analogue colour TV standards, such as PAL, NTSC, and SECAM, in terms of resolution and frame rate?

k) Compare the display technologies in LED and LCD TVs.

l) What is TVRO? How does it differ from DTH system?

Part-III

Only Long Answer Type Questions (Answer Any Two out of Four)

Q3 a) Explain the operation of a CW Doppler Radar with a non-zero IF receiver, including the role of the block diagram and the benefits of this configuration. **(12)**

b) Distinguish between PPI and A-Scope. **(4)**

Q4 a) What is the core principle behind the LORAN navigation System? How is a receiver's position determined? What is the modern replacement for the LORAN system? **(8)**

b) What do you understand by a Delay Line Canceller? Explain its role in the MTI Radar System. **(8)**

Q5 a) What do you understand by interlaced scanning in TV? What are the advantages of it over progressive scanning? **(8)**
Calculate the horizontal and vertical frequency of interlaced scanning in the following systems.
(i) 525 lines, 30 Frames per second.
(ii) 625 lines, 25 Frames per second.

b) Calculate the bandwidth required for the video signal formed by the scanning system with 525 lines per picture and 30 pictures per second. The aspect ratio is 4:3, and the Kell factor = 0.7. **(8)**

Q6 a) Provide the block diagram of a TV transmitter and briefly explain its functioning. **(10)**

b) What is the role of blanking and synchronising pulses that are used in a TV receiver? **(6)**