School of Aeronautics (Neemrana)

Question Paper For Internal Assessment Examination (Theory) - Old Scheme i.e 2012 Syllabus

Instructions For Students / Faculty

Mid Term I (Total 40 Marks, 1 Hr. & 30 Min, Syllabus From Beginning of The Session)

Total number of questions to be given are 8, each carrying 10 marks and it is compulsory to attend 2 questions from each part i.e. Part A and B. There is a choice of two questions out of four in each part. Part A will be theoretical or derivation type **(Not More Than 70 Words For Question).** Part B will be fully numerically oriented questions **(Not More Than 70 Words For Question)**, except for the list of subjects given below. No objective type or fill in the blanks shall be given, but subpart of question can be given for both Part A & B.

Mid Term II (Total 50 Marks, 1 Hr. & 45 Min, Syllabus From Beginning of The Session)

Total number of questions to be given are 8, each carrying 10 marks and it is compulsory to attend 2 questions from Part A and three questions from Part B. There is a choice of two questions out of four in part A and 3 questions out of 4 in Part B. Part A will be theoretical or derivation type **(Not More Than 70 Words For Question).** Part B will be fully numerically oriented questions **(Not More Than 70 Words For Question)**, except for the list of subjects given below. No objective type or fill in the blanks shall be given, but subpart of question can be given for both Part A & B.

Mid Term III (Total 60 Marks, 2 Hrs, Syllabus From Beginning of The Session)

Total number of questions to be given are 10, each carrying 10 marks and it is compulsory to attend 2 questions from Part A and 4 questions from Part B. There is a choice of two questions out of four in part A and 4 questions out of 6 in Part B. Part A will be theoretical or derivation type **(Not More Than 70 Words For Question).** Part B will be fully numerically oriented questions **(Not More Than 70 Words For Question)**, except for the list of subjects given below. No objective type or fill in the blanks shall be given, but subpart of question can be given for both Part A & B.

*** LIST OF ELABORATIVE THEORY QUESTION SUBJECTS**: Aircraft Materials, Aircraft System, Aircraft Rules & Regulation-I, Mechanics of Composite Materials, Aircraft Design, Aircraft Rules & Regulation-II, Avionics-I, Helicopter Theory, Maintenance of Airframe and System Design, Avionics-II, Airlines and Airport Management, Maintenance of Power Plant & Systems

FACULTY MEMBERS, PLEASE ENSURE EXCEPT ABOVE LISTED SUBJECTS, NO THEORITICAL ELABORATIVE QUESTION SHOULD BE GIVEN IN PART 'B' OF QUESTION PAPER

STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF

STUDENT IS ALLOWED TO ENTER LATE NOT MORE THAN 15 MIN AFTER STARTING OF EXAM, AND MAY LEAVE THE EXAM HALL ON EXPIRY OF ATLEAST OF 1 Hr FROM THE STARTING TIME OF EXAMINATION

Question Paper & Student Details

Mid Term* Mid Term 1

Name of Faculty* Tarun Thukral,Raviraj Srikrishr

Subject* 7AN1 – Avionics –I (Old)

Batch Tenth (10)

Email Id of Faculty:* tarun.thkrl.14may@gmail.com

Date of Submission of QP 05/09/2019

Date of Examination* 07/09/2019

Course* B.Tech (Aeronautical Enginee...

Semest... Semester : 7

Phone Number of Faculty* 750 096 6581

Student Name

Student Reg No.

Part A

Question : 1* Describe the working principle of Continuous wave Radar.

Lesson Plan* 2 Topic* Continuous wave Radar Source* Radar systems by

Question : 2* What are the various types of Radar displays used in Avionics system?

Lesson Plan* 4 Topic* Various types of Radar d Source* Electronic Comm

Question : 3*	Define Radar and PRT . Derive Radar range equation. What is the purpose of using duplexer in Radar transmission line?				
Lesson Plan*	1	**Topic***	Introduction to Radar ar	**Source***	Electronic Comm !
Question : 4*	Explain the working principle of Moving Target Indicating(MTI) radars.				
Lesson Plan*	3	**Topic***	Moving Target Indicating	**Source***	Radar systems by

Part B

Question : 1*	What is the need of antenna? Explain various types of antenna.				
Lesson Plan*	5	**Topic***	Basics of antenna	**Source***	ANTENNA & WAVE
Question : 2*	Explain the following: 1. Transmission efficiency of antenna 2. Directive gain of antenna				
Lesson Plan*	6	**Topic***	Characteristics of Antenı	**Source***	ANTENNA & WAVE

Question : 3*	Explain the small dipole antenna and its features.				
Lesson Plan*	7	Topic*	Small dipole Antenna &	Source*	ANTENNA & WAVE
Question : 4*	What are the features of Half wave dipole antenna.Explain in detail.				
Lesson Plan*	7	Topic*	Half wave dipole Antenn	Source*	ANTENNA & WAVE
Question : 5					
Lesson Plan		Topic		Source	
Question : 6					
Lesson Plan		Topic		Source	

Upload Scanned Document In Case of Numerical or Diagram for any of the above question

Mention question number with relevant fig / numerical / equations. Max 150 KB

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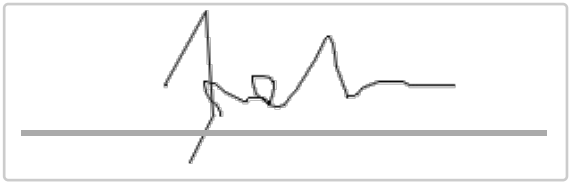
I have scrutinized the question paper. There is no spelling mistake or any type of irrelevant question.



Answer Sheet Details	
Mid Term	Mid Term 1
Name of Faculty	Ms.Tarun Thukral & Mr.Raviraj Srikrishna
Subject	7AN1 – Avionics –I (Old)
Date of Submission of QP	15/09/2019
Batch	Tenth (10)
Email Id of Faculty:	ravirajsrikrishna@gmail.com
Date of Examination	07/09/2019
Course	B.Tech (Aeronautical Engineering)
Semester	Semester : 7
Phone Number of Faculty	820-917-0726

Part A	
Question : 1	CW Transmitter − It produces an analog signal having a frequency of fo. The output of CW Transmitter is connected to both transmitting Antenna and Mixer-I. Local Oscillator − It produces a signal having a frequency of fl. The output of Local Oscillator is connected to Mixer-I. Mixer-I − Mixer can produce both sum and difference of the frequencies that are applied to it. The signals having frequencies of fo and fl are applied to Mixer-I. So, the Mixer-I will produce the output having frequencies fo+fl or fo−fl. Side Band Filter − As the name suggests, side band filter allows a particular side band frequencies − either upper side band frequencies or lower side band frequencies. The side band filter shown in the above figure produces only upper side band frequency, i.e., fo+fl. Mixer-II − 2fo+fl±fd or fl±fd. IF Amplifier − IF amplifier amplifies the Intermediate Frequency (IF) signal. The IF amplifier shown in the figure allows only the Intermediate Frequency, fl±fd and amplifies it. Doppler Amplifier − As the name suggests, Doppler amplifier amplifies the signal, which is having Doppler frequency, fd.

Question : 2	A radar display is an electronic device to present radar data to the operator. The radar system transmits pulses or continuous waves of electromagnetic radiation, a small portion of which backscatter off targets (intended or otherwise) and return to the radar system. The receiver converts all received electromagnetic radiation into a continuous electronic analog signal of varying (or oscillating) voltage that can be converted then to a screen display. A-Scope It is a two dimensional Radar display. The horizontal and vertical coordinates represent the range and echo amplitude of the target respectively. In A-Scope, the deflection modulation takes place. It is more suitable for manually tracking Radar. P-Scope It is a Radar display, which uses intensity modulation. It displays the information of echo signal as plan view. Range and azimuth angle are displayed in polar coordinates. Hence, it is called the Plan Position Indicator or the PPI display.
Question : 3	Radar is a system for detecting the presence, direction, distance, and speed of aircraft, ships, and other objects, by sending out pulses of radio waves which are reflected off the object back to the source. PRT is the interval between the start of one pulse and the start of another. PRT is also equal to the sum, PRT = PW+RT. A duplexer is an electronic device that allows bi-directional (duplex) communication over a single path. In radar and radio communications systems, it isolates the receiver from the transmitter while permitting them to share a common antenna.
Question : 4	If the Radar is used for detecting the movable target, then the Radar should receive only the echo signal due to that movable target. This echo signal is the desired one. However, in practical applications, Radar receives the echo signals due to stationary objects in addition to the echo signal due to that movable target. The echo signals due to stationary objects (places) such as land and sea are called clutters because these are unwanted signals. Therefore, we have to choose the Radar in such a way that it considers only the echo signal due to movable target but not the clutters. For this purpose, Radar uses the principle of Doppler Effect for distinguishing the non-stationary targets from stationary objects. This type of Radar is called Moving Target Indicator Radar or simply, MTI Radar. According to Doppler effect, the frequency of the received signal will increase if the target is moving towards the direction of Radar. classification: MTI Radar with Power Amplifier Transmitter MTI Radar with Power Oscillator Transmitter
Part B	

Question : 1	An antenna plays a vital role in a communication system. It is used in both the transmission and reception of radio frequency signals. In fact, an antenna is a structure that is capable of radiating electromagnetic waves or receiving them, as the case may be. Basically, an antenna is generally a metallic object , often a wire or collection of wires, used to convert high frequency current into electromagnetic waves and vice versa. Thus, a transmitting antenna converts electrical energy into electromagnetic waves, whereas a receiving antenna converts electromagnetic waves into electrical energy. Apart from their different functions, transmitting and receiving antennas behave identically i.e. their behaviour is reciprocal.When a transmitting antenna is held vertically, the electromagnetic waves produced are polarised vertically. When the same antenna is held horizontally, the em waves produced are polarised horizontally.The design of an antenna depends on frequency of carrier wave and directivity of the beam etc. Various types of antenna: 1.Small monopole 2.Small dipole 3.Yagiuda 4.Horn 5.Parabolic dish 6.Log periodic
Question : 2	1.The efficiency of an antenna is a ratio of the power delivered to the antenna relative to the power radiated from the antenna. A high efficiency antenna has most of the power present at the antenna's input radiated away. A low efficiency antenna has most of the power absorbed as losses within the antenna, or reflected away due to impedance mismatch. The antenna efficiency (or radiation efficiency) can be written as the ratio of the radiated power to the input power of the antenna. 2.The Directive Gain (DG) is defined as the ratio of radiation intensity due to the test antenna to isotropic antenna (hypothetical antenna that radiates uniformly in all direction). DG = U = 4πU U0 Prad Where, U = radiation intensity due to test antenna, in watts per unit solid angle U0 = radiation intensity due to isotropic antenna, in watts per unit solid angle Prad =total power radiated in watt

Question : 3	A short dipole is a simple wire antenna. One end of it is open-circuited and the other end is fed with AC source. This dipole got its name because of its length. Frequency range The range of frequency in which short dipole operates is around 3KHz to 30MHz. This is mostly used in low frequency receivers. The Short dipole is the dipole antenna having the length of its wire shorter than the wavelength. A voltage source is connected at one end while a dipole shape is made, i.e., the lines are terminated at the other end. Short Dipole The circuit diagram of a short dipole with length L is shown. The actual size of the antenna does not matter. The wire that leads to the antenna must be less than one-tenth of the wavelength. That is $L<\lambda 10$ Where L is the length of the wire of the short dipole. λ is the wavelength. Another type of short dipole is infinitesimal dipole, whose length is far less than its wave length. Its constructiion is similar to it, but uses a capacitor plate
Question : 4	The half wave dipole is the most popular version of the dipole antenna or aerial. As the name implies, the half wave dipole is a half wavelength long. This is the shortest resonant length that can be used for a resonant dipole. It also has a very convenient radiation pattern. Half wave dipole basics The half wave dipole is formed from a conducting element which is wire or metal tube which is an electrical half wavelength long. The half wave dipole is normally fed in the middle where the impedance falls to its lowest. In this way, the antenna consists of the feeder connected to two quarter wavelength elements in line with each other. The voltage and current levels vary along the length of the radiating section of the antenna. This occurs because standing waves are set up along the length of the radiating element. As the ends are open circuit current at these points is zero, but the voltage is at its maximum. As the point at which these quantities is measured moves away from the ends, it is found that they vary sinusoidally: the voltage falling, but the current rising. The current then reaches a maximum and the voltage a minimum at a length equal to an electrical quarter wavelength from the ends. As it is a half wave dipole, this point occurs in the centre
Question : 5	
Question : 6	
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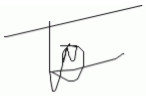
I have scrutinized the answer sheet. There is no spelling mistake or any type of irrelevant answers.



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