



# LAKIREDDY BALI REDDY COLLEGE OF ENGINEERING

(AUTONOMOUS)

Accredited by NAAC & NBA (CSE, IT, ECE, EEE & ME)

Approved by AICTE, New Delhi and Affiliated to JNTUK, Kakinada

L.B.Reddy Nagar, Mylavaram-521230, Krishna Dist, Andhra Pradesh, India

DEPARTMENT OF AERO SPACE ENGINEERING

## COURSE HANDOUT

### PART-A

Name of Course Instructor : **Dr. T. RAJASEKHAR (T 090)**  
Course Name & Code : **PRINCIPLES OF MANAGEMENT**  
L-T-P Structure : 3-0-0 Credits : 3  
Program/Sem/Sec : B.Tech., ASE., VIII-Sem., Sec-A A.Y : 2019-20

**PRE-REQUISITE: NIL**

#### **Course Objectives:**

1. To learn the basics of management strategies and its historical developments
2. To learn about the planning and its importance
3. To learn about the issues related to organizing
4. To learn about the leadership strategies

#### **Course Outcomes:**

**Upon The Successful Completion of This Course Students Will Able To:**

CO1: Apply the conceptual knowledge of management and organization in work environment

CO2: Develop decision making quality in the organizations

CO3: Manage human resources efficiently and effectively with best HR practices

CO4: Develop leadership qualities suitable for organizations

CO5: Asses and compare the planned output with the actual output

#### **COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):**

Cos	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12
<b>CO1</b>								<b>3</b>	<b>3</b>	<b>3</b>		
<b>CO2</b>								<b>3</b>	<b>3</b>	<b>3</b>		
<b>CO3</b>								<b>3</b>	<b>3</b>	<b>3</b>		
<b>CO4</b>								<b>3</b>	<b>3</b>	<b>3</b>		
<b>CO5</b>								<b>3</b>	<b>3</b>	<b>3</b>		

**Note:** Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-'

1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High).

#### **Text Books:**

T1:Dr. A.R.Aryasri, Management Science, TMH, 10<sup>th</sup> edition, 2012

#### **References:**

R1: Koontz & wehrich – Essentials of management, TMH, 10<sup>th</sup> edition, 2015

R2: Stoner, Freeman, Gilbert, Management, 6<sup>th</sup> edition Pearson education, New Delhi, 2004

R3:O.P. Khana, Industrial engineering and Management

R4:L.S.Srinath, PERT & CPM

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Orientation Programme about subject and MBA programme and its significance	1	25.11.19		TLM1	
2.	Introduction to management & definition of management	1	26.11.19		TLM1	
3.	Nature & Importance of management & Goals, levels of management	1	27.11.19		TLM2	
4.	Managerial rolls and functions & Functions of management	1	28.11.19		TLM2	
5.	Admin vs management	1	29.11.19		TLM2	
6.	Early management thoughts	1	02.12.19		TLM2	
7.	Managing people and Org.in the new era context	1	03.12.19		TLM2	
8.	Managing For competitive advantage	1	04.12.19		TLM2	
9.	Modern approaches & Recent developments	1	05.12.19		TLM1	
10.	Challenges of management	1	06.12.19		TLM2	
11.	Admin vs management	1	09-12-2019		TLM2	
12.	Early management thoughts	1	10-12-2019		TLM2	
No. of classes required to complete UNIT-I:12				No. of classes taken:		

#### UNIT-II:

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Planning-meaning& Nature and importance of planning	1	11.12.19		TLM1	
2.	Steps in planning & Types of plans, levels of plans, Process of planning	1	12.12.19		TLM1	
3.	MBO process & Advantages, Disadvantages of MBO	1	13.12.19		TLM1	
4.	Decision making-significance	1	02.01.20		TLM2	
5.	Types, Decision making Process	1	04.01.19		TLM1	
6.	Modern approaches, Evaluating decisions	1	06.01.20		TLM2	
7.	Relevant cases	1	07.01.20		TLM1	
8.	Relevant cases	1	08.01.20		TLM1	
9.	Review	1	10.01.20		TLM1	
No. of classes required to complete UNIT-II:09				No. of classes taken:		

**UNIT-III:**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Organizing –meaning, importance	1	23.01.20		TLM2	
2.	Formal and informal organizations	1	24.01.20		TLM2	
3.	Formal and informal organizations	1	25.01.20		TLM1	
4.	Organisation levels, span of management	1	27.01.20		TLM2	
5.	Structure and process, Departmentation	1	28.01.20		TLM1	
6.	Modern organisation structures, characteristics	1	29.01.20		TLM2	
7.	Line and staff, concepts	1	30.01.20		TLM2	
8.	Delegation & Centralization	1	31.01.20		TLM2	
9.	Decentralizations	1	03.02.20		TLM1	
10.	Staffing, definition, HRP	1	04.02.20		TLM1	
11.	Staffing, definition, HRP	1	05.02.20		TLM1	
12.	. HR-principles, process	1	06.02.20		TLM1	
13.	Recruitment, selection	1	07.02.20		TLM1	
14.	Recruitment, selection	1	10.02.20		TLM1	
15.	Performance appraisal	1	11.02.20		TLM1	
16.	Delegation & Centralization	1	12.02.20		TLM1	
No. of classes required to complete UNIT-III:16				No. of classes taken:		

**UNIT-IV :**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Directing-meaning	1	14-02-2020		TLM2	
2.	Assumptions of human behavior Theory-X, Theory-Y	1	17-02-2020		TLM2	
3.	Maslow's motivation theory	1	18-02-2020		TLM2	
4.	Leadership-dimensions	1	19-02-2020		TLM1	
5.	Leadership-dimensions	1	20-02-2020		TLM2	
6.	Leader vs Manager	1	21-02-2020		TLM2	
7.	Leadership behavior styles	1	24-02-2020		TLM1	
8.	Leadership traits	1	25-02-2020		TLM2	
9.	Recent approaches, Managerial grid	1	26-02-2020		TLM1	
10.	Communication process	1	28-02-2020		TLM1	
11.	Communication process	1	02.03.2020		TLM1	
12.	Communication methods	1	04.03.2020		TLM1	
13.	Communication methods	1	06.03.2020		TLM1	
14.	Case Studies	1	09.03.2020		TLM1	
No. of classes required to complete UNIT-IV:14				No. of classes taken:		

## UNIT-V : Project management

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Controlling-nature, importance	1	12-03-2020		TLM2	
2.	Process of controlling	1	13-03-2020		TLM2	
3.	Feedback system	1	16-03-2020		TLM1	
4.	Requirements for effective control	1	17-03-2020		TLM1	
5.	Control techniques	1	20-03-2020		TLM1	
6.	Control techniques	1	23-04-2020		TLM1	
7.	Relevant cases	1	24-04-2020		TLM1	
8.	Relevant cases	1	25-03-2020		TLM1	
9.	Relevant cases	1	25-03-2020		TLM1	
No. of classes required to complete UNIT-V:09				No. of classes taken:		

Teaching Learning Methods			
<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

## PART-C

### EVALUATION PROCESS (R17 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks = 75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks = 75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	40
Semester End Examination (SEE)	60
Total Marks = CIE + SEE	100

## PART-D

### **Program Educational Objectives (PEO)**

**PEO1:** To provide students with a solid foundation in mathematical, scientific and engineering fundamentals required to solve engineering problems

**PEO2:** To train students with good scientific and engineering breadth so as to comprehend, analyze, design, and create novel products and solutions for the real life problems

**PEO3:** To prepare students to excel in competitive examinations, postgraduate programs advanced education or to succeed in industry/technical profession

**PEO4:** To inculcate in students professional and ethical attitude, effective communication skills, teamwork skills, multidisciplinary approach, and an ability to relate engineering issues to broader social context

**PEO5:** To provide student with an academic environment with awareness of excellence leadership, and the life-long learning needed for a successful professional career

### **PROGRAM OUTCOMES (POs)**

- Apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of engineering problems
- Identify, formulate and analyze complex engineering problems reaching substantiated conclusions
- 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.
- Conduct investigations of complex problems that cannot be solved by straightforward application of knowledge, theories and techniques applicable to the engineering discipline
- Create, select and apply appropriate techniques, resources, and modern engineering and IT tools
- 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
- Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development
- Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice
- Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings
- Communicate effectively on complex engineering activities with the engineering community and with society
- 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, Manage projects and in multidisciplinary environments
- 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

Dr.T.Rajasekhar	Dr,T.Rajasekhar	Dr.T.Rajasekhar	
Course Instructor	Course Coordinator	Module Coordinator	HOD



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## DEPARTMENT OF AEROSPACE ENGINEERING

### COURSE HANDOUT

#### PART-A

Name of Course Instructor : Mr.M.Sambasiva Reddy  
Course Name & Code : Satellite Technology, S376  
L-T-P Structure : 4-1-0 Credits : 3  
Program/Sem/Sec : B.Tech., AE., VIII-Sem. A.Y : 2019-20

#### PRE-REQUISITE:

#### COURSE EDUCATIONAL OBJECTIVES (CEOs):

**COURSE OUTCOMES (COs):** At the end of the course, students are able to

CO 1	Know the mechanism and parameters of satellite communication in space.
CO 2	Have the idea about how uplink/downlink signals can be processed using different techniques and parameters.
CO 3	Can understand the internal and external design issues of a spacecraft and the technique of launching.
CO 4	Learn different techniques of satellite applications in real time and appreciate the further scope of the subject.

#### COURSE ARTICULATION MATRIX (Correlation between COs, POs & PSOs):

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3
CO1	-	2	-	-	3	-	-	-	-	3	-	1	-	-	3
CO2	3	3	-	-	-	-	-	-	-	-	-	-	-	-	3
CO3	-	-	3	2	2	-	-	-	-	-	-	2	-	-	3
CO4	-	-	3	2	2	-	-	-	-	-	-	2	-	-	3

**Note:** Enter Correlation Levels 1 or 2 or 3. If there is no correlation, put '-'

1- Slight (Low), 2 – Moderate (Medium), 3 - Substantial (High).

#### TEXT BOOKS:

- T1** Trimothy Pratt, Charles Bostian, J Allnut , ‘Satellite Communication’, John Wiley & Sons, 2/e,2003.  
**T2** Richard.F, Filipowsky Ergan I Muehllorf, ‘Space Communication Systems’, Prentice Hall 1995.

#### REFERENCE BOOKS:

- R1** M.Richharia , ‘Satellite Communications Systems: Design principles’ , BS Publications,2/e, 2003.  
**R2** D.C Agarwal , ‘Satellite Communications’, Khanna Publications,5/e,2006.  
**R3** Dennis Roddy , ‘Satellite Communications’, Tata McGraw Hills,4/e, 2009.

## PART-B

### COURSE DELIVERY PLAN (LESSON PLAN):

#### UNIT-I: INTRODUCTION T SATELLITE SYSTEMS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introductin to Satellite Technology	1	25.11.2019			
2.	Introductin to Unit-1	1	26.11.2019			
3.	Common satellite applications and missions	1	27.11.2019			
4.	Types of spacecraft orbits, Definitions of spin	1	28.11.2019			
5.	Three axis stabilization	1	29.11.2019			
6.	Space environment	1	02.12.2019			
7.	Launch vehicles	1	03.12.2019			
8.	Satellite system and their functions	1	04.12.2019			
9.	<b>Tutorial-1</b>	<b>1</b>	<b>05.12.2019</b>			
10.	structure, thermal, mechanisms	<b>1</b>	06.12.2019			
11.	power, propulsion	1	09.12.2019			
12.	guidance and control	1	10.12.2019			
13.	bus electronics	1	11.12.2019			
14.	<b>Tutorial-2</b>	<b>1</b>	<b>12.12.2019</b>			
15.	<b>Assignment-1</b>	<b>1</b>	<b>13.12.2019</b>			
No. of classes required to complete UNIT-I: 15				No. of classes taken:		

#### UNIT-II: ORBITAL MECHANICS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Unit-2	1	16.12.2019			
2.	Fundamentals of orbital dynamics	1	17.12.2019			
3.	Kepler's laws	1	18.12.2019			
4.	Co-ordinate systems	2	19.12.2019 20.12.2019			
5.	Orbital parameters and determination	2	23.12.2019 24.12.2019			
6.	<b>Tutorial-3</b>	<b>1</b>	<b>26.12.2019</b>			
7.	Orbital maneuvers	2	27.12.2019 30.12.2019			
8.	Need for station keeping	2	31.12.2019 02.01.2020			
9.	GPS Systems	1	03.01.2020			
10.	Application for satellite/Orbit determination		06.01.2020			
11.		1	07.01.2020			
12.	Ground/Earth station network requirements	1	08.01.2020			
13.	<b>Tutorial-4</b>	<b>1</b>	<b>09.01.2020</b>			
14.	<b>Assignment-2</b>	<b>1</b>	10.01.2020			
No. of classes required to complete UNIT-II:				No. of classes taken:		

**UNIT-III: SATELLITE STRUCTURE AND THERMAL CONTROL**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Unit-3	1	23.01.2020			
2.	satellite configuration choices	1	24.01.2020			
3.	launch loads, separation induced loads	1	27.01.2020			
4.	deployment requirements	1	28.01.2020			
5.	Design and analysis of satellite structures	1	29.01.2020			
6.	<b>Tutorial-5</b>	<b>1</b>	<b>30.01.2020</b>			
7.	Structural materials and Fabrication	1	31.01.2020			
8.	The need of thermal control: externally induced thermal environment	1	03.02.2020			
9.	Internally induced thermal environment	1	04.02.2020			
10.	Heat transfer mechanism	1	05.02.2020			
11.	internal to the spacecraft and external heat load variations	1	06.02.2020			
12.	Thermal control systems	1	07.02.2020			
13.	active and passive methods	1	10.02.2020			
14.	<b>Assignment-3</b>	<b>1</b>	11.02.2020			
No. of classes required to complete UNIT-III: 14				No. of classes taken:		

**UNIT-IV: SPACECRAFT CONTROL**

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Unit-4	1	13.02.2020			
2.	Control requirements	1	14.02.2020			
3.	attitude control and station keeping functions type of control maneuvers	1	17.02.2020			
4.	Stabilization schemes, spin stabilization	1	18.02.2020			
5.	gravity gradient methods	1	19.02.2020			
6.	3 axis stabilization	1	20.02.2020			
7.	Commonly used control systems	1	24.02.2020			
8.	mass expulsion systems	1	25.02.2020			
9.	Momentum exchange Systems	1	26.02.2020			
10.	<b>Tutorial-7</b>		<b>27.02.2020</b>			
11.	Gyro and magnetic torque-sensors	<b>1</b>	28.02.2020			
12.	star and sun sensor, earth sensor	1	02.03.2020			
13.	magnetometers and inertial sensors	1	03.03.2020			
14.	<b>Assignment-4</b>	<b>1</b>	04.03.2020			
No. of classes required to complete UNIT-IV: 14				No. of classes taken:		

## UNIT-V : POWER SYSTEM AND BUS ELECTRONICS

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Unit-5					
2.	Solar panels: Silicon and Ga-As cells		05.03.2020			
3.	power generation capacity		06.03.2020			
4.	efficiency-Space battery systems		09.03.2020			
5.	battery types		11.03.2020			
6.	characteristics and efficiency parameters		12.03.2020			
7.	Power electronics		13.03.2020			
8.	Telemetry, Tracking and command control functions		16.03.2020			
9.	Generally employed communication bands		17.03.2020			
10.	Their characteristics and applications		18.03.2020			
11.	<b>Tutorial-8</b>		<b>19.03.2020</b>			
12.	Coding systems		20.03.2020			
13.	Onboard computer, Ground checkout systems		23.03.2020			
14.	<b>Assignment-5</b>	<b>1</b>	<b>24.03.2020</b>			
No. of classes required to complete UNIT-V: 13				No. of classes taken:		

Teaching Learning Methods			
<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Demonstration (Lab/Field Visit)
<b>TLM2</b>	PPT	<b>TLM5</b>	ICT (NPTEL/Swayam Prabha/MOOCs)
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Group Discussion/Project

## PART-C

### EVALUATION PROCESS (R14 Regulations):

Evaluation Task	Marks
Assignment-I (Unit-I)	A1=5
Assignment-II (Unit-II)	A2=5
I-Mid Examination (Units-I & II)	M1=20
I-Quiz Examination (Units-I & II)	Q1=10
Assignment-III (Unit-III)	A3=5
Assignment-IV (Unit-IV)	A4=5
Assignment-V (Unit-V)	A5=5
II-Mid Examination (Units-III, IV & V)	M2=20
II-Quiz Examination (Units-III, IV & V)	Q2=10
Attendance	B=5
Assignment Marks = Best Four Average of A1, A2, A3, A4, A5	A=5
Mid Marks =75% of Max(M1,M2)+25% of Min(M1,M2)	M=20
Quiz Marks =75% of Max(Q1,Q2)+25% of Min(Q1,Q2)	B=10
Cumulative Internal Examination (CIE) : A+B+M+Q	30
Semester End Examination (SEE)	70
Total Marks = CIE + SEE	100

<b>Academic Calendar: B.Tech., VIII-Sem., 2019-20</b>			
Description	From	To	Weeks
<b>Commencement of Class work: 02.12.2019</b>			
I Phase of Instructions	25/11/2019	11/01/2020	7 W
Pongal Holidays	13/01/2020	18/01/2020	1 W
I MID Examinations	20/01/2020	22/01/2020	1/2 W
II Phase of Instructions	23/01/2020	25/03/2020	9 W
II MID Examinations	26/03/2020	28/03/2020	1/2 W
Preparation and Practicals	30/03/2020	04/04/2020	1 W
Semester End Examinations	06/04/2020	11/04/2020	1 W

## PART-D

### PROGRAMME OUTCOMES (POs):

<b>PO 1</b>	<b>Engineering knowledge:</b> Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.
<b>PO 2</b>	<b>Problem analysis:</b> Identify, formulate, review research literature, and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences, and engineering sciences.
<b>PO 3</b>	<b>Design/development of solutions:</b> 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.
<b>PO 4</b>	<b>Conduct investigations of complex problems:</b> 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.
<b>PO 5</b>	<b>Modern tool usage:</b> Create, select, and apply appropriate techniques, resources, and modern engineering and IT tools including prediction and modelling to complex engineering activities with an understanding of the limitations
<b>PO 6</b>	<b>The engineer and society:</b> 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
<b>PO 7</b>	<b>Environment and sustainability:</b> Understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development.
<b>PO 8</b>	<b>Ethics:</b> Apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice.
<b>PO 9</b>	<b>Individual and team work:</b> Function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.
<b>PO 10</b>	<b>Communication:</b> 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.
<b>PO 11</b>	<b>Project management and finance:</b> 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.
<b>PO 12</b>	<b>Life-long learning:</b> 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.

### PROGRAMME SPECIFIC OUTCOMES (PSOs):

<b>PSO 1</b>	<b>Communication:</b> Design and develop modern communication technologies for building the inter disciplinary skills to meet current and future needs of industry.
<b>PSO 2</b>	<b>VLSI and Embedded Systems:</b> Design and Analyze Analog and Digital Electronic Circuits or systems and Implement real time applications in the field of VLSI and Embedded Systems using relevant tools
<b>PSO 3</b>	<b>Signal Processing:</b> Apply the Signal processing techniques to synthesize and realize the issues related to real time applications

Course Instructor  
(Name)

Course Coordinator  
(Name)

Module Coordinator  
(Name)

HOD  
(Name)

**LAKKIREDDY BALI REDDY COLLEGE OF ENGINEERING**  
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NAAC Accredited with 'B++' grade, Accredited by NBA, Certified by ISO 9001:2015)  
L B Reddy Nagar, Mylavaram-521 230, Krishna District, Andhra Pradesh.

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**COURSE HANDOUT**

**PROGRAM** : B.Tech., VIII-Sem., ASE  
**ACADEMIC YEAR** : 2019-20  
**COURSE NAME & CODE** : Advanced Propulsion systems S-106  
**L-T-P STRUCTURE** : 5-0-0  
**COURSE CREDITS** : 3  
**COURSE INSTRUCTOR** : P. Dileep kumar  
**COURSE COORDINATOR** :  
**PRE-REQUISITE** : Propulsion -I, Propulsion -II  
**COURSE OBJECTIVE** : Able to learn the principle involved along with working of scramjet, functions of nuclear propulsion system, electric propulsion systems and micro propulsion systems.

**COURSE OUTCOMES (CO)**

**CO1:** To analyze the scram jet engine performance  
**CO2:** To analyze the performance nuclear propulsion systems  
**CO3:** To apply the electric propulsion and micro propulsion for space applications  
**CO4:** To understand the various advanced propulsion systems

**COURSE ARTICULATION MATRIX (Correlation between COs&POs,PSOs):**

COs	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
<b>CO1</b>	3	2	2	3			1						3	2
<b>CO2</b>	3	3	3	3			1						3	3
<b>CO3</b>	3	2	3	1			1						3	3
<b>CO4</b>	3	3	3	2			1						3	3

**Note:** Enter Correlation Levels **1** or **2** or **3**. If there is no correlation, put '-'  
**1-** Slight (Low), **2** - Moderate (Medium), **3** - Substantial (High).

**BOS APPROVED REFERENCE BOOKS:**

- R1** Sutton, G.P., Rocket Propulsion Elements, John Wiley, 1993  
**R2** Martin Tajmar, Advanced space propulsion systems, Springer  
**R3** Claudio Bruno, Antonio G, Accettura Advanced propulsion systems and technologies today to 2020  
**R4** Martin J.L. Turner, Rocket and Space propulsion : Principles, practice and new developments Springer

## COURSE DELIVERY PLAN (LESSON PLAN)

### UNIT-I

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
1.	Introduction to Advanced propulsion systems	1	25/11/2019		TLM2	
2.	Operating Principle of different engines	1	26/11/2019		TLM2	
3.	Introduction to Scramjet Engine	1	27/11/2019		TLM2	
4.	Fundamental considerations of hypersonic air breathing vehicles.	1	28/11/2019		TLM2	
5.	Scramjet Inlets Importance	1	02/12/2019		TLM1/ TLM2	
6.	Scramjet Inlets types	2	03/12/2019 04/12/2019		TLM1	
7.	Supersonic Flow Combustors	1	05/12/2019		TLM1	
8.	Scramjet Performance	2	06/12/2019 09/12/2019		TLM1	
9.	Scramjet and Ram rocket propulsion system	2	10/12/2019 11/12/2019		TLM1	
10.	Dual mode combustion system	1	12/12/2019		TLM1	
11.	Assignment-I	1	13/12/2019		TLM6	
12.	<b>Revision of UNIT- I</b>	1	16/12/2019		TLM2	
No. of classes required to complete UNIT-I		15				

### UNIT-II

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
13.	Introduction to Nuclear propulsion systems	1	17/12/2019		TLM1	
14.	Types of Nuclear propulsion systems	2	18/12/2019 19/12/2019		TLM1	
15.	Solid Heat Transfer nuclear rockets	1	20/12/2019		TLM1	
16.	Liquid Heat Transfer nuclear rockets	1	23/12/2019		TLM1	
17.	Gaseous core nuclear	2	24/12/2019 27/12/2019		TLM1	

	rockets					
18.	pure nuclear propulsion systems	2	30/12/2019 31/12/2019			TLM1
19.	Performance and application areas	2	02/01/2020 03/01/2020			TLM1
20.	Advantages and disadvantages	1	06/01/2020			TLM1
21.	Nuclear Hazards	1	07/01/2020			TLM1
22.	Assignment-II	1	08/01/2020			TLM6
23.	<b>Revision of UNIT- II</b>	1	09/01/2020			TLM2
No. of classes required to complete UNIT-II		15				

### Unit III

S.No.	Topics to be covered	No. of Classes Required	Tentative Date of Completion	Actual Date of Completion	Teaching Learning Methods	HOD Sign Weekly
24.	Introduction to the electric propulsion system	1	23/01/2020		TLM1	
25.	Application areas	1	24/01/2020		TLM1	
26.	Ideal flight performance	2	27/01/2020 28/01/2020		TLM1	
27.	Electro thermal thrusters	1	29/01/2020		TLM3	
28.	Resisto jets	1	30/01/2020		TLM1	
29.	Arc jets	1	31/01/2020		TLM1	
30.	Pure electric thrusters	1	03/02/2020		TLM1/ TLM2	
31.	Electric and electromagnetic thrusters	2	04/02/2020 05/02/2020		TLM2	
32.	Hall effect thrusters	2	06/02/2020 07/02/2020		TLM2	
33.	Electric power generation in space	2	10/02/2020 11/02/2020		TLM1	
34.	Assignment-III	1	12/02/2020		TLM6	
35.	<b>Revision of UNIT- III</b>	1	13/02/2020		TLM1	
No. of classes required to complete UNIT-III		16				

### Unit IV

S.No.	Topics to be covered	No. of Classes	Tentative Date of	Actual Date of	Teaching Learning	HOD Sign
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		<b>Required</b>	<b>Completion</b>	<b>Completion</b>	<b>Methods</b>	<b>Weekly</b>
36.	Introduction to micro propulsion	1	14/02/2020		<b>TLM1</b>	
37.	Micro mono propellant thrusters	2	17/02/2020 18/02/2020		<b>TLM1</b>	
38.	Micro bi propellant thrusters	2	19/02/2020 20/02/2020		<b>TLM1</b>	
39.	Micro cold gas thrusters	2	24/02/2020 25/02/2020		<b>TLM1</b>	
40.	Micro ion thrusters	2	26/02/2020 27/02/2020		<b>TLM1</b>	
41.	Micro ppt thrusters	2	28/02/2020 02/03/2020		<b>TLM2</b>	
42.	Assignment-IV	1	03/03/2020		<b>TLM6</b>	
43.	<b>Revision of UNIT- IV</b>	1	04/03/2020		<b>TLM1</b>	
No. of classes required to complete UNIT-IV		13				

### Unit V

<b>S.No.</b>	<b>Topics to be covered</b>	<b>No. of Classes Required</b>	<b>Tentative Date of Completion</b>	<b>Actual Date of Completion</b>	<b>Teaching Learning Methods</b>	<b>HOD Sign Weekly</b>
44.	Introduction to advanced propellants	1	05/03/2020		<b>TLM2</b>	
45.	High performance chemical propulsion systems	1	06/03/2020		<b>TLM1/ TLM2</b>	
46.	Metalized propellants	2	09/03/2020 10/03/2020		<b>TLM1/ TLM2</b>	
47.	Solar sail	2	11/03/2020 12/03/2020		<b>TLM2</b>	
48.	Tether propulsion	2	13/03/2020 16/03/2020		<b>TLM1/ TLM2</b>	
49.	Photon rockets	2	17/03/2020 18/03/2020		<b>TLM1/ TLM2</b>	
50.	Assignment-V	1	19/03/2020		<b>TLM6</b>	
51.	<b>Revision of UNIT- V</b>	1	20/03/2020		<b>TLM1/ TLM2</b>	
No. of classes required to complete UNIT-V		12				

<b>Teaching Learning Methods</b>					
<b>TLM1</b>	Chalk and Talk	<b>TLM4</b>	Problem Solving	<b>TLM7</b>	Seminars or GD
<b>TLM2</b>	PPT	<b>TLM5</b>	Programming	<b>TLM8</b>	Lab Demo
<b>TLM3</b>	Tutorial	<b>TLM6</b>	Assignment or Quiz	<b>TLM9</b>	Case Study

### EVALUATION PROCESS:

Evaluation Task	COs	Marks
Assignment/Quiz – 1	1	A1=5
Assignment/Quiz – 2	2	A2=5
I-Mid Examination	1,2	B1=20
Assignment/Quiz – 3	3	A3=5
Assignment/Quiz – 4	4	A4=5
Assignment/Quiz – 5	5	A5=5
II-Mid Examination	3,4,5	B2=20
Evaluation of Assignment/Quiz Marks: $A=(A1+A2+A3+A4+A5)/5$	1,2,3,4,5	A=5
Evaluation of Mid Marks: $B=75\% \text{ of Max}(B1,B2)+25\% \text{ of Min}(B1,B2)$	1,2,3,4,5	B=20
<b>Cumulative Internal Examination : A+B</b>	<b>1,2,3,4,5</b>	<b>A+B=25</b>
<b>Semester End Examinations</b>	<b>1,2,3,4,5</b>	<b>C=75</b>
<b>Total Marks: A+B+C</b>	<b>1,2,3,4,5</b>	<b>100</b>

### PROGRAMME OUTCOMES (POs):

#### Engineering Graduates will be able to:

**PO1:** To apply the knowledge of mathematics, science, engineering fundamentals and an engineering specialization to the solution of complex engineering problems.

**PO2:** To identify, formulate, review research literature and analyze complex engineering problems reaching substantiated conclusions using first principles of mathematics, natural sciences and engineering sciences.

**PO3:** To 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.

**PO4:** To 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.

**PO5:** To create, select and apply appropriate techniques, resources, and modern engineering and IT tools including predictions and modeling to complex engineering activities with an understanding of limitations.

**PO6:** To 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

**PO7:** To understand the impact of the professional engineering solutions in societal and environmental contexts, and demonstrate the knowledge of, and need for sustainable development

**PO8:** To apply ethical principles and commit to professional ethics and responsibilities and norms of the engineering practice

**PO9:** To function effectively as an individual, and as a member or leader in diverse teams, and in multidisciplinary settings.

**PO10:** To communicate effectively on complex engineering activities with the engineering community and with society at large, such as, being able to comprehend and effective reports and design documentation, make effective presentations, and give and receive clear instructions.

**PO11:** To 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.

**PO12:** To 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

**PROGRAMME SPECIFIC OUTCOMES (PSOs):**

**PSO1:** To apply the knowledge of Aerodynamics, Propulsion, Aircraft structures and Flight Dynamics in the Aerospace vehicle design

**PSO2:** To prepare the students to work effectively in the defense and space research programs

<b>Position</b>	<b><i>Course Instructor</i></b>	<b><i>Course Coordinator</i></b>	<b><i>Module Coordinator</i></b>	<b><i>HOD</i></b>
<b>Name</b>				
<b>Signature</b>				