SRM VALLIAMMAI ENGINEERING COLLEGE
(An Autonomous Institution)

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF
ELECTRONICS AND COMMUNICATION ENGINEERING

QUESTION BANK

V SEMESTER
PEC601 –Satellite and Radar Communication
Regulation – 2023

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UNIT I SATELLITE ORBITS				
Kepler's Laws, Newton's law, orbital parameters, orbital perturbations, station keeping, geo stationary and non-Geo-stationary orbits–Look Angle Determination- Limits of visibility –eclipse- Sub satellite point–Sun transit outage-Launching Procedures-launch vehicles and propulsion.				
	PART A			
Q. No	**Questions**	**CO**	**BT Level**	**Competence**
1.	Mention the services offered by the satellites.	CO1	BTL1	Remembering
2.	Define Kepler's First Law for planetary motion.	CO1	BTL1	Remembering
3.	State Kepler's second law of planetary motion.	CO1	BTL2	Understanding
4.	Write the importance of Kepler's third law.	CO1	BTL2	Understanding
5.	Differentiate the ascending and descending nodes.	CO1	BTL2	Understanding
6.	List the significance of Newton's law.	CO1	BTL1	Remembering
7.	Differentiate Apogee and Perigee.	CO1	BTL1	Remembering
8.	Identify the frequency bands used for satellite applications.	CO1	BTL1	Remembering
9.	Illustrate the orbital parameters used for positioning a satellite.	CO1	BTL2	Understanding
10.	List the launching stages of a satellite with example.	CO1	BTL1	Remembering
11.	Analyze where the determination of antenna look angles used.	CO1	BTL2	Understanding
12.	Mention the purpose of station keeping.	CO1	BTL1	Remembering
13.	Name the basic factors affecting satellite position.	CO1	BTL1	Remembering
14.	Compute the radius of a circular orbit for which the period is 1 day.	CO1	BTL2	Understanding
15.	Differentiate geostationary and geosynchronous satellites.	CO1	BTL2	Understanding
16.	What are polar-orbiting Satellites?	CO1	BTL1	Remembering
17.	Compare prograde orbit and retrograde orbit.	CO1	BTL2	Understanding
18.	Justify why the batteries plays a major role in satellites during Eclipse?	CO1	BTL2	Understanding
19.	Analyze the differences between LEO and MEO satellites.	CO1	BTL1	Remembering
20.	What is meant by sub satellite point and its directions?	CO1	BTL1	Remembering
21.	Compare parking orbit and transfer orbit.	CO1	BTL2	Understanding
22.	Find the viewing angle of a geostationary satellite orbiting at 42000 km from an earth station making an elevation angle of 25 degrees.	CO1	BTL2	Understanding
23.	What is meant by sun transit outage?	CO1	BTL1	Remembering
24.	Point out the uses of launching vehicles.	CO1	BTL2	Understanding
	PART – B			
1.	State and illustrate the Kepler's laws of planetary motion with suitable diagrams. (16)	CO1	BTL3	Applying
2.	(i) Describe the launching procedure of satellite. (8) (ii)Calculate the apogee and perigee heights for the orbital parameters. Assume a mean earth radius of 6371 km. e =.0011501, a=7192.3 km. (8)	CO1	BTL4	Analyzing

3.	(i) State and examine the significance of Newton's laws in satellite communication. (8) (ii) Estimate the suitable equations for azimuth angle and location of geostationary satellite. (8)	CO1	BTL3	Applying
4.	Describe the orbital parameters in detail with necessary illustration (16)	CO1	BTL3	Applying
5.	Analyze the effects of a non-spherical earth in orbital Perturbations. (16)	CO1	BTL4	Analyzing
6.	Summarize the different types of satellite orbits and discuss their merits and demerits. (16)	CO1	BTL3	Applying
7.	A satellite is in a 322 km high circular orbit. Determine: a. The orbital angular velocity in radians per second; (6) b. The orbital period in minutes; and (4) c. The orbital velocity in meters per second. (6) Assume the average radius of the earth is 6378.137 km and Kepler's constant has the value 3.986004418×10^5 $km^3/s^{2.}$	CO1	BTL4	Analyzing
8.	Describe the structures and functions of orbital elements used in a satellite. (16)	CO1	BTL3	Applying
9.	Write short notes on (i) Sub satellite point (8) (ii) Propulsion system (8)	CO1	BTL3	Applying
10.	(i) State the significance of station keeping. (8) (ii) Define the term limits of visibility in satellite looking from the earth station. (8)	CO1	BTL3	Applying
11.	Derive the expression for elevation angle for geostationary Satellite. (16)	CO1	BTL4	Analyzing
12.	(i) Discuss in detail the orbital parameters like inclination, ascending node, semi major axis and eccentricity. (8) (ii) Explain the sun transit outrage. (8)	CO1	BTL4	Analyzing
13.	Summarize the different applications & different services provided by satellite services. (16)	CO1	BTL4	Analyzing
14.	(i) Underline the effects of a solar eclipse on a satellite (8) (ii) List the features of near stationary orbits. (8)	CO1	BTL3	Applying
15.	A satellite is orbiting in the equatorial plane with a period from perigee to perigee of 12 h. Given that the eccentricity is 0.002, Investigate the semi major axis. The earth's equatorial radius is 6378.1414 km. (16)	CO1	BTL4	Analyzing
16.	What is the principle of a liquid propulsion system? Explain the specific technologies under the categories of electric and ion propulsion. (16)	CO1	BTL3	Applying
17.	(i) Asses the orbital velocity of a satellite from the forces acting on the satellite. (8) (ii) Write a brief note on launch vehicles and propulsion. (8)	CO1	BTL4	Analyzing

UNIT II SPACE SEGMENT

Spacecraft Technology - Structure, Primary power, Attitude and Orbit control, Thermal control and Propulsion, communication Payload and supporting subsystems, Telemetry, Tracking and command – Transponders - The Antenna Subsystem

PART A

Q.No	Questions	CO	BT Level	Competence
1.	List the materials used for making the satellites.	CO2	BTL1	Remembering
2.	Assess the need of a thermal control segment for a spacecraft.	CO2	BTL1	Remembering
3.	Define satellite and its applications.	CO2	BTL1	Remembering
4.	Differentiate between split-body stabilization and spin stabilization in satellites.	CO2	BTL2	Understanding
5.	State the importance of AOCS.	CO2	BTL1	Remembering
6.	Write a note on spin stabilized satellites.	CO2	BTL1	Remembering
7.	Why is attitude control necessary in a satellite?	CO2	BTL2	Understanding
8.	Name the three axes used to define a satellite's attitude.	CO2	BTL1	Remembering
9.	Justify how the attitude of a satellite controlled through active control?	CO2	BTL2	Understanding
10.	Examine why station keeping consumes so much fuel in the satellite.	CO2	BTL2	Understanding
11.	Point out the role of station-keeping maneuvers.	CO2	BTL1	Remembering
12.	Identify the major design types of satellites.	CO2	BTL1	Remembering
13.	Classify the fuel estimation system used in satellites.	CO2	BTL2	Understanding
14.	Draw some common structural types to hold the spacecraft.	CO2	BTL2	Understanding
15.	Illustrate how you achieve stabilization by momentum wheel?	CO2	BTL2	Understanding
16.	What are the advantages of using solar power over nuclear power in satellites?	CO2	BTL2	Understanding
17.	State the term" propellant" and its types.	CO2	BTL1	Remembering
18.	Write the functions of the TT&C subsystem	CO2	BTL1	Remembering
19.	What is meant by transponder?	CO2	BTL1	Remembering
20.	Examine why noise temperature is a useful concept in communication receiver.	CO2	BTL2	Understanding
21.	Describe the terms gain and bandwidth in antenna subsystem.	CO2	BTL1	Remembering
22.	Write the uplink & downlink frequencies of a satellite.	CO2	BTL2	Understanding
23.	Compare momentum wheel and spin stabilization.	CO2	BTL2	Understanding
24.	Express the 3-dB beam width of antennas used in satellites.	CO2	BTL2	Understanding

PART – B

1.	Describe the communication payload and supporting subsystems used in satellite. (16)	CO2	BTL3	Applying
2.	Illustrate the structure of spacecraft technology and explain the components of spacecraft. (16)	CO2	BTL4	Analyzing
3.	For a satellite circuit the carrier-to-ratio are: uplink 23 dB, downlink 20 dB, intermodulation noise 24dB. Calculate the overall carrier-to-ratio in dB. Suggest a method to reduce intermodulation noise. (16)	CO2	BTL4	Analyzing
4.	Sketch the attitude control momentum wheel stabilization in the	CO2	BTL4	Analyzing

	space segment with necessary diagrams and explain it. (16)			
5.	Describe the term "antenna" and discuss in detail the various types of antennas used in satellites. (16)	CO2	BTL3	Applying
6.	Assess the various methods of generating the power in satellites and explain the importance of solar cells in satellite. (16)	CO2	BTL4	Analyzing
7.	Summarize the importance of propulsion system. Also explain the mono and bi-propellant system used in satellite. (16)	CO2	BTL3	Applying
8.	Examine how the attitude and orbit control system is achieved through spin stabilization systems? Give necessary diagrams. (16)	CO2	BTL4	Analyzing
9.	Illustrate the functions of Telemetry, Tracking and Command system in ground segment with suitable diagrams. (16)	CO2	BTL3	Applying
10.	Describe the components of thermal control system and why it is necessary in a satellite. (16)	CO2	BTL4	Analyzing
11.	Explain what is meant by satellite altitude and briefly describe two forms of attitude control. (16)	CO2	BTL3	Applying
12.	Describe the East West and North South station keeping maneuvers required in satellite station keeping. (16)	CO2	BTL3	Applying
13.	(i) Describe the necessity of power amplifier in the transponder. (8) (ii) List out the methods of estimating the fuel in the satellite. (8)	CO2	BTL3	Applying
14.	Describe briefly about the antenna subsystem and Derive the antenna gain and bandwidth of antenna subsystem. (16)	CO2	BTL3	Applying
15.	Analyze the reasons behind why the transponders are connected in the communication channel with neat diagrams. (16)	CO2	BTL4	Analyzing
16.	Briefly describe the three-axis method of satellite stabilization. (16)	CO2	BTL3	Applying
17.	Elaborate the wideband receiver used in satellite transponder. (16)	CO2	BTL4	Analyzing

UNIT III SATELLITE LINK DESIGN

Basic link analysis, Uplink and Downlink Design equation, Free space loss-Atmospheric effects, Ionospheric scintillation, Rain induced attenuation and interference, system noise temperature, Link Design with and without frequency reuse.

PART A

Q.No	Questions	CO	BT Level	Competence
1.	Write the significance of RF power density.	CO3	BTL2	Understanding
2.	Outline the path loss in satellite communication.	CO3	BTL2	Understanding
3.	Define noise factor.	CO3	BTL1	Remembering
4.	Interpret the term saturation flux density.	CO3	BTL2	Understanding
5.	What is EIRP of an antenna?	CO3	BTL1	Remembering
6.	A satellite downlink at 12GHz operates with a transmit power of 6w and an antenna gain of 48.2dB. Calculate the EIRP in dBW.	CO3	BTL2	Understanding
7.	The range between a ground station and a satellite is 42000 km. Calculate the free space loss a frequency of 6 GHz.	CO3	BTL2	Understanding
8.	What is a link margin? How is it computed in a satellite link?	CO3	BTL1	Remembering
9.	Write the equation of link budget.	CO3	BTL1	Remembering

10.	What are factors contributing to noise in an earth station receiving channel?	CO3	BTL2	Understanding
11.	List the earth station parameters affecting C/N ratio.	CO3	BTL1	Remembering
12.	A receiving system has antenna noise temperature of 60K & its receiver noise figure 9dB. Find the system noise temperature if room temperature is 290K.	CO3	BTL2	Understanding
13.	How would you relate Input and output back-off for the satellite Traveling-wave-tube amplifier?	CO3	BTL2	Understanding
14.	The range between a ground station and a satellite is 42,000 Km. Predict the free space loss at a frequency of 10 GHz.	CO3	BTL2	Understanding
15.	Illustrate the antenna misalignment losses.	CO3	BTL2	Understanding
16.	Why is the cassegrain antenna popular for large earth station?	CO3	BTL2	Understanding
17.	Point out the basic requirements of an earth station antenna.	CO3	BTL1	Remembering
18.	Outline the concept of fade margin.	CO3	BTL1	Remembering
19.	Define intermodulation noise.	CO3	BTL1	Remembering
20.	Identify the effects of rain in fade margin.	CO3	BTL1	Remembering
21.	What is co-channel interference? How does frequency reuse cause it?	CO3	BTL1	Remembering
22.	Name the Ionospheric effects on space link.	CO3	BTL1	Remembering
23.	What is the relationship between EIRP and antenna gain?	CO3	BTL1	Remembering
24.	What is meant by polarization interleaving?	CO3	BTL1	Remembering
	PART – B			
1.	(i) Derive the expression for Equivalent Isotropic Radiated Power. (10) (ii) Find the gain in decibels of a 3-m paraboloidal antenna operating at a frequency of 12 GHz. Assume an aperture efficiency of 0.55. (6)	CO3	BTL3	Applying
2.	(i) Express the uplink equation with respect to saturation flux density. (8) (ii) An uplink operates at 14 GHz, and the flux density required to saturate the transponder is -120 dB (W/m^2). The free-space loss is 207 dB, and the other propagation losses amount to 2 dB. Calculate the earth-station [EIRP] required for saturation, assuming clear-sky conditions. (8)	CO3	BTL3	Applying
3.	Summarize the various types of system noise and explain in detail. (16)	CO3	BTL3	Applying
4.	A satellite link operating at 14 GHz has receiver feeder losses of 1.5 dB and a free-space loss of 207 dB. The atmospheric absorption loss is 0.5 dB, and the antenna pointing loss is 0.5 dB. Depolarization losses may be neglected. Determine the total link loss for clear-sky conditions. (16)	CO3	BTL3	Applying
5.	Demonstrate the equation of noise figure and carrier to noise ratio with necessary diagrams. (16)	CO3	BTL3	Applying
6.	Explain about free space transmission losses and express the received power in unit of dBW. (16)	CO3	BTL3	Applying
7.	Describe the noise temperature of absorptive networks and Derive the expression for overall system noise temperature at the receiving earth station. (16)	CO3	BTL4	Analyzing

8.	Discuss the following in detail: (i) Uplink rain-fade margin (8) (ii) Downlink rain-fade margin (8)	CO3	BTL4	Analyzing
9.	Analyze input and output back-off relationship for the satellite Traveling-wave-tube amplifier. (16)	CO3	BTL4	Analyzing
10.	Draw the power flow diagram, explain the combined uplink, and downlink communication. (16)	CO3	BTL3	Applying
11.	A QPSK signal is transmitted by satellite. Raised-cosine filtering is used, for which the roll off factor is 0.2 and a bit error rate (BER) of 10-5 is required. For the satellite downlink, the losses amount to 200 dB, the receiving earth station G/T ratio is 32 dBK, and the transponder bandwidth is 36 MHz. Calculate the bit rate that can be accommodated and the EIRP required. (16)	CO3	BTL4	Analyzing
12.	Describe the following with diagram. (i) Feeder losses (8) (ii) Antenna misalignment losses (8)	CO3	BTL3	Applying
13.	Examine the effects of ionosphere in satellite communication. (16)	CO3	BTL4	Analyzing
14.	Write a detail note on the link design with and without frequency reuse. (16)	CO3	BTL3	Applying
15.	Explain with neat diagram, the community antenna TV system. (16)	CO3	BTL3	Applying
16.	(i) An antenna has a noise temperature of 35 K and is matched into a receiver which has a noise temperature of 100 K. Calculate the noise power for a band of 36MHz. (6) (ii) What is input backoff? Also, substantiate the reason behind employing it. (10)	CO3	BTL4	Analyzing
17.	(i) How does the system noise temperature affect the performance of satellite communication? (6) (ii) A LNA is connected to a receiver, which has a noise figure of 12 dB. The gain LNA is 30dB and its noise temperature is 12k. Calculate the overall noise temperature referred to the LNA input. (10)	CO3	BTL4	Analyzing

UNIT IV INTRODUCTION TO RADAR EQUATION

The Origins of Radar, Radar principles, Basic Block Diagram, Radar classifications based on Frequencies, Wave form and application, Radar Fundamentals: Detection, Range, velocity, The simple form of the Radar Equation, Pulsed Radar equation, Detection of Signals in Noise- Receiver Noise, Signal-to-Noise Ratio.

PART A

Q. No	Questions	CO	BT Level	Competence
1.	What is radar?	CO4	BTL 1	Remembering
2.	What do you mean by maximum unambiguous range?	CO4	BTL 1	Remembering
3.	Define Plan Position Indicator.	CO4	BTL 1	Remembering
4.	Name the applications of radar.	CO4	BTL 1	Remembering
5.	Categorize the antenna parameters.	CO4	BTL 1	Remembering
6.	How the weakest signal is detected?	CO4	BTL 1	Remembering
7.	Illustrate the factors affecting radar operation.	CO4	BTL 2	Understanding
8.	A radio link has a 15 W transmitter connected to an antenna of $2.5m^2$ effective aperture at 5 GHz. The receiving antenna has an	CO4	BTL 2	Understanding

	effective aperture of 0.5 m^2 and is located at a 15 Km line-of- sight distance from the transmitting antenna. Assuming lossless, matched antennas, find the power delivered to the receiver.			
9.	Sketch the two dimensional radiation pattern of a directional antenna.	CO4	BTL 2	Understanding
10.	Give some examples of simple targets.	CO4	BTL 2	Understanding
11.	Mention the limitations of Basic radar.	CO4	BTL 2	Understanding
12.	Relate the gain and directivity of an antenna through an appropriate mathematical expression.	CO4	BTL 1	Remembering
13.	How will you determine the minimum range and range resolution?	CO4	BTL 2	Understanding
14.	List out the advantages of basic radar.	CO4	BTL 2	Understanding
15.	What is called as false alarm?	CO4	BTL 2	Understanding
16.	List out the main reasons for the failure of the simple form of the radar equation.	CO4	BTL 1	Remembering
17.	Explore the term Scan to Scan Fluctuation.	CO4	BTL 1	Remembering
18.	Summarize the different types of radar signals.	CO4	BTL 2	Understanding
19.	Write an equation for Probability density function.	CO4	BTL 2	Understanding
20.	Mention the importance of Resolution in Radar.	CO4	BTL 2	Understanding
21.	Write the expression for the fundamental range equation.	CO4	BTL 1	Remembering
22.	Outline the characteristics of Rayleigh region.	CO4	BTL 2	Understanding
23.	Interpret the term radar duty cycle.	CO4	BTL 1	Remembering
24.	Why the target echoes might not exceed the threshold and would not be detected. Justify?	CO4	BTL 1	Remembering
	PART – B			
1.	With suitable figures, explain the SPADE communication system and how this is used on Intelsat satellites. (16)	CO4	BTL 3	Applying
2.	Write the design aspects and explain the technical features of TDMA frame structure. (16)	CO4	BTL 4	Analyzing
3.	(i) Outline the operation of FDMA and list how this differs from FDM. (6) (ii) What are the ways in which demand assignment may be carried out in FDMA network? (10)	CO4	BTL 3	Applying
4.	Compare uplink power requirements for FDMA and TDMA with necessary diagrams. (16)	CO4	BTL 4	Analyzing
5.	Analyze the concept of direct sequence spread spectrum communication with necessary diagrams. (16)	CO4	BTL 4	Analyzing
6.	Describe about digital video broadcasting with real time example. (16)	CO4	BTL 3	Applying
7.	Evaluate the techniques of compression and encryption used in satellite communication with general block diagram. (16)	CO4	BTL 4	Analyzing
8.	(i) What are the digital transmission systems used in satellites? (4) (ii) Analyze the concept of ADM & ADPCM techniques. (12)	CO4	BTL 4	Analyzing
9.	Discuss the following with neat diagram. (i) Analog voice transmission systems, (8) (ii) PCM coder/decoder (CODEC). (8)	CO4	BTL 4	Analyzing
10.	Illustrate in detail about pre assigned & demand assigned FDMA with necessary diagrams. (16)	CO4	BTL 3	Applying

11.	Explain the principle behind the spectrum spreading and despreading and how this is used to minimize interference in a CDMA system. (16)	CO4	BTL 3	Applying
12.	Discriminate the operation of On-Board signal processing for FDMA/TDMA operation with suitable diagrams. (16)	CO4	BTL 3	Applying
13.	Illustrate the satellite switched TDMA with switch matrix. (16)	CO4	BTL 4	Analyzing
14.	Summarize the following, (i) Digital TASI in TDMA operation, (8) (ii) Speech predictive encoded communications. (8)	CO4	BTL 4	Analyzing
15.	Illustrate the schematic block of voice & data MUX/DEMUX. (16)	CO4	BTL 4	Analyzing
16.	Explain in detail about coding techniques used in satellite communication. (16)	CO4	BTL 3	Applying
17.	In a TDMA network the reference burst and the preamble, each requires 560 bits, and the nominal guard interval between bursts is equivalent to 120 bits. Given that there are eight traffic bursts and one reference burst per frame and the total frame length is equivalent to 40, 800 bits, calculate the frame efficiency. (16)	CO4	BTL3	Applying

UNIT V CW, MTI AND PULSE DOPPLER RADAR

CW and Frequency Modulated Radar, Doppler and MTI Radar- Delay Line Cancellers, Staggered Pulse Repetition Frequencies, Doppler Filter Banks, Digital MTI Processing, Moving Target Detector, Limitations to MTI Performance.

PART A

Q. No	Questions	CO	BT Level	Competence
1.	What is meant by clutter in radar display?	CO5	BTL 2	Understanding
2.	What is a saturation detector?	CO5	BTL 2	Understanding
3.	Define eclipsing loss.	CO5	BTL 1	Remembering
4.	Draw the block diagram of single delay line canceler.	CO5	BTL 2	Understanding
5.	Relate the terms “bipolar” and “unipolar” in the video.	CO5	BTL 2	Understanding
6.	Mention the methods for employing multiple PRFs to avoid losing target echoes due to blind speeds.	CO5	BTL 1	Remembering
7.	Define Dynamic Range.	CO5	BTL 2	Understanding
8.	State the MTI improvement factor.	CO5	BTL 1	Remembering
9.	Summarize the properties of single DLC that limit the utility of simple Doppler filter.	CO5	BTL 1	Remembering
10.	Interpret the term Doppler frequency shift with radial velocity.	CO5	BTL 2	Understanding
11.	Outline the characteristics of doppler filter.	CO5	BTL 1	Remembering
12.	List the disadvantages of recursive delay line filter.	CO5	BTL 1	Remembering
13.	Interpret how blind speed occurs in sampling.	CO5	BTL 1	Remembering
14.	Compare the importance of Stalo and Coho.	CO5	BTL 2	Understanding
15.	Analyze why VHF is not considered as a desirable frequency choice for a long-range air surveillance radar.	CO5	BTL 1	Remembering
16.	Summarize the advantages of doppler filter banks over the single filters.	CO5	BTL 2	Understanding

17.	Categorize the methods used to reduce blind speeds.	CO5	BTL 1	Remembering
18.	Differentiate MTI with respect to pulse doppler radar.	CO5	BTL 2	Understanding
19.	Illustrate the expressions for doppler frequency shift from clutter scatterer.	CO5	BTL 2	Understanding
20.	Name the compensation techniques in MTI radar.	CO5	BTL 2	Understanding
21.	How is the blind phase different from blind speed?	CO5	BTL 1	Remembering
22.	Classify the types of regions according to elevation angle.	CO5	BTL 1	Remembering
23.	Mention the advantages of MTI radar.	CO5	BTL 1	Remembering
24.	Identify the effect of multipath depending of elevation angles.	CO5	BTL 1	Remembering

PART – B

1.	Describe the CW radar and simple pulse radar with neat block diagram. (16)	CO5	BTL 4	Analyzing
2.	What is doppler frequency shift? Obtain the expression for doppler frequency shift from radial velocity. (16)	CO5	BTL 4	Analyzing
3.	Discuss the four methods for reducing the detrimental effects of blind speeds. (16)	CO5	BTL 3	Applying
4.	Explain the frequency response of the single delay line canceler with relevant mathematical expressions. (16)	CO5	BTL 3	Applying
5.	Write the Improvement factor for single DLC and double DLC. Derive the expression for clutter attenuation. (16)	CO5	BTL 4	Analyzing
6.	Explain in the detail about digital MTI processing. (16)	CO5	BTL 3	Applying
7.	With the help of three- pulse canceller, explain the configuration of recursive and non-recursive filter. (16)	CO5	BTL 3	Applying
8.	Elaborate the eight-pulse doppler filter bank with uniform amplitude weights. (16)	CO5	BTL 3	Applying
9.	Describe the operation of moving target detector signal processor. (16)	CO5	BTL 3	Applying
10.	With necessary sketches, explain in detail the split gate tracking mechanism of a target in range. (16)	CO5	BTL 3	Applying
11.	Demonstrate the concept of Mono pulse in one angle coordinate and Mono pulse in two-angle coordinate in radar tracking. (16)	CO5	BTL 4	Analyzing
12.	Analyze the degradation in performance of MTI radar with suitable expressions (16)	CO5	BTL 4	Analyzing
13.	Draw the low angle tracking illuminates the target via two paths and describe the methods for reducing multipath effects at low angles. (16)	CO5	BTL 3	Applying
14.	List the compensation techniques of MTI radar on a moving platform and explain it with suitable examples. (16)	CO5	BTL 3	Applying
15.	Derive the frequency response of delay line canceller with neat diagram. (16)	CO5	BTL 4	Analyzing
16.	List the compensation techniques of MTI radar on a moving platform and explain it with suitable examples. (16)	CO5	BTL 3	Applying
17.	Derive the total power spectral density of clutter using gaussian model. (16)	CO5	BTL 4	Analyzing