**A screenshot of a cell phone

Description generated with very high confidenceB.Tech Aeronautical and Automobile Engineering**

**COURSE PLAN: THEORY COURSE**

|  |  |  |  |
| --- | --- | --- | --- |
| **Department :** | **Aeronautical and Automobile Engineering** | | |
| **Course Name & code :** | **Introduction to Avionics and Navigation Systems** | | **AAE 4304** |
| **Semester & branch :** | **VI** | **Open Elective** | |
| **Name of the faculty :** | **Dr Vishnu G Nair** | | |
|  |  | | |
| |  |  |  |  | | --- | --- | --- | --- | | **L** | **T** | **P** | **C** | | **3** | **0** | **0** | **3** |   **No of contact hours/week:** | | | |

**Course Outcomes (COs) to PO, PSO, BL Mapping**

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **At the end of this course, the student should be able to:** | | **No. of**  **Contact**  **Hours** | **Marks** | **Program Outcomes (POs)** | **PSOs** | **BL**  **(Recommended)** |
| **CO1** | Classify the display system, Human Machine interaction, I/O Device, aircraft deck their adavance technology and challenges. | 6 | 15 | 1,2,3 | 1,2,3 | 2 |
| **CO2** | Identify and apply the concepts of Radars and aircraft warning systems. | 10 | 25 | 1,2,3 | 1,2,3 | 1 |
| **CO3** | Analyze aircraft navigation and its various types and technologies. | 8 | 25 | 1,2,3 | 1,2,3 | 4 |
| **CO4** | Compare the various landing system technologies and possible future aspects | 9 | 25 | 1,2,3 | 1,2,3 | 2 |
| **CO5** | Discuss the databuses, communication, architecture and software used in avionics domain. | 3 | 10 | 1,2,3 | 1,2,3 | 4 |
|  | **Total** | **36** | **100** |  |  |  |

**Course Articulation Matrix**

|  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| **CO/PO** | **PO1** | **PO2** | **PO3** | **PO4** | **PO5** | **PO6** | **PO7** | **PO8** | **PO9** | **PO10** | **PO11** | **PO12** | **PSO1** | **PSO2** | **PSO3** |  |
| **CO1** | **2** | **3** | **2** |  |  |  |  |  |  |  |  |  | **1** |  | **-** |  |
| **CO2** | **2** | **3** | **2** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **CO3** | **2** | **3** | **2** |  |  |  |  |  |  |  |  |  |  | **1** |  |  |
| **CO4** | **2** | **3** | **2** |  |  |  | **1** |  |  |  |  |  |  | **1** |  |  |
| **CO5** | **2** | **2.8** | **2** |  |  |  |  |  |  |  |  |  |  |  |  |  |
| **Average Articulation Level** | 2 | 2 | 2 |  |  |  | 1 |  |  |  |  |  |  | 1 |  |  |

**ICT Tools used in delivery and assessment**

|  |  |  |
| --- | --- | --- |
| **Sl. No** | **Name of the ICT tool used** | **Details of how it is used** |
|  |  |  |

**Course Outcomes (COs)/Course Learning Outcomes (CLOs) to PO, PSO, LO, BL Mapping** #

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| **At the end of this course, the student should be able to:** | | **No. of Contact Hours** | **Marks** | **Program Outcomes(POs)** | **Learning Outcomes (LOs)** | **BL (Recommended)** |
| **CLO1** | Classify the display system, Human Machine interaction, I/O Device, aircraft deck their adavance technology and challenges. | 6 | 15 | 1,2,3 | 1,2,3,6,17 | 2 |
| **CLO2** | Identify and apply the concepts of Radars and aircraft warning systems. | 10 | 25 | 1,2,3 | 1,2,3,6,17 | 1 |
| **CLO3** | Analyze aircraft navigation and its various types and technologies. | 8 | 25 | 1,2,3 | 1,2,3,6,17 | 4 |
| **CLO4** | Compare the various landing system technologies and possible future aspects | 9 | 25 | 1,2,3 | 1,2,3,6,17 |  |
| **CLO5** | Discuss the databuses, communication, architecture and software used in avionics domain. | 3 | 10 | 1,2,3 | 1,2,3,6,17 | 2 |
|  | **Total** | **36** | **100** |  |  |  |

***# Applicable to IET Accredited Programs***

**Delivery and assessment Plan of LOs** #

|  |  |  |
| --- | --- | --- |
| **Learning Outcome (LO) mapped to the course** | | **Delivery and assessment Plan** |
| **LO** | **LO statement** |
| 1 | Classify the display system, Human Machine interaction, I/O Device, aircraft deck their adavance technology and challenges. | Lectures, tutorials and Assignments. |
| 2 | Identify and apply the concepts of Radars and aircraft warning systems. | Lectures, tutorials and Assignments. |
| 3 | Analyze aircraft navigation and its various types and technologies. | Lectures, tutorials and Assignments. |
| 6 | Compare the various landing system technologies and possible future aspects | Lectures, tutorials and Assignments. |
| 17 | Discuss the databuses, communication, architecture and software used in avionics domain. | Lectures, tutorials and Assignments. |

***# Applicable to IET Accredited Programs***

**Assessment Plan**

|  |  |  |  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- | --- | --- | --- |
| ***IN – SEMESTER ASSESSMENTS*** | | | | | | | | | |
| **Sl. No.** | **Assessment Mode** | | **Assessment Method** | **\*\*Time Duration** | **\*\*Marks** | **\*\* Weightage** | **Typology of Questions (Recommended)** | **\*\*Schedule** | **\*\*Topics Covered** |
| 1 | **MISAC** | **1** | **In-semester Exam 1** | **60 Mins** | **15** | **Objective:** 5M  10 MCQs × ½ = 5 marks  **Descriptive:** 10 M  (2 Questions of 2 marks +2 Questions of 3 marks) | Bloom’s taxonomy (B) level of the question should be L3 and above. |  |  |
| **2** | **Quiz** | **15 Mins** | **5** | 10 MCQs × ½ = 5 | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  |  |
| **3** | **Surprise Assignment** | **20 Mins** | **5** | 1 Question × 5M = 5 marks  (Minimum 5 questions to be given) | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  |  |
| **4** | **In-semester Exam 2** | **60 Mins** | **15** | **Objective:** 5M  10 MCQs × ½ = 5 marks  **Descriptive:** 10 M  (2 Questions of 2 marks +2 Questions of 3 marks) | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  |  |
| 2 | **FISAC** | **1** | **Seminar** | **15 Mins** | **5** | Pressenatation- 2.5 marks  Report- 2.5 marks | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  |  |
| **2** | **Group Assignment** | **NA** | **5** | Presenatation- 2.5 marks  Report- 2.5 marks | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  |  |
| ***END – SEMESTER ASSESSMENT*** | | | | | | | | | |
| 1 | **Regular/Make–Up Exam** | | | 180 Mins | 50 | Answer all 5 full questions of 10 marks each. Each question can have 3 parts of 2/3/4/5/6 marks. | Bloom’s taxonomy (BT) level of the question should be L3 and above. |  | Comprehensive examination covering full syllabus. |

**Note: Fine tune the assessment plan as per the guidelines, issued by AD(A), notified from time to time.**

***\*\* Individual faculty will be entering the details***

***\*\*\* Individual faculty shall identify the assessment method from FISAC Assessment method (Table 1 below) and fill in the details.***

***NOTE: Information provided in the table is as per the In-semester assessment plan notified by Associate Director (Academics).***

**Lesson Plan**

|  |  |  |  |
| --- | --- | --- | --- |
| **L No** | **Topics** | |  | | --- | | **Course Outcome Addressed** | |
| 0 | Introduction, course structure, evaluation plan, COs, Syllabus discussion, books to be referred | --- |
| 1 | Basics of aircraft | CO1 |
| 2 | Aircraft Instruments and their layout | CO1 |
| 3 | Glass cockpit of modern aircrafts | CO1 |
| 4 | Electronic Flight Management System | CO1 |
| 5 | Air Data Instruments- Introduction | CO1 |
| 6 | Air Data Instruments-Pitot static tubes | CO1 |
| 7 | Directional Systems | CO2 |
| 8 | Electronic Flight Instrument system | CO2 |
| 9 | Attitude Direction Indictor | CO2 |
| 10 | Radar Fundamentals | CO2 |
| 11 | Rdio Altimeter | CO2 |
| 12 | Airborne Weather Radar | CO2 |
| 13 | Flight Management System | CO2 |
| 14 | Air Data Wrning Systems | CO2 |
| 15 | Ground Proximity Warning Systems | CO2 |
| 16 | Traffic Collision Avoidance Systems | CO2 |
| 17 | Gyroscopes | CO3 |
| 18 | Turn and Bank Indicator | CO3 |
| 19 | Gyro stabilized direction indicating systems | CO3 |
| 20 | Radio Navigation systems | CO3 |
| 21 | VOR | CO3 |
| 22 | Inertial Navigation System |  |
| 23 | Distance Measuring Equipment | CO3 |
| 24 | Global Positioning System |  |
| 25 | Landing Systems | CO4 |
| 26 | Instrument Landing System | CO4 |
| 27 | Microwave Landing Systems | CO4 |
| 28 | Satellite Landing System | CO4 |
| 29 | Autopilot | CO4 |
| 30 | Automatic Flight Control System | CO4 |
| 31 | Aircraft Communication And Reporting System | CO5 |
| 32 | Aeronautical Telecommunication Network | CO5 |
| 33 | Attitude Heading and Reference System | CO5 |
| 34 | Introduction to Databuses | CO5 |
| 35 | Avionics Systems Essentials-Data Bus Systems-ARINC 429, 629,664, MIL STD 1553,CAN, IEEE & Others | CO5 |
| 36 | ARINC-664[AFDX] | CO5 |

**Faculty members teaching the course (if multiple sections exist):**

|  |  |  |  |
| --- | --- | --- | --- |
| **Faculty** | **Section** | **Faculty** | **Section** |
|  |  |  |  |
|  |  |  |  |
|  |  |  |  |

**References:**

1. R.P.G. Collinson, Introduction to Avionics Systems, Springer, 2002.
2. Arjun Singh, Airport Ground Navigation Systems,Tata McGraw Hill Education Pvt. Ltd, 2012.
3. Thomas K. Eismin, Aircraft Electricity and Electronics, Sixth Edition, Tata McGraw Hill Education Pvt. Ltd, 2014.
4. Cary R. Spitzer, Digital Avionics Handbook: (2e), Avionics Development and Implementation, CRC Press, Taylor & Francis Group, 2007
5. Bradford W. Parkinson and James J. Spilker, The Global Positioning System: Theory and Application, Volume I & II, AIAA Copyright, 1996.
6. https://www.aviationtoday.com/

**Submitted by:**

**(Signature of the faculty)**

**Date:**

**Approved by:**

**(Signature of HOD)**

**Flexible In-semester Assessment Component (FISAC):**

1. The FISAC 1 & FISAC 2 may be any of the types given in Table 1. However, tne two components should be of different type.
2. The type of assessment should be informed to the students well in advance.
3. Syllabus for the last component of In-semester Assessment (ISAC) i.e. FISAC 2 should cover the topics mentioned for self-study if any / topics which are not covered till MISAC 4: In-Semester Exam 2.

**Table 1: Flexible In-semester Assessment Component (FISAC)**

