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VISION AND MISSION OF THE INSTITUTE AND DEPARTMENT

VISION OF THE INSTITUTION

To Produce Professionally Excellent, Knowledgeable, Globally Competitive and Socially Responsible Engineers and Entrepreneurs.

MISSION OF THE INSTITUTION

M1	To Provide Quality Education in Engineering and Management.
M2	To Establish a Continuous Industry-Institute Interaction, Participation and Collaboration to Contribute Skilled Engineers.
M3	To Develop Human Values, Social Values, Entrepreneurship Skills and Professional Ethics among the Technocrats.
M4	To Focus on Innovation and Development of Technologies by Engaging in Cutting Edge Research areas.

VISION OF THE DEPARTMENT

To Produce Professionally Excellent, Knowledgeable, Globally Competitive and Socially Responsible Electronics and Communication Engineers and Entrepreneurs.

MISSION OF THE DEPARTMENT

M1	To Provide Quality Education in Electronics and Communication Engineering.
M2	To Establish a Continuous Industry-Institute Interaction, Participation and Collaboration to Contribute Skilled Electronics and Communication Engineers.
M3	To Develop Human Values, Social Values, Entrepreneurship Skills and Professional Ethics among the Technocrats.
M4	To Focus on Innovation and Development of Technologies by Engaging in Electronics and Communication Research areas.



PROGRAM EDUCATIONAL OBJECTIVES (PEOs)

PEO1	Graduates of Electronics & Communication Engineering course will have successful professional career.
PEO2	Graduates of Electronics & Communication Engineering course will pursue higher education or to become an Entrepreneur.
PEO3	Graduates of Electronics & Communication Engineering course will have ability for lifelong learning and to serve the society.

PROGRAM SPECIFIC OUTCOMES (PSO)

PSO 1	Ability to Design, Develop and Test the Electronics Circuits & Communication Systems.
PSO 2	Ability to Develop Excellent Programming and Problem Solving skills in the field of Embedded System.



PROGRAM OUTCOMES (PO)

PO 1	Engineering Knowledge	Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
PO 2	Problem Analysis	Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
PO 3	Design/ Development of Solutions	Design solutions for complex engineering problems and design system components or processes that meet the specified needs with appropriate consideration for the public health and safety, and the cultural, societal, and environmental considerations.
PO 4	Conduct investigations of complex problems	Use research-based knowledge and research methods including design of experiments, analysis and interpretation of data, and synthesis of the information to provide valid conclusions.
PO 5	Modern tool usage	Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modeling to complex engineering activities with an understanding of the limitations.
PO 6	The engineer and society	Apply reasoning informed by the contextual knowledge to assess societal, health, safety, legal and cultural issues and the consequent responsibilities relevant to the professional engineering practice.
PO 7	Environment and sustainability	Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
PO 8	Ethics	Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
PO 9	Individual and team work	Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
PO 10	Communication	Communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and write effective reports and design documentation, make effective presentations, and give and receive clear instructions.
PO 11	Project management and finance	Demonstrate knowledge and understanding of the engineering and management principles and apply these to one's own work, as a member and leader in a team, to manage projects and in multidisciplinary environments.
PO 12	Life-long learning	Recognize the need for, and have the preparation and ability to engage in Independent and life-long learning in the broadest context of technological change.



Name of the Staff: H SURENDRANATH				
Course Name: RADAR Engineering				
Course Code: 17EC833	Sem:	8 A/B	Year	2020-21

COURSE OUTCOME STATEMENTS	
At the end of the course, students will be able to	
CO302.1	Understand the Radar fundamentals and analyze the radar signals.(L1,L2,L3)
CO302.2	Explain the working principles of various Radars like Pulse, MTI, Doppler, their applications and limitations.(L1,L2,L3)
CO302.3	Analyze the various range parameters of Radar system, tracking Radars and their comparisons.(L1,L2,L3)
CO302.4	Describe the working of various Radar transmitters and receivers. .(L1,L2,L3)

CO-PO/PSO Mapping														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
CO302.1	3	3	3										3	
CO302.2	3	3	3										3	
CO302.3	3	3	3										3	
CO302.4	3	3	3										3	
AVG	3	3	3										3	

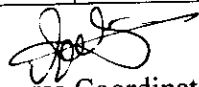
CO	PO	Mapping	Justification
CO302.1	PO1	3	Students use the knowledge of mathematics to the solution of complex engineering problems to understand the Radar fundamentals and analyze the radar signals.
	PO2	3	Student identifies and analyzes complex engineering problems to understand the Radar fundamentals and analyze the radar signals.
	PO3	3	Student design, develop solutions of complex engineering problems to understand the Radar fundamentals and analyze the radar signals.
	PSO1	3	Students design, develop and test solutions with various technologies involved in the Radar transmitters and receivers.



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
DEPARTMENT OF ELECTRONICS & COMMUNICATION ENGINEERING



CO302.2	PO1	3	Students uses the knowledge of mathematics to evaluate the use and Explain the working principles of various Radars like Pulse, MTI, Doppler, their applications and limitations
	PO2	3	Student identify and analyze complex engineering problems to evaluate the use and Explain the working principles of various Radars like Pulse, MTI, Doppler, their applications and limitations
	PO3	3	Student design, develop solutions of complex engineering problems to evaluate the use and Explain the working principles of various Radars like Pulse, MTI, Doppler, their applications and limitations
	PSO1	3	Students design, develop and test solutions with various technologies involved in the Radar transmitters and receivers.
CO302.3	PO1	3	Students use the knowledge of mathematics to Analyze the various range parameters of Radar system, tracking Radars and their comparisions.
	PO2	3	Student identifies and analyzes complex engineering problems to Analyze the various range parameters of Radar system, tracking Radars and their comparisions.
	PO3	3	Student design, develop solutions of complex engineering problems to Analyze the various range parameters of Radar system, tracking Radars and their comparisions.
	PSO1	3	Students design, develop and test solutions with various technologies involved in the Radar transmitters and receivers.
CO302.4	PO1	3	Students use the knowledge of mathematics to Describe the working of various Radar transmitters and receivers.
	PO2	3	Student identifies and analyzes complex engineering problems to Describe the working of various Radar transmitters and receivers.
	PO3	3	Student design, develop solutions of complex engineering problems to Describe the working of various Radar transmitters and receivers.
	PSO1	3	Students design, develop and test solutions with various technologies involved in the Radar transmitters and receivers.


Course Coordinator

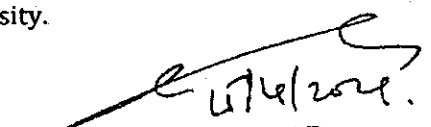

Staff  Signature



Academic Calendar of EVEN SEMESTERS

Semesters	IV semester B.E./B.Tech.	IV semester B.Arch./ B.Plan.	VI semester B.E./B.Tech.	VI semester B.Plan./B.Arch	VIII semester B.E./B.Tech.	VII semester B.Plan./B.Arch.
EVENTS						
Commencement of EVEN Semester	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021	19.04.2021
Last Working day of EVEN Semester	07.08.2021	07.08.2021	07.08.2021	07.08.2021	20.07.2021	20.07.2021
Practical Examinations	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	09.08.2021 To 19.08.2021	---	---	---
Theory Examinations	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	23.08.2021 To 09.09.2021	10.08.2021 To 31.08.2021	#22.07.2021 To 30.07.2021	#22.07.2021 To 30.07.2021
Internship	---	---	---	---	---	---
Internship Viva-Voce	---	---	---	---	02.08.2021 To 06.08.2021	---
Professional training / Organization study	---	---	---	---	---	---
Commencement of ODD Semester	13.09.2021	13.09.2021	13.09.2021	13.09.2021	---	09.08.2021 (IX sem Arch)

- The classroom sessions for even the semester should commence from the dates mentioned above. The classroom sessions for all the semesters would be in **Offline /Online/blended mode** until further orders.
- The Institute needs to function for **six days** a week with additional hours (**Saturday is a full working day**). #if required the college can plan to have extra classes even on **Sundays also**.
- If any of the above dates are declared to be a holiday then the corresponding event will come into effect on the next working day.
- Notification regarding the Calendar of Events relating to the conduct of **University Examinations** will be issued by the Registrar (Evaluation) from time to time.
- The faculty/staff shall be available to undertake any work assigned by the University.
- Academic Calendar may be modified based on guidelines/directions issued in the future by MHRD/UGC/AICTE/State Government.
- Revised Academic Calendar is also applicable for **Autonomous Colleges**. In case if any changes are to be affected by Autonomous Colleges in the academic terms and examination schedule, they could do so with the approval of the University.


REGISTRAR




Academic Calendar of Events
EVEN Semester 2020-21(April 2021-Sept 2021)

	III, V & VII Sem B.E/B.Tech
Pre Placement Training	For VI Semester Students of all Branches from 20 th to 25 th Sep 2021
Commencement of ODD Semester	19 th April 2021
Admission Publicity in and around Ballari	March 2021
Six Days National Webinar on "Intellectual Property Rights and IP Management for Start-up" by Mrs. Priyadarshini Singh, Research Scholar	26 th April to 1 st May
I Internal Assessment Test	10 th , 11 th & 12 th June 2021 (Thu, Fri & Sat-Online)
Last date for sending IA Marks (SMS)	14 th June 2021
Parents Meet	15 th June 2021
2nd International Virtual Conference on "Futuristic Trends in Embedded Systems and Networking" ICFTEN 2021 in association with IFERP and RYMEC	7 th -8 th July 2021
II Internal Assessment Test	16 th , 17 th & 18 th July 2021 (Tue, Wed & Thu-Online)
Last date for sending IA Marks (SMS)	19 th July 2021
Parents Meet	20 th July 2021
Department forum "Talentronics"	2 nd August 2021
Current Covid 19 Situation and How to Overcome All Diseases by Dr. Khadar Vali	2 nd August 2021
Mini project exhibition for 8 th sem students	4 th August 2021
Farewell day for final year students	8 th August 2021
Six Days Workshop on Basics of Machine Learning using Python	30 th August to 4 th Sept 2021
III Internal Assessment Test	12 th , 13 th & 14 th August 2021 (Thu, Fri & Sat-Online)
Last date for sending IA Marks (SMS)	15 th August 2021
Mini project exhibition for 6 th sem students	18 th August 2021
Parents Meet	16 th August 2021
Last Working Day	07/08/2021
Practical Examination	09/08/2021 to 19/08/2021
Theory Examination	23/08/2021 to 09/09/2021
NBA SAR audit by Ms. Manisha .	7 th Sept 2021
NAAC Presentation by DR H Girish, Coordinator and Dean	13 th Sept 2021
Commencement of EVEN Semester	13/09/2021

Head of the Department
Electronics & Communication Engg.
R. Y. M. Engineering College.
(Formerly Vijaya Vittala Engg. College)
BELLARY-583 104.



COURSE PLAN 2020-21 (ODD/EVEN)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:	Time:
Course Name:	RE	Max Marks	60
Course code:	17EC833	IA Marks	40
Prerequisites:	Antennas		
Number of Lecture Hours/Week:	03	Exam Marks	100
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

Course outcomes: This course will enable students to:

- Understand the radar fundamentals and radar signals.
- Understand the various technologies involved in the design of radar transmitters and receivers.
- Learn various Radar like MTI, Doppler system, tracking Radars and their comparisons.

Module. No	Module Name	Lecture Hours Required
01	Basics of Radar, Simple form of the Radar Equation.(L1,L2,L3)	8
02	The Radar Equation, Radar Cross Section of Targets.(L1,L2,L3)	8
03	MTI and Pulse Doppler Radar, Digital MTI Processing.(L1,L2,L3)	8
04	Tracking Radar, Sequential Lobing.(L1,L2,L3)	8
05	The Radar Antenna, Radar Receiver.(L1,L2,L3)	8



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Department of Electronics and Communication Engineering



Sl.No	Date	Hour	Topic to be Covered
1	26-04-2021	4	Basics of Radar: Introduction, Maximum Unambiguous Range, Radar Waveforms
2	27-04-2021	4	Definitions with respect to pulse waveform - PRF, PRI, Duty Cycle, pt, pa
3	28-04-2021	2	Simple form of the Radar Equation:
4	29-04-2021	2	Radar Block Diagram and Operation
5	30-04-2021	4	Radar Frequencies.
6	3-05-2021	4	Applications of Radar.
7	4-05-2021	4	The Origins of Radar.
8	5-05-2021	2	Illustrative Problems. (Chapter 1 of Text).
9	6-05-2021	2	The Radar Equation: Prediction of Range Performance, Detection of signal in Noise,
10	7-05-2021	4	Minimum Detectable Signal, Receiver Noise, SNR.
11	10-05-2021	4	Modified Radar Range Equation
12	11-05-2021	4	Envelope Detector — False Alarm Time and Probability, Probability of Detection,
13	12-05-2021	2	Radar Cross Section of Targets: simple targets – sphere, cone-sphere
14	13-05-2021	2	Transmitter Power, PRF and Range Ambiguities,
15	14-05-2021	4	System Losses (qualitative treatment),
16	17-05-2021	4	Illustrative Problems. (Chapter 2 of Text, Except 2.4, 2.6, 2.8 & 2.11)
17	18-05-2021	4	MTI and Pulse Doppler Radar: Introduction, Principle, Doppler Frequency Shift, Simple CW Radar,
18	19-05-2021	2	Sweep to Sweep subtraction and Delay Line Canceller
19	20-05-2021	2	MTI Radar with – Power Amplifier Transmitter
20	21-05-2021	4	Delay Line Cancellers — Frequency Response of Single Delay-Line Canceller
21	24-05-2021	4	Blind Speeds, Clutter Attenuation, MTI Improvement Factor, N- Pulse Delay-Line Canceller
22	25-05-2021	4	Digital MTI Processing :- Blind phases, I and Q Channels
23	26-05-2021	2	Digital MTI Doppler signal processor
24	27-05-2021	2	Moving Target Detector- Original MTD. (Chapter 3: 3.1, 3.2, 3.5, 3.6 of Text)
25	28-05-2021	4	Tracking Radar: Tracking with Radar
26	31-05-2021	4	Types of Tracking Radar Systems



RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Electronics and Communication Engineering



	Date	Hour	Topic to be Covered
27	1-06-2021	4	Monopulse Tracking- Amplitude Comparison Monopulse (one-and two-coordinates),
28	2-06-2021	2	Phase Comparison Monopulse
29	3-06-2021	2	Sequential Lobing.
30	4-06-2021	4	Conical Scan Tracking
31	7-06-2021	4	Block Diagram of Conical Scan ,Tracking Radar, Tracking in Range,
32	8-06-2021	4	Comparison of Trackers. (Chapter 4: 4.1, 4.2, 4.3 of Text)
33	9-06-2021	2	The Radar Antenna: Functions of The Radar Antenna, and
34	10-06-2021	2	Antenna Parameters
35	11-06-2021	4	Reflector Antennas and
36	14-06-2021	4	Electronically Steered Phased array Antennas. (Chapter 9: 9.1, 9.2 9.4, 9.5 of Text)
37	15-06-2021	2	Radar Receiver: The Radar Receiver, Receiver Noise Figure,
38	16-06-2021	2	Super Heterodyne Receiver,
39	17-06-2021	2	Duplexers and Receivers Protectors
40	18-06-2021	2	Radar Displays. (Chapter 11 of Text)

Course outcomes: At the end of the course, students will be able to:

- Understand the Radar fundamentals and analyze the radar signals.
- Explain the working principles of various Radars like Pulse, MTI, Doppler , their applications and limitations
- Analyze the various range parameters of Radar system, tracking Radars and their comparisons.
- Describe the working of various radar transmitters and receivers.

Teaching and Learning Tools: Chalk and Blackboard.

Text Book:

Introduction to Radar Systems- Merrill I Skolink, 3e, TMH, 2001.

Reference Books:

1. Radar Principles, Technology, Applications — Byron Edde, Pearson Education, 2004.
2. Radar Principles – Peebles. Jr, P.Z. Wiley. New York, 1998.
3. Principles of Modern Radar: Basic Principles – Mark A. Rkhards, James A. Scheer, William A. Holm. Yesdee, 2013



Digital Library/E-Resources:


1. <http://192.168.8.8:8080>
2. <http://192.168.8.8/gdln>
3. <http://192.168.8.8/gdln4>-- for VTU E Learning-NPTEL

Innovative Practices:

1. Key points summarizing.
2. All formulae for each module.
3. Solving VTU Question Papers.

Note: Planning of syllabus is done as per VTU curriculum


Staff Signature


HOD



Rao Bahadur .Y. Mahabaleswarappa Engineering
College Bellary

Dept
ECE

2020 - 2021

Title: Report on Syllabus Status

REPORT ON SYLLABUS STATUS

Semester	Branch	Subject	Section	Name of the Staff
VIII	ECE	RF/ITEC833	A/B	H. Sureshwarath

Sl.No	Date	Period	Topics Covered	Remarks
01	28/4	4	Basics of Radar, Int'l Range, Waveforms	
02	29/4	4	OPA, PRF, PRT, Duty cycle, M, R	
03	29/4	2	Simple form of Radar Equation	
04	29/4	2	Radar Block Diagram & operation	
05	30/4	4	Radar frequencies	
06	30/4	4	Applications of Radar	
07	4/5	4	The origins of Radar	
08	4/5	2	Illustrative Problems	
09	4/5	2	The Radar Equation	
10	7/5	4	Minimum Detectable Signal, SNR, Receiver	
11	7/5	4	Modified Radar Range Equation	
12	11/5	4	Envelope Detector, False Alarm Rate, & P _d	
13	12/5	2	Radar Cross Section of Targets	
14	13/5	2	Transmitter Power, PRF, & Range Amb	
15	14/5	4	System Losses	
16	12/5	4	Illustrative problems	
17	12/5	4	MTI & Pulse Doppler Radar	
18	14/5	2	Sweep to Sweep Subtraction to DC	
19	20/5	2	MTI Radar with pulse amp Transmitter	
20	21/5	4	Delay Line Canceller	
21	21/5	4	Blind Speeds, Clutter Attenuation, etc.	
22	22/5	4	Digital MTI Processing	
23	22/5	2	Digital MTI Doppler Signal Processor	
24	22/5	2	Moving Target Indicator & original MTI	
25	28/5	4	Tracking Radar	
26	31/5	4	Types of Tracking Radar Systems	
27	1/6	4	Monopulse Tracking	
28	1/6	2	Phase Comparison Monopulse	
29	3/6	2	Sequential lobing	

Signature
Staff In-charge

Name of the Staff
H. Sureshwarath

Signature
Head of the Department



Rao Bahadur .Y. Mahabaleswarappa Engineering College Bellary

 Dept
ECE

200 - 200

Title: Report on Syllabus Status

REPORT ON SYLLABUS STATUS

Semester	Branch	Subject	Section	Name of the Staff

Sl.No	Date	Period	Topics Covered	Remarks
30	4/6	4	Conical Scan Tracking	
31	2/6	4	Block Diagram of Conical Scan	
32	8/6	4	Comparison of Trackers	
33	9/6	2	1. Radar Antenna	
34	10/6	2	Antenna Parameters	
35	11/6	4	Reflector Antennas	
36	14/6	4	Electronically Steered phase array Antenna	
37	15/6	4	Radar Receiver	
38	16/6	2	Super Heterodyne Receiver	
39	17/6	2	Duplexers & Receivers	
40	18/6	4	Radar Displays	

Signature
Staff in-charge

[Signature]

Name of the Staff
A. Suresh Babu

Signature
Head of the Department

[Signature]



COURSE EVALUATION AND ASSESSMENT SCHEME-2017

	What		To Whom	When/ Where (Frequency in the course)	Max Marks	Evidence Collected
Direct Assessment Methods	IA	Internal Assessment Tests	Students	Thrice(Average of three IA Tests)	30	Blue Books
				Assignment	10	Assignment Books
		Practical Assessment		Once	40	Practical evaluation
	FE	Final Examination		End of Course (Answering One of two questions from five Modules)	100	Result sheet
		Practical Examination		One question from lot	100	Result sheet
Indirect Assessment Methods	Students Feedback		Students	End of the course	-	Questionnaire
	Course Exit Survey					

Questions for IA and FE will be designed to evaluate the various educational components (Bloom's taxonomy)



ASSIGNMENT-I(2020-21 Even Sem)

Staff Name : HS	Sem/Sec:8 th /A & B	Max Marks:10/05
Course Name : RE	Course Code : 17EC833/15EC833	

Q No	QUESTIONS	CO
1	Define RADAR. Explain the basic principle of RADAR with neat diagram	1
2	Derive RADAR range equation in terms of effective aperture, RADAR cross section of target and minimum detectable signal power of receivers.	1
3	With the help of neat block diagram, explain the operation of RADAR system	1
4	Write a note on i) Origin of RADAR II) Applications of RADAR	1
5	List all the formulae or solve problems on An Introduction to RADAR	1
6	<ul style="list-style-type: none">Explain with a neat block diagram CW Doppler RADARDraw a functional block diagram of a pulsed RADAR and describe the function of each blockWith block diagram explain MTI RADAR system	2
7	<ul style="list-style-type: none">Write short notes on i)Delay –Line-Cancellers ii) Frequency response of a single DLC iii) Blind speeds iv)Clutter Attenuation v)MTI improvement factor vi) N-Pulse DLCDerive an expression for Doppler Frequency Shift in terms of radial velocity	2
8	Explain the blind phases I & Q channels and also with neat block diagram explain the Digital MTI signal processor	2
9	Explain the working of a Moving Target Detector with block diagram	2
10	List all the formulae or solve problems on MTI & Pulse Doppler RADAR	2

Seabla
CO-ordinator

Faculty Incharge



CIE 1/ IA 1 (2020-2021 Even Sem)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:12/06/2021	Time:10.30am-12.00pm
Course Name: Course code: Prerequisites:	RE 17EC833/15EC833 Communication ,Antennas	CIE Marks	40/20
Number of Lecture Hours/Week:	03	SEE Marks	60/80
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 50/30

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	What is RADAR? With neat block diagram, explain the operation of RADAR	10/ 6	L2	1	1,2,3
OR					
2.	Relate, Starting from basic principles, derive RADAR range equation in terms of transmitted power, antenna gain, and minimum detectable signal power of the receiver	10/6	L2	1	1,2,3
3.	Explain the following with reference to a RADAR system i) maximum unambiguous range ii) RADAR frequencies	10/6	L2	1	1,2,3
OR					
4.	Summarize(Write a note on) i)origin of RADAR ii) Applications of RADAR	10/6	L2	1	1,2,3
5.	Solve for a,(A)ground based air- surveillance RADAR operates at a frequency of 1300MHZ (L-band). Its maximum range is 200 nmi for the detection of a target with a RADAR cross section of one square meter. Its antenna is 12 m wide by 4 m high, and the antenna aperture efficiency is 0.65. The receiver minimum detectable signal is 10 W. Determine the following: i) Antenna effective aperture and antenna gain in db ii) peak transmitted power iii) pulse repetition frequency to achieve minimum unambiguous range of 200 nmi iv) average transmitted power if pulse width is 2 micro sec v) duty cycle vi) horizontal beam width in degrees.	10/6	L3	1	1,2,3
OR					
6.	Solve for, An MTI RADAR operates at a frequency of 3000MHZ, pulse repetition frequency of 2000HZ, standard deviation of clutter spectrum of 0.3 m/s. Determine the first two blind speeds in m/s and in knots, and also find the MTI improvement factor for single, double and triple DLC and also comment on the result.	10/6	L3	2	1,2,3
7.	Explain with neat block diagram, how simple pulse RADAR extracts the Doppler frequency shift of the echo signal from the moving target. Also derive the equation for Doppler frequency shift.	10/6	L2	2	1,2,3
OR					
8.	Explain with a neat block diagram the principle and operation of a MTI RADAR system.	10/6	L2	2	1,2,3
9.	Explain the working of digital moving target indicator Doppler signal processor with neat diagram.	10/6	L2	2	1,2,3
OR					
10.	Explain the working of an moving target detector with block diagram	10/6	L2	2	1,2,3

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome) PO (Program Outcome)

IA Coordinator

Signature of Faculty



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-I (20-21 Even Sem)

Staff : Mr.Surendranth.H	Sem / Sec : VIII - A	Max. Marks : 40
Course Name : Radar Engineering	Course Code : 18EC833	Total Contact Hours : 40
Prerequisites : Maths Basics , Communication, Antennas and Wave Propagation		
Date :	Time :	

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 30 / 50

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	RADAR definition - Radio detection & ranging - 02 Block Diagram 1:4 and explanation of each block, 02 to 02 = 04 - 05 to 5 - 04	6/10	L2	1	1,2,3
OR					
2.	Derivation of RADAR range equation in terms of Pt, G, Smin $R_{max} = \left(\frac{P_t G A_e \sigma}{(4\pi)^2 S_{min}} \right)^{1/4}$ 10 - 06.	6/10	L2	1	1,2,3
OR					
3.	i) Maximum unambiguous range 1:2, 4 $R_{un} = \frac{c T_P}{2} = \frac{c}{2 f_p}$, explain - 03 ii) Radar frequency table 1:1, 12, - 03 05 to 5	6/10	L2	1	1,2,3
OR					
4.	i) RADAR origin history explanation - 03 1:6 ii) Applications of RADAR 1:5, military Remote sensing, ATC, Law enforcement and Highway safety, space, ship safety, Aircraft. - 03 05 to 5	6/10	L2	1	1,2,3
5.		6/10	L3	1	1,2,3

IA Coordinator
(Dr. Prabhavathi.S.)

Signature of Faculty
Mr. Surendranath.H.



	<p>i) $A_e = A_p \times \eta = 31.2 \text{ m}^2$ ii) $P_t = \frac{P_{max} (4\pi)^2 S_{min}}{4 \times A_e \times r} = 1.29 \text{ mW}$ iii) $f_p = \frac{c}{2R_{min}} = 404.97 \text{ Hz}$ iv) $P_{avg} = \frac{P_t}{T_p} = 1.04 \text{ kW}$ v) Duty cycle = $\frac{t}{T_p} = 0.6$ vi) Horizontal beamwidth</p>				
OR					
6.	<p>$V_1 = \eta \lambda P_p = 1000 \text{ m/s} = 2000 \text{ kts}$ $f_{D1} = 15.8 \text{ kHz} = 120 \text{ dB}$ $V_2 = 2000 \text{ m/s} = 400 \text{ kts}$ $f_{D2} = 2.97 \text{ kHz} = 104.73 \text{ dB} - 0.6$ $f_{D1} = 5.6299 \times 10^3 = 37.504 \text{ dB}$ Constant: $\text{KCT}, \text{FFT}, \text{chirp}$</p>	6/10	L3	2	1,2,3
7.	<p>Block diagram of MTI Radar system with explanation - 03 Figure 3.30) eqn, equation for the doppler frequency shift $f_D = \frac{2V_r}{\lambda} = \frac{2V_r f_c}{c}$ - 03</p>	6/10	L2	2	1,2,3
8.	<p>Block diagram of MTI Radar system fig 3.7, 111 - 02 Principle of MTI Radar system - 02 operation of MTI Radar system - 02 03, 03, 04</p>	6/10	L2	2	1,2,3
9.	<p>Digital moving Target Doppler signal - 02 procedure, Digital MTI processing, Blind phases, 1, 6 & channel fig 3.7, 111, block diagram fig 3.13, 138 - 02 04, 03, 03</p>	6/10	L2	2	1,2,3
OR					
10.	<p>Moving Target Detector block diagram - 02 Original MTI working fig 3.30, 142 BD - 02 working of an MTI with block diagram - 02 04, 03, 03</p>	6/10	L2	2	1,2,3

Note: BTL (Blooms Taxonomy Level) CO (Course Outcome) PO (Program Outcome)

IA Coordinator
(Dr. Prabhavathi.S.)

Signature of Faculty
Mr. Surendranath.H.




ASSIGNMENT-II(2020-21 Even Sem)

Staff Name : HS	Sem/Sec:8 th /A &B	Max Marks:10/05
Course Name : RE	Course Code : 17/15EC833	

Q No	QUESTIONS	CO
1	Derive an expression for minimum detectable signal power in terms of noise figure of the receiver.	3
2	Define and derive the equations for i) Probability of False alarm ii) Probability of detection. Relate them using an empirical formula.	3
3	Discuss RADAR cross section of targets.	3
4	Illustrate the concepts of pulse repetition frequencies in case of RADAR	3
5	Give a brief account of system losses encountered in a RADAR system & List all the formulae or solve problems on The RADAR Equation.	3
6	Define Monopulse tracker. Using block diagram explain amplitude comparison tracking RADAR.	3
7	Discuss the concept of pulse comparison monopulse.	3
8	With neat block diagram, explain conical scan tracking and sequential lobing tracking RADAR.	3
9	Briefly discuss the concept of splitgate, Range glint range tracking.	3
10	Compare amplitude comparison monopulse and conical scan trackers. & List all the formulae or solve problems on Tracking RADAR	3


CO-ordinator


Faculty Incharge



CIE II / IA II (2020-2021 EVEN SEM)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:02/07/2021	Time:10.30-12.00
Course Name:	RE	IA Marks	40/20
Course code:	17/15EC833		
Prerequisites:	Communication, Antennas		
Number of Lecture Hours/Week:	03	Exam Marks	60/80
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 50/30

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	Derive the modified RADAR Equation in terms of signal-to-noise ratio.	10/6	L2	3	1,2,3
OR					
2.	Make use of portion of RADAR receiver block diagram, discuss with necessary equation the probability of false alarm and probability of detection.	10/6	L2	3	1,2,3
3.	Discuss briefly following types of signal losses in RADAR i) microwave plumbing losses ii) Antenna losses iii) signal-processing losses.	10/6	L2	3	1,2,3
OR					
4.	Illustrate the concepts of pulse repetition frequency and range ambiguities in case of RADAR.	10/6	L2	3	1,2,3
5.	Solve for: a. What signal-to-noise ratio is required for a RADAR that makes a detection on the basis of a single pulse, when the probability of detection is 0.50 and the probability of false alarm is ten power minus six? Assume a nonfluctuating target echo. b. Repeat for a 0.99 probability of detection and the same probability of false alarm.	10/6	L3	3	1,2,3
OR					
6.	Solve for, a RADAR measures range of 7 nmi when the prf is 4000 Hz, but it measures an apparent range about 18.6 nmi when the prf is 3500 Hz. What is the true range(nmi)?	10/6	L3	3	1,2,3
7.	What co-ordinates of the target are required in order to continuously track the target by tracking RADAR.	10/6	L2	3	1,2,3
OR					
8.	With a neat block diagram, explain the two co-ordinate amplitude comparison mono pulse tracking RADAR.	10/6	L2	3	1,2,3
9.	Briefly discuss the concept of split-gate range tracking.	10/6	L2	3	1,2,3
OR					
10.	Compare monopulse and conical RADAR tracking system.	10/6	L2	3	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

PO (Program Outcome)

IA Coordinator

Signature of Faculty



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-II (20-2) Even Sem)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:	Time:
Course Name:	RE	Max Marks	30
Course code:	15EC833	IA Marks	20
Prerequisites:	Antennas		
Number of Lecture Hours/Week:	03	Exam Marks	80
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 30

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	$L_{min} = \frac{R_g A_e \sigma}{(4\pi)^2 K T_0 B F_n \left(\frac{S}{N}\right)_{min}}$ <p>Complete Derivation, 10 06.</p>	6/10	L2	3	1,2,3
OR					
2.	$P_{fa} = \exp\left(-\frac{V_T^2}{2\psi_0}\right) = 0.3 \quad A = \ln\left[0.62/P_{fa}\right]$ $P_d \Rightarrow \frac{S}{N} = A + 0.12AB + 1.7B \quad B = \ln\left[P_d/(1-P_d)\right]$ <p>05 03</p>	6/10	L2	3	1,2,3
3.	<p>i) Microwaving losses 04 02</p> <p>ii) Antenna losses 05 02</p> <p>iii) Signal processing losses 03 02</p>	6/10	L2	3	1,2,3
OR					
4.	<p>Pulse repetition frequency 05 03</p> <p>Range ambiguities</p> $R_{true} = R_r \sqrt{R_r + R_{max}}, \sqrt{R_r + 2R_{max}} \quad 05 03$	6/10	L2	3	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

PO (Program Outcome)

IA Coordinator

Signature of Faculty



5.	$\Delta \cdot \frac{\Sigma}{\Delta} = A + 0.12 AB + 1.7B, A, B$ $\frac{\Sigma}{\Delta} = 11.25 \text{ db} \quad 05 \rightarrow 03$ $\frac{\Sigma}{\Delta} = 14.548 \text{ db} \quad 05 \rightarrow 03$	6/10	L3	3	1,2,3
OR					
6.	$L_{\text{max}} = 27.25 \text{ mm} \quad 05 \rightarrow 03$ $L_{\text{min}} = 41.74 \text{ mm} \quad 05 \rightarrow 03$	6/10	L3	3	1,2,3
OR					
7.	Coordinate target by Tracking radar 04-02 4.2, 4.3, 4.4, 4.6, 4.7, 4.9 05-02 Block diagram / Figure explanation / Equation 05-02	6/10	L2	3	1,2,3
OR					
8.	a. Two-coordinate Comp 05-03 b. Mono pulse Tracking radar 05-03	6/10	L2	3	1,2,3
OR					
9.	Concept of split gate lobe Tracking 05-03 Figure 4.19 & Explanation 05-03 Related figures, Equation.	6/10	L2	3	1,2,3
OR					
10.	Comparison a. Monopulse 05-03 b. Conical lobe Tracking system 05-03	6/10	L2	3	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

PO (Program Outcome)

IA Coordinator

Signature of Faculty



IA-2 PERFORMANCE ANALYSIS

Internal Assessment 2

	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CO mapping	3	3	3	3	3	3	3	3	5	3
Max Marks /Question	10	10	10	10	10	10	10	10	10	10
Total marks of class /question	90	300	320	89	93	243	148	239	337	90
No. of students attended	9	31	33	10	11	27	17	30	35	10
No of students scored > 65% of marks/Question	9	30	32	9	9	23	14	20	34	9
Percentage of students scored > 65% of marks/Question	100.00	96.78	96.97	90.00	81.82	85.19	82.36	66.67	97.15	90.00

Mark range	0-10	11 to 20	21 to 30	31-40	41-50
No. Of Students	00	00	00	00	41


Note: 2017 & 2018 Scheme Format



ASSIGNMENT-III(20-21 Even Sem)

Staff Name : HS	Sem/Sec:8 th /A &B	Max Marks:10/05
Course Name : RE	Course Code : 17/15EC833	

Q No	QUESTIONS	CO
1	List and discuss the different functions served by RADAR antenna.	4
2	Explain the terms as applied to an antenna.	4
3	Explain with neat sketches the various kinds of feeds used with reflector antenna.	4
4	Explain the principle of an electronically steered phased array antenna. What is beam steering and array feeding? Explain the principle.	4
5	Explain / Discuss the RADAR receiver.	4
6	Define receiver noise figure. Derive the noise figure equation for N-network in cascade.	4
7	Explain the superhetrodyne receiver of a RADAR system.	4
8	Explain with a neat diagram functioning of the balance duplexer.	4
9	List and explain the types of display presentations used in a RADAR systems.	4
10	List all the formulae or solve problems on The RADAR Antenna & RADAR Receiver	4


CO-Ordinator


Faculty Incharge



CIE III/IA III (2020-2021 Even Sem)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:09/07/2021	Time:4-5:30 PM
Course Name:	RE	IA Marks	40/20
Course code:	17/15EC833		
Prerequisites:	Communication, Antennas		
Number of Lecture Hours/Week:	03	Exam Marks	60/80
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 30/30

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	Define directive gain and power gain.	10/6	L2	4	1,2,3
OR					
2.	Explain with neat sketches the various kinds of feeds used with reflector antenna.	10/6	L2	4	1,2,3
OR					
3.	Describe the operation of cassegrain antenna.	10/6	L2	4	1,2,3
OR					
4.	Explain the principle of electronically steered phased array antennas. Also explain the steering and array feed networks.	10/6	L2	4	1,2,3
OR					
5.	Problem/Solve for a,(A)ground based air- surveillance RADAR operates at a frequency of 1300MHZ (L-band). Its maximum range is 200 nmi for the detection of a target with a RADAR cross section of one square meter. Its antenna is 12 m wide by 4 m high, and the antenna aperture efficiency is 0.65. The receiver minimum detectable signal is 10 W. Determine the following: i) Antenna effective aperture and antenna gain in db ii) peak transmitted power iii) pulse repetition frequency to achieve minimum unambiguous range of 200 nmi iv) average transmitted power if pulse width is 2 micro sec v) duty cycle vi) horizontal beam width in degrees.	10/6	L3	4	1,2,3
OR					
6.	Problem/Solve for, An MTI RADAR operates at a frequency of 3000MHZ, pulse repetition frequency of 2000HZ, standard deviation of clutter spectrum of 0.3 m/s. Determine the first two blind speeds in m/s and in knots, and also find the MTI improvement factor for single, double and triple DLC and also comment on the result.	10/6	L3	4	1,2,3
OR					
7.	Explain different types of RADAR display system	10/6	L2	4	1,2,3
OR					
8.	Explain the following i) Balanced Duplexer ii) Stoke and Roster displays iii) Receiver Noise Figure.	10/6	L2	4	1,2,3
OR					
9.	What is the role of duplexer's in RADAR system? Illustrate the transmit condition and receive condition in case of balanced duplexer.	10/6	L2	4	1,2,3
OR					
10.	With neat diagrams, explain the operation of i) single ended receiver ii) balanced mixer iii) image rejection mixer.	10/6	L2	4	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

PO (Program Outcome)

IA Coordinator

Signature of Faculty



SCHEME OF EVALUATION INTERNAL ASSESSMENT TEST-III(20-21 Even Sem)

Staff Name : H SURENDRANATH	Sem/Sec: VIII A,B	Date:	Time:
Course Name:	RE/ITEC833	IA Marks	20
Course code:	15EC833		
Prerequisites:	Communication, Antennas		
Number of Lecture Hours/Week:	03	Exam Marks	80
Total Number of Lecture Hours	40(08 Hours per Module)	Exam Hours	03

NOTE: Answer all five questions (At least any one from each part)

Max Marks: 30

Q No	QUESTIONS	Marks	BTL	CO	PO
1.	<p>Directive Gain $g_2/g_1, 2, 3, 4, 5a, 5b, 5c$ 05-03 Power Gain $g_2/g_1, 6a, 6b, 9.7$ 05-03</p>	6/10	L2	4	1,2,3
OR					
2.	<p>Reflector Antenna with various kinds of feeds, 9.6, 9.7, 9.9 04-02 Half Sketches, 9.9 03-02 Explanation, 9.6 03-02</p>	6/10	L2	4	1,2,3
OR					
3.	<p>Cassegrain Antenna, 9.4 Description, 9.10, 9.11, 9.12 05-02 operation, 03-02 figures, equation 02-02</p>	6/10	L2	4	1,2,3
OR					
4.	<p>Electronically Steered Phased array antennas Principle and explanation, 9.5 04-02 Steering and Array feed networks 03-02 explanation, figure, equation 02-02</p>	6/10	L2	4	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

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5.	<p>Listing radar antenna function second</p> <p>listing. 9.1 functions 05 02</p> <p>Listing 03 02</p> <p>radar antenna 03 02</p>	6/10	L3	4	1,2,3
OR					
6.	<p>radar receiver 11.1 05 02</p> <p>figure related 03 02</p> <p>Explanation 03 02</p>	6/10	L3	4	1,2,3
OR					
7.	<p>radar system displays, 11.5 05 02</p> <p>figures, types, A scope, B scope 03 02</p> <p>Explanation C scope, L scope, M 03 02</p> <p>Explanation, etc. 03 02</p>	6/10	L2	4	1,2,3
OR					
8.	<p>Explanation of, 11.4 05 02</p> <p>i) balanced Duplexer, 11.3 f 05 02</p> <p>ii) Stoke & Costel displays 755 05 02</p> <p>iii) receiver voice figures, 11.2 05 02</p>	6/10	L2	4	1,2,3
OR					
9.	<p>radar system duplexed role</p> <p>Transmit condition illustration, 11.5 05 03</p> <p>Receiver condition in balanced Duplexer 11.5 05 03</p>	6/10	L2	4	1,2,3
OR					
10.	<p>Diagram, Explanation, operation of</p> <p>i) single ended receiver, 11.2 c 05 02</p> <p>ii) balanced mixer, 11.2 b 03 02</p> <p>iii) image rejection mixer, 11.2 c 03 02</p>	6/10	L2	4	1,2,3

Note: BTL (Blooms Taxonomy Level)

CO (Course Outcome)

PO (Program Outcome)

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RAO BAHADUR Y. MAHABALESWARAPPA ENGINEERING COLLEGE, BALLARI
Department of Electronics and Communication Engineering



	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10
CO mapping	4	4	4	4	4	4	4	4	4	4
Max Marks /Question	10	10	10	10	10	10	10	10	10	10
Total marks of class /question	340	70	20	390	367	30	360	57	127	177
No. of students attended	35	8	3	40	38	4	37	7	18	25
No of students scored > 65% of marks/Question	34	7	2	39	37	3	36	6	12	14
Percentage of students scored > 65% of marks/Question	97.15	87.50	66.67	97.50	97.37	75.00	97.30	85.72	66.67	56.00

Mark range	0-10	11 to 20	21 to 30	31-40	41-50
No. Of Students	00	00	00	00	41

Note: 2017 & 2018 Scheme Format

RAO BAHADUR Y.MAHABALESWARAPPA ENGINEERING COLLEGE, BELLARY.

Branch : EC

Semester : 8

Sl NO.	USN	17EC833
1	3VC16EC011	39
2	3VC16EC021	40
3	3VC16EC033	39
4	3VC16EC045	-
5	3VC16EC065	39
6	3VC16EC098	-
7	3VC17EC002	-
8	3VC17EC003	40
9	3VC17EC004	40
10	3VC17EC005	40
11	3VC17EC006	-
12	3VC17EC008	-
13	3VC17EC009	-
14	3VC17EC011	40
15	3VC17EC012	-
16	3VC17EC013	40
17	3VC17EC014	-
18	3VC17EC015	-
19	3VC17EC016	-
20	3VC17EC017	40
21	3VC17EC018	39
22	3VC17EC019	-
23	3VC17EC022	39
24	3VC17EC023	39
25	3VC17EC024	39
26	3VC17EC025	39
27	3VC17EC026	-
28	3VC17EC027	39
29	3VC17EC028	39
30	3VC17EC029	-
31	3VC17EC031	40
32	3VC17EC033	39
33	3VC17EC035	-
34	3VC17EC036	40
35	3VC17EC037	39
36	3VC17EC038	-

SI NO.	USN	17EC833
37	3VC17EC039	39
38	3VC17EC042	39
39	3VC17EC044	40
40	3VC17EC045	-
41	3VC17EC047	39
42	3VC17EC048	-
43	3VC17EC050	39
44	3VC17EC051	-
45	3VC17EC053	-
46	3VC17EC054	-
47	3VC17EC055	39
48	3VC17EC056	-
49	3VC17EC057	39
50	3VC17EC058	-
51	3VC17EC060	39
52	3VC17EC061	40
53	3VC17EC062	-
54	3VC17EC064	39
55	3VC17EC066	40
56	3VC17EC067	-
57	3VC17EC068	40
58	3VC17EC069	-
59	3VC17EC070	40
60	3VC17EC071	-
61	3VC17EC072	39
62	3VC17EC073	-
63	3VC17EC074	-
64	3VC17EC076	-
65	3VC17EC077	40
66	3VC17EC078	-
67	3VC17EC079	39
68	3VC17EC080	-
69	3VC17EC081	39
70	3VC17EC082	-
71	3VC17EC083	40
72	3VC17EC084	-
73	3VC18EC401	39
74	3VC18EC402	-
75	3VC18EC403	39

Branch : EC

Semester : 8

SI NO.	USN	15EC833
1	3VC15EC007	19
2	3VC15EC088	15
3	3VC15EC100	15
4	3VC15EC101	20
5	3VC16EC004	-
6	3VC16EC009	19
7	3VC16EC019	19
8	3VC16EC048	20
9	3VC16EC054	20
10	3VC16EC070	20
11	3VC16EC071	20
12	3VC16EC088	20
13	3VC16EC089	19
14	3VC16EC103	19
15	3VC17EC405	19
16	3VC17EC406	20

Faculty:HS**Course Name: RE****Course Code: 17EC833****Academic Year: 2020-21**

Sl. No	USN NO	NAME	CIE	SEE
1	3VC16EC011	MONISHA B S	39	32
2	3VC16EC033	HARITHA	39	36
3	3VC16EC065	RAGHAVENDRA	39	41
4	3VC17EC004	ANJUM K M	40	44
5	3VC17EC018	GAGANA B J	39	41
6	3VC17EC022	JAIPRAKASH N	39	42
7	3VC17EC023	JYOTHI H	39	29
8	3VC17EC024	K SUSHMA	39	41
9	3VC17EC025	K SWETHA	39	45
10	3VC17EC027	KEERTHI M V	39	38
11	3VC17EC031	MANASA B	40	32
12	3VC17EC033	MANJUNATH SUNKAD	39	37
13	3VC17EC036	N SOWBAGYASHREE	40	33
14	3VC17EC039	NEELESH PATIL	39	32
15	3VC17EC044	PAWAN KUMAR M	39	32
16	3VC17EC047	PRAVEEN KUMAR GOTUR	39	36
17	3VC17EC050	RAJASHEKAR REDDY S	39	42
18	3VC17EC055	S KIRAN KUMAR	39	42
19	3VC17EC060	SAI KRISHNA BURUGUPALLI	40	38
20	3VC17EC061	SAI KRISHNA M	40	33
21	3VC17EC079	VENKATESH K	39	31
22	3VC17EC081	VINAYAKA V	39	39
23	3VC16EC021	DHANYA CUDDAPH	40	28
24	3VC17EC003	ANISHA	40	40
25	3VC17EC005	ASIF AHMED	40	23
26	3VC17EC011	C RUCHITHA	39	49
27	3VC17EC013	CHANDANA B J	40	38
28	3VC17EC017	G S TANUJA	40	43
29	3VC17EC028	LAKSHMINARAYANA CHOUDARY	39	31
30	3VC17EC037	NAGARATHNA	39	51

31	3VC17EC042	PALLAVI NAYAKA B	39	35
32	3VC17EC057	S T SINDHUJA	39	29
33	3VC17EC064	SHARATH KUMAR	39	27
34	3VC17EC066	SHOBHA	40	40
35	3VC17EC068	SNEHA T	40	31
36	3VC17EC070	SOUMYA	40	29
37	3VC17EC077	TEJASWINI A	40	47
38	3VC17EC083	Y ANUSHA	40	41
39	3VC18EC401	HARISH BABU B V	39	36
40	3VC18EC403	RAVI KUMAR K	39	27
41	3VC17EC072	Sree Lakshmi Desai	39	40
42				
43				
44				
64				
65				
Number of students scoring ≥ 27 in EXTERNAL				40

EXTERNAL EXAM

Number of students appeared for the exam	41	
Number of students scoring $\geq 45\%$ in EXTERNAL	40	
Percentage	0.98	
Achieved target:		98%
ATTAINMENT LEVEL		

-
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79
66
75
81
87
69
71
80
66
68
74

Total
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75
80
84
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89
78
83
70
90



Rao Bahadur Y Mahabaleswarappa Engineering College



Dept. of Electronics & Communication Engineering

Sem: ^{8 A, B} ~~7 A~~

IA Marks for ^{RE 17/15EC833} ~~DIP (15/17EC72)~~ 2020-21

Sl. No	IA	USN	Name of the Student	Average	EXT	Test			Ave	Grade	ASSY
						1st	2nd	3rd			
1	+	3VC16EC011	MONISHA B S ✓ x x ✓ ✓ ✓	39+	32/71	49	47	47	48	10	29 39
2	+	3VC16EC033	HARITHA ✓ x x ✓ ✓ ✓	39+	36/75	48	47	47	48	10	29 39
3	+	3VC16EC065	RAGHAVENDRA ✓ ✓ x ✓ ✓ ✓	39+	41/80	48	46	46	46	10	28 39
4	+	3VC17EC004	ANJUM K M ✓ x x ✓ ✓ ✓	40+	44/84	50	46	47	48	10	29 40
5	+	3VC17EC018	GAGANA B J x x x ✓ ✓ x	39+	41/80	46	46	0	46	0	19 39
6	+	3VC17EC022	JAIPRAKASH N x x x ✓ ✓ ✓	39+	42/81	49	49	46	46	0	29 39
7	-	3VC17EC023	JYOTHI H ✓ x x ✓ ✓ ✓	39+	29/68	46	47	47	48	10	28 39
8	+	3VC17EC024	K SUSHMA ✓ x x ✓ ✓ ✓	39+	41/80	48	47	47	48	10	29 39
9	+	3VC17EC025	K SWETHA ✓ x x ✓ ✓ ✓	39+	45/74	48	47	47	48	10	29 39
10	-	3VC17EC027	KEERTHI M V ✓ ✓ x ✓ ✓ ✓	39+	38/77	46	48	47	48	10	29 39
11	+	3VC17EC031	MANASA B ✓ ✓ x ✓ ✓ ✓	40+	32/72	49	50	49	49	10	30 40
12	-	3VC17EC033	MANJUNATH SUNKAD x x x ✓ ✓ ✓	39+	37/76	47	46	46	46	0	28 39
13	+	3VC17EC036	N SOWBAGYASHREE ✓ x x ✓ ✓ ✓	40+	39/79	48	48	46	46	10	29 40
14	-	3VC17EC039	NEELESHPATIL x x x ✓ ✓ ✓	39+	32/71	46	46	46	46	0	28 39
15	-	3VC17EC044	PAWAN KUMAR M x x x ✓ ✓ ✓	39 40+	32/72	47	46	46	46	0	28 39
16	-	3VC17EC047	PRAVEEN KUMAR GOTUR x x x ✓ ✓ ✓	39+	36/75	46	46	46	46	0	28 39
17	-	3VC17EC050	RAJASHEKAR REDDY S x x x ✓ ✓ x	39+	42/81	46	46	46	46	0	28 39
18	+	3VC17EC055	S KIRAN KUMAR x x x ✓ ✓ ✓	39+	42/81	46	46	46	46	0	28 39
19	+	3VC17EC060	SAI KRISHNA BURUGUPALLI x ✓ x ✓ ✓ ✓	39+	30/77	46	46	46	46	10	28 39
20	-	3VC17EC061	SAI KRISHNA M ✓ x x ✓ ✓ ✓	40+	33/73	48	50	48	50	10	29 40
21	-	3VC17EC079	VENKATESH K x x x ✓ ✓ ✓	39+	31/70	46	46	46	46	0	28 39
22	-	3VC17EC081	VINAYAKA V x x x ✓ ✓ ✓	39+	39/78	46	46	46	46	0	28 39
23	-	3VC16EC021	DHANYA CUDDAPH ✓ ✓ x ✓ ✓ ✓	40+	40/68	47	50	48	49	10	30 40
24	+	3VC17EC003	ANISHA ✓ ✓ x ✓ ✓ ✓	40+	40/80	50	50	49	50	10	30 40
25	+	3VC17EC005	ASIF AHMED ✓ ✓ x ✓ ✓ ✓	40+	43/83	46	50	49	49	10	30 40
26	+	3VC17EC011	C RUCHITHA ✓ x x ✓ ✓ ✓	39 40+	49/89	48	49	48	48	10	29 39



Rao Bahadur Y Mahabaleswarappa Engineering College

Dept. of Electronics & Communication Engineering

Sem: 7 A

IA Marks for DIP (15/17EC72) 2020-21

12/19



Sr	Roll No	Name	Q1	Q2	Q3	Q4	Q5	Q6	Q7	Q8	Q9	Q10	Total	Grade							
27	+3VC17EC013	CHANDANA B J	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40+	38/78	49	50	49	50	10	30	40
28	+3VC17EC017	G S TANUJA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40+	43/83	50	50	49	50	10	30	40
29	+3VC17EC028	LAKSHMINARAYANA CHOUDARY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	31/70	48	47	46	46	0	28	39
30	+3VC17EC037	NAGARATHNA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	51/90	48	47	47	48	10	29	39
31	+3VC17EC042	PALLAVI NAYAKA B	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	35/76	48	49	47	48	10	29	39
32	-3VC17EC057	S T SINDHUJA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	29/68	46	46	46	46	0	28	39
33	+3VC17EC064	SHARATH KUMAR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	27/66	49	40	40	47	10	28	39
34	+3VC17EC066	SHOBHA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40+	40/80	50	50	50	33	10	30	40
35	+3VC17EC068	SNEHA T	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40+	31/71	50	50	48	50	10	30	40
36	-3VC17EC070	SOUMYA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39/40+	29/69	48	48	46	46	0	28	39
37	+3VC17EC077	TEJASWINI A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	40+	47/87	49	50	48	50	10	30	40
38	+3VC17EC083	Y ANUSHA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39/40+	41/81	50	46	47	48	10	29	39
39	+3VC18EC401	HARISH BABU B V	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	36/75	48	47	47	48	10	28	39
40	+3VC18EC403	RAVI KUMAR K	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	39+	27/61	48	46	47	48	10	29	39
41	3VC15EC007	AKASH KULKARNI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19+	61/80	26	26	A	15	5/0	15	19
42	3VC15EC088	SWATHI H.A	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15+	47/62	0	20	A	15	5/0	08	15
43	3VC15EC100	*SUSHMITHA	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	15+	15/30	0	20	A	15	5/0	08	15
44	3VC15EC101	NAZHATHUNNISA.S	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20+	63/83	26	26	A	15	5-	20	20
45	3VC16EC019	DARASHAN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19+	48/67	26	26	A	15	5/0	15	19
46	3VC16EC048	MOHAMMED ASIF ALI	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20+	49/69	28	26	A	15	5-	20	20
47	3VC16EC071	ROSHAN ZAMEER	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20+	57/77	26	26	A	15	5-	20	20
48	3VC16EC103	VARUN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19+	50/69	27	26	A	15	5/0	15	19
49	3VC17EC406	TAYYABA AFRIN	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20+	57/77	26	26	A	15	5-	20	20
50	3VC17EC405	SOMASHEKAR	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19+	44/63	26	26	A	15	5/0	15	19
51	3VC16EC009	ANUSHA G.	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	19+	49/68	30	0	A	8-	5-	13	19
52	3VC16EC054	NITHIN REDDY	✓	✓	✓	✓	✓	✓	✓	✓	✓	✓	20+	51/71	27	26	A	15-	5-	20	20



Rao Bahadur Y Mahabaleswarappa Engineering College



Dept. of Electronics & Communication Engineering

Sem: 7 A

IA Marks for DIP (15/17EC72) 2020-21

53	3VC16EC088	SHRILAKSHMI PRASANNA	20+	48/68	29	26	A	15	5	20	20
54	3VC16EC089	SHRICHARAN R	19+	33/52	26	26	A	15	5/0	15	19
55	3VC16EC070	REVANA SIDDAPA	20+	61/81	28	26	A	15	5	20	20

ABSENT

PRESENT

Staff Incharge: Mr.SH

B. 3VC17EC072 See Lakshmi Devi 39+40/79
 23/07/2021
 26/7/21

Reglar: 41
 Entued: 41

OTE: 15

Total: 56

Sec A R O Sec B R O
 22 10 19 05
 32 24

Sec A: 32
 Sec B: 24

Total: 56

Total: 56

Pass: 55

Fail: 01

Result: 55/56 = 98.21

Sec A: 22/22 = 100%

Sec B: 19/19 = 100%

Sec A/B: 22+19 = 41 => 41/41 = 100%

OTE A => 09/10 => 90%

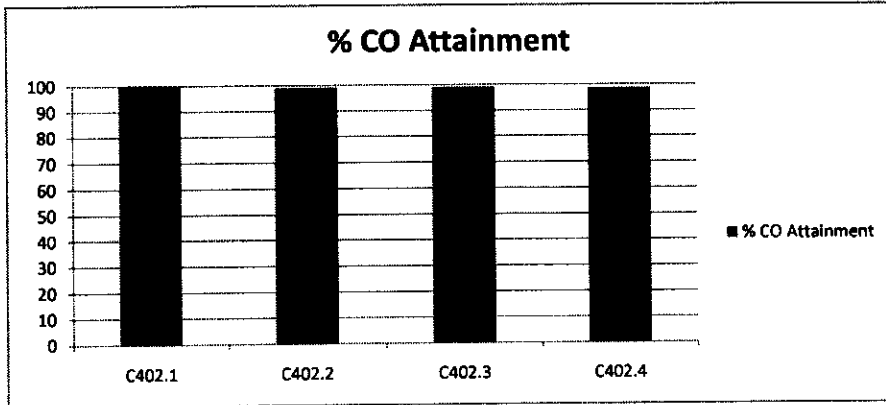
OTE B => 05/05 => 100%

OTE A/B: 93%

38 18
 29 19
 40 20

64							
		AVERAGE	4.98	4.95	4.95	4.93	
			1.00	0.99	0.99	0.99	
		% CO Attainment	100	99	99	99	
		ATTAINMENT LEVEL	3	3	3	3	

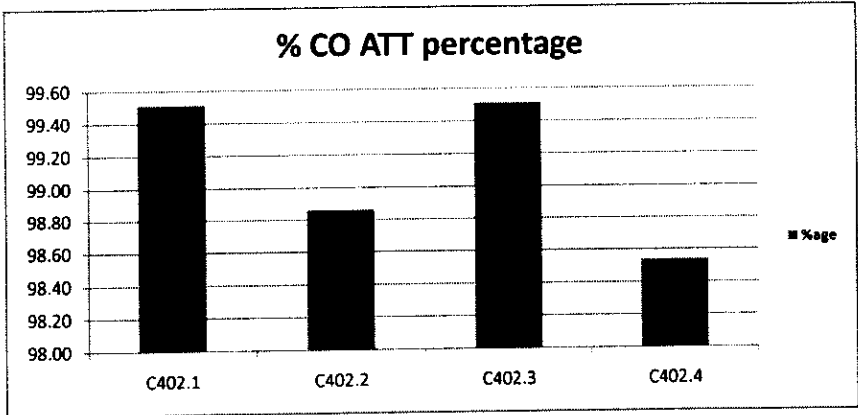
% CO Attainment
C402.1
C402.2
C402.3
C402.4



33	3VC17EC064	SHARATH KUMAR	5	5	5	5	5	5	5	5	5	5
34	3VC17EC066	SHOBHA	5	5	5	5	5	5	5	5	5	5
35	3VC17EC068	SNEHA T	5	5	4	5	5	5	5	5	5	5
36	3VC17EC070	SOURMYA	5	5	5	5	5	5	5	5	5	5
37	VC17EC0	TEJASWINI A	5	5	5	5	5	5	5	5	5	5
38	VC17EC0	Y ANUSHA	5	5	5	5	5	5	5	5	5	5
39	VC18EC4	HAKISH BABU B V	5	5	5	5	5	5	5	5	5	5
40	VC18EC4	RAVI KUMAR K	5	5	5	5	5	5	5	5	5	5
41	VC17EC0	Sree Lakshmi	5	5	5	5	5	5	5	5	5	5
42												
43												
44												
0												
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Average	5	4.95122	4.902439	4.97561	5	4.926829	4.95122	4.878049	4.95122	4.97561
CO Attainment	1.00	0.99	0.98	1.00	1.00	0.99	0.99	0.98	0.99	1.00
%CO Attainment	100.00	99.02	98.05	99.51	100.00	98.54	99.02	97.56	99.02	99.51

C402.1	1	0.99024		0.99512						1.00	99.51
C402.2			0.98049		1	0.98537				0.99	98.86
C402.3									0.99512	1.00	99.51
C402.4							0.99024	0.97561	0.99024	0.99	98.54

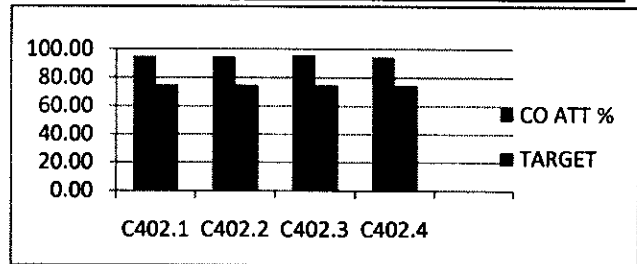


DIRECT & INDIRECT ATTAINMENT 2020-21

Faculty: HS	
Course Name: RE	
Course Code: 17EC833	Sem 8 Sec A,B
C402.1	Understand the Radar fundamentals and analyze the radar signals.(L1,L2,L3)
C402.2	Explain the working principles of various Radars like Pulse, WTTI, Doppler, their applications and limitations.(L1,L2,L3)
C402.3	Analyze the various range parameters of Radar system, tracking Radars and their comparisons.(L1,L2,L3)
C402.4	Describe the working of various Radar transmitters and receivers. .(L1,L2,L3)

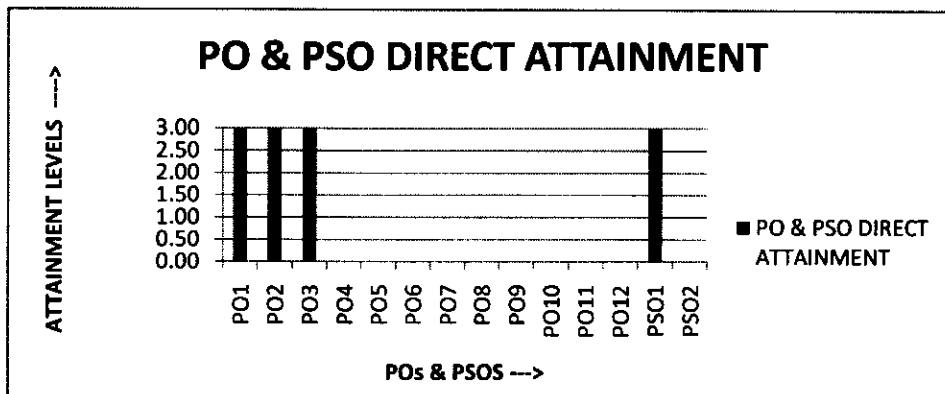
CO-PO/PSO Mapping														
	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
C402.1	3	3	3											
C402.2	3	3	3											
C402.3	3	3	3											
C402.4	3	3	3											
AVG	3.00	3.00	3.00										3.00	

	CO ATT	TARGET
C402.1	95.06	75
C402.2	94.88	75
C402.3	96.18	75
C402.4	94.59	75



	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
PO ATT	3.00	3.00	3.00										3.00	

	PO 1	PO 2	PO 3	PO 4	PO 5	PO 6	PO 7	PO 8	PO 9	PO 10	PO 11	PO 12	PSO 1	PSO 2
PO ATT	3.00	3.00	3.00										3.00	





CO ATTAINMENT GAP ANALYSIS 2019-20

Course Outcomes	CO Direct Attainment =0.80(FE)+0.20(IA)	CO Target	CO Attainment Gap
C408.1	95.06	75	-
C408.2	96.88	75	-
C408.3	96.18	75	-
C408.4	94.59	75	-

ACTION REPORT ON GAP ANALYSIS

Course Outcomes	Action proposed to bridge the gap	Modification of target if achieved
CO401.1	-	-
CO401.2	-	-
CO401.3	-	-
CO401.4	-	-

Note: 1. Suitable action to be initiated to fill the gap at the course coordinator level and the same has to be documented

2. If the targets are achieved then higher targets may be set.

3. If the targets are not achieved then planning must be done with respect to

Improvements in teaching /learning process so as to meet the target



INSTRUCTOR REPORT (INNOVATIVE PRACTICES) 2019-20

Impact of Delivery Methods :

Chalk and Board : ✓ ON-LINE.

Assignments : ✓

Seminars : -

Course Outcome Attainment Remarks : Attained.

Instructor Feedback : -

Scope for Improvements : -

CBCS SCHEME

USN

3	2	1	7	E	C	4	0	5
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15EC833

Eighth Semester B.E. Degree Examination, July/August 2021 RADAR Engineering

Time: 3 hrs.

Max. Marks: 80

Note: Answer any FIVE full questions.

- 1 a. Define RADAR. Explain the basic principle of RADAR with block diagram. (08 Marks)
b. Briefly describe the major area of radar application. (08 Marks)
- 2 a. With a neat diagram, explain conventional pulse radar with a superheterodyne receiver. (08 Marks)
b. Explain the simple form of radar equation. (08 Marks)
- 3 a. Derive the modified RADAR equation in terms of signal to noise ratio. (08 Marks)
b. Briefly discuss the following type of signal losses in RADAR.
i) Antenna losses
ii) Losses in Doppler processing radar. (08 Marks)
- 4 a. Explain the concepts of pulse repetition frequency and range ambiguities in case of radar. (08 Marks)
b. Making use of portion of radar receiver block diagram, discuss with necessary equation the probability of false alarm and probability of detection. (08 Marks)
- 5 a. Explain the working of digital Moving Target Indicator (MTI) Doppler signal processor with neat diagram. (08 Marks)
b. With a neat block diagram, explain how simple pulse radar extracts the Doppler frequency shaft of the echo signal from the moving target. (08 Marks)
- 6 a. Illustrate with neat block diagram, single - delay line canceller. Also derive the expression for frequency response of single-delay line canceller. (08 Marks)
b. Write a note on blind speeds. (08 Marks)
- 7 a. Define monopulse tracker. Using block diagram, explain amplitude comparison monopulse tracking radar in one angle co-ordinates. (08 Marks)
b. With a neat block diagram, explain conical scan tracking radar. (08 Marks)
- 8 a. Discuss the concept of phase comparison monopulse. (08 Marks)
b. Compare monopulse and conical radar tracking system. (08 Marks)
- 9 a. List the different functions served by radar antenna. (08 Marks)
b. What is the role of duplexers in radar system? Illustrate the transmit condition and receiver condition in case of balanced duplexer. (08 Marks)
- 10 a. List the advantages and limitations of electronically steered phased array antenna. (08 Marks)
b. Explain different types of radar display system. (08 Marks)

Important Note : 1. On completing your answers, compulsorily draw diagonal cross lines on the remaining blank pages.
2. Any revealing of identification, appeal to evaluator and /or equations written eg, 42+8 = 50, will be treated as malpractice.

CBCS SCHEME

USN

3VC17FL025

17EC833

Eighth Semester B.E. Degree Examination, July/August 2021 Radar Engineering

Time: 3 hrs.

Max. Marks: 100

Note: Answer any FIVE full questions.

- 1 a. Explain basic principle of radar with suitable diagrams. (10 Marks)
b. Explain maximum unambiguous range of a radar with equation and graph. (10 Marks)
- 2 a. A 10GHz radar has the following characteristics $P_t = 250\text{KW}$, $\text{PRF} = 1500\text{PPS}$, pulse width = $0.8\mu\text{s}$, Power gain of antenna = 2500, $S_{\text{min}} = 10^{-14}\text{W}$, $A_e = 10\text{m}^2$, $\sigma = 2\text{m}^2$. Find : i) Runamb ii) Maximum possible range iii) Duty cycle iv) Average power. (10 Marks)
b. Briefly describe the major areas of radar applications. (10 Marks)
- 3 a. Derive the modified radar equation in terms of signal to noise ratio. (10 Marks)
b. Explain the radar cross section of sphere and cone sphere targets. (10 Marks)
- 4 a. Discuss with equation and graphs the probability of false alarm and the probability of detection using an envelope detector. (10 Marks)
b. Discuss briefly the following types of system losses in radar:
i) Microwave plumbing losses
ii) Antenna losses
iii) Signal processing losses. (10 Marks)
- 5 a. Explain the working of digital Moving Target Indicator (MTI) doppler signal processor with neat diagram. (10 Marks)
b. List the limitations of single delay line cancellers and derive its associated equations. (10 Marks)
- 6 a. With neat block diagram, explain the original Moving Target Detector (MTD) signal processor. (10 Marks)
b. Derive the equations for clutter attenuation and MTI improvement factor. (10 Marks)
- 7 a. Define monopulse tracker. Using block diagram explain amplitude comparison monopulse tracking radar for a single angular coordinate. (10 Marks)
b. With neat block diagram, explain conical scan tracking radar. (10 Marks)
- 8 a. What are the different types of tracking radar systems? Explain with diagrams, how angle tracking is done. (10 Marks)
b. Discuss on tracking in range of a tracking radar with suitable waveforms and equations. (10 Marks)
- 9 a. List the different functions served by radar antenna. (10 Marks)
b. Explain different types of radar display system. (10 Marks)
- 10 a. List the advantages and limitations of electronically steered phase array antenna. (10 Marks)
b. What is the role of duplexers in a radar system? Illustrate the transmit condition and receive condition in case of a balanced duplexer. (10 Marks)

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