



SCHEME OF STUDIES & EXAMINATIONS

Department: Aeronautical Engineering – 8th Semester

S. No.	Course No.	Course Title	Teaching Schedule			Marks of Class work	Examination Marks		Total	Credit	Duration of Exam
			L	T	P		Theory	Practical			
1	AER-402B	ROCKETS AND MISSILES	3	1		25	75	-	100	4	3
2	AER-404B	GAS DYNAMICS	3	1		25	75	-	100	4	3
3		ELECTIVE I	4	-		25	75	-	100	4	3
4		ELECTIVE II	4	-		25	75	-	100	4	3
5	AER-406B	SEMINAR	-	-	2	50	-	-	50	2	3
6	AER-407B	PROJECT	-	-	8	75	-	125	200	8	3
7	GFAER408B	GENERAL FITNESS FOR THE PROFESSION	1	-	-	-	-	100	100	4	3
Total			15	2	10	225	300	225	750	30	

Elective - I		Elective -II	
AER-432B	THEORY OF ELASTICITY	AER-442B	ROBOTICS ENGINEERING
AER-434B	KINEMATICS AND DYNAMICS OF MACHINE	AER-444B	AIR TRANSPORTATION AND AIR CRAFT MAINTENANCE
AER-436B	AVIONICS	AER-446B	MODERN MANUFACTURING PROCESSES
AER-438B	FLEXIBLE MANUFACTURING SYSTEM	AER-448B	WIND ENERGY CONVERSION

Note:

- 1 Every student has to participate in the sports activities. Minimum one hour is fixed for sports activities either in the morning or evening. Weightage of Sports is given in General Proficiency Syllabus.
- 2 The students will be allowed to use non-programmable scientific calculator. However, sharing/exchange of calculator is prohibited in the examination.
- 3 Electronics gadgets including Cellular phones are not allowed in the examination.
- 4 The minimum strength of students should be 20 to run an elective course.
5. The choice of students for any elective subject shall not be binding for the department offer, if the department does not have expertise.



SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8th Semester

Subject: Rockets And Missiles (Theory)

Subject Code: AER 402B

Detailed Content

UNIT NO 1: Introduction To Rockets And Missiles:

- Topic No.1: General Introduction: Difference between Rockets and Missiles
- Topic No.2: Types of Rockets and Missiles
- Topic No.3: Satellite launch vehicles, Manned Rockets.
- Topic No.4: Aerodynamics Characteristics of Air Frame Components: Introduction
- Topic No.5: Bodies of revolution, Different forebody shapes
- Topic No.6: Summary of characteristics of bodies of revolution
- Topic No.7: Base pressure. Aerodynamic controls
- Topic No.8: Jet control.

UNIT NO.2 Performance of Missiles and Rockets:

- Topic No.9: Introduction, various types of drags
- Topic No.10: Boost glide trajectory, Graphical solution
- Topic No.11: Boost sustainer trajectory
- Topic No.12: Long range cruise trajectory, long range Ballistic trajectory
- Topic No.13: Powered and unpowered flight
- Topic No.14: Brief description of Fin stabilized and spin stabilized rockets and their force systems.
- Topic No.15: Thrust misalignment

UNIT NO.3 Stability and Control:

- Topic No.16: Longitudinal: Two degrees of freedom analysis
- Topic No.17: Complete missile aerodynamics with forward and rear control, Static stability margin
- Topic No.18: **Directional:** Introduction, cruciform configuration
- Topic No.19: Body, Wind and Tail contribution on directional control
- Topic No.20: Lateral: Induced Roll, Interl control and design consideration for cruciform and monowing;
- Topic No.21: Damping in Roll

UNIT NO.4 Manoeuvring Flight:

- Topic No.22: Introduction, Flat turns for cruciform and monowing Pull ups
- Topic No.23: Relationship of manoeuvrability and static stability margin.
- Topic No.24: Dynamic Stability : Equations of motion
- Topic No.25: Longitudinal and lateral dynamics.
- Topic No.26: Miscellaneous: Launching problems
- Topic No.27: Re-entry and Recovery of Space Vehicles,
- Topic No.28: Modern Concepts, Manned Missions.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

Text Books

1. S S Chin, Missile configuration Design, McGraw Hill

Reference Books

1. Davis Follin & Blitzer Van, Exterior Ballistics of Rockets, Nostrand
2. Seifert & Brown, Ballistic Missiles and Space Vehicle Systems, John Wiley
3. Ed. Seifert, Space Technology, John Wiley



SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8TH Semester

Subject: Gas Dynamics (Theory)

Subject Code: AER 404B

Detailed Content

UNIT NO 1 Normal & Oblique Shock Waves:

- Topic No.1: Equation of motion for a normal shock
- Topic No.2: Normal shock relations for a perfect gas, Stagnation conditions
- Topic No.3: Rankine-Hugoniot relations, Propagating shock waves, weak shock, Reflected shock wave
- Topic No.4: Centered expansion waves, Shock tube. Oblique Shock Waves: Introduction, oblique shock relations
- Topic No.5: Relation between shock angle and turning angle, Use of oblique shock chart
- Topic No.6: Supersonic flow over a wedge, weak oblique shocks
- Topic No.7: Supersonic compression, detached shock.

UNIT NO.2 Expansion Waves & Compressible Flow Aerodynamics:

- Topic No.8: Supersonic expansion by turning, Prandtl-Meyer flow
- Topic No.9: Simple and non-simple regions, Reflection and interaction of shocks and expansion waves
- Topic No.10: Mach reflection, method of characteristics.
- Topic No.11: Airfoils in Compressible Flow: Introduction, Linearized compressible flow
- Topic No.12: Airfoils in subsonic flow, Prandtl-Glauert transformation
- Topic No.13: Critical Mach number, supercritical flow, Airfoils in Transonic flow
- Topic No.14: Governing equation, Shock wave-boundary layer interaction, Stability and control problems

UNIT NO.3 Lift and drag in supersonic flow:

- Topic No.15: Shock expansion theory, Flow field in supersonic flow
- Topic No.16: Thin airfoil theory, Analytical determination of lift, drag coefficients on flat plate
- Topic No.17: Bi-convex, diamond -shaped profiles in supersonic flow, Supersonic flow past wings.
- Topic No.18: Potential equation for compressible flows: Introduction, Crocco's theorem
- Topic No.19: Derivation of basic potential equation for compressible flow
- Topic No.20: Linearization of potential equation & boundary conditions
- Topic No.21: Small perturbation theory, Application to wavy wall and bodies of revolution

UNIT NO.4 Measurements in compressible flows:

- Topic No.22: Instruments used in compressible flow, Rayleigh-Pitot-formula
- Topic No.23: Subsonic, transonic and supersonic wind tunnels- Design and operation of supersonic wind tunnel.
- Topic No.24: Flow visualization by interferometer, Schlieren and shadow graph methods
- Topic No.25: Instrumentation for Hypersonic wind and shock tunnels, Aeroballistic range
- Topic No.26: Terminal ballistic range. Rocket-sled facility.

Study Scheme				Evaluation Scheme			Total Marks
L	T	P	Credits	Internal Assessment	External Assessment (Examination)		
				Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

Text Books:

1. John D Anderson, Modern Compressible Flow with Historical Perspective
2. E Rathakrishnan, Gas Dynamics
3. Arnold M Kuethe Chuenyen, Chow, Foundations of Aerodynamics, 4th Ed., John Wiley & Sons

Reference Books:

1. M J Zucrow and Hoffman, Gas Dynamics
2. A Pope & K L Goin, High Speed Wind Tunnel Testing
3. J Lucasiwicz. Experimental Methods in Hypersonics



SYLLABUS: B Tech (AERO)

Department: Aeronautical Engineering – 8th Semester

Subject: Flexible Manufacturing System (Theory)

Subject Code: ME 438B

Detailed Content

UNIT NO1 Automation And Manufacturing Flexibility:

- Topic no 1: Automation and types, reasons for automation
- Topic no 2: Basic elements of an Automated System: Sensors, Actuators
- Topic no 3: Analog-to-Digital and Digital-to-Analog Converters
- Topic no 4: Input/output Devices for Discrete Data, Definition of Manufacturing Flexibility
- Topic no 5: Need of Manufacturing flexibility, Types of Manufacturing Flexibilities
- Topic no 6: Classification of Manufacturing systems on Flexibility types
- Topic no 7: Resources and Processes to increase flexibility of manufacturing systems
- Topic no 8: Group technology (gt): GT and its benefits, Parts classification and coding systems
- Topic no 9: The composite part concept, GT based Machine cell design through Cluster Analysis and Hollier's Algorithm

UNIT II Numerical Control (NC):

- Topic no 10: Fundamentals of NC Technology and advantages in Manufacturing
- Topic no 11: NC Machines and types, Computer Numerical Control, Distributed Numerical Control, brief introduction of NC Part Programming.

Flexible Manufacturing Systems (FMS):

- Topic no 12: Components of an FMS, FMS work stations
- Topic no 13: Material handling and storage system: Functions of material handling system
- Topic no 14: FMS layout configurations, Computer control system: Computer function, FMS data file, system reports.
- Topic no 15: Planning the FMS, FMS applications and benefits

UNIT III Robotic Technology:

- Topic no 16: Common robot configurations, Joints and links, work volume
- Topic no 17: Types of robot control, accuracy and repeatability, interlocks
- Topic no 18: Advantages and disadvantages. Brief review of Robot programming and languages
- Topic no 19: Motion programming, simulation and offline programming, work cell control. Applications of Robot:
- Topic no 20: Material Handling, processing operations, assembly and inspection

Materials Handling Systems:

- Topic no 21: Automated flow lines, methods of work part transport
- Topic no 22: Transfer Mechanisms, buffer storage, automation for machining operations
- Topic no 23: Part feeding devices, Brief review of Automated assembly systems and types

UNIT IV Computer Integrated Manufacturing Systems (Cims):

- Topic no 24: Elements of CIM, Brief Review of Computer aided process Planning,
- Topic no 25: Computer Integrated Production Management Systems, MRP, Capacity Planning
- Topic no 26: MRPII, Shop floor Control systems, Computer Process Monitoring
- Topic no 27: Computer aided quality control, Adaptive Control of Manufacturing

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
3	1	-	4	25	75	3 hours	100

TEXT BOOKS:

1. Automation, Production Systems and Computer Integrated Manufacturing: Groover M.P, Prentice Hall of India.
2. CAD/CAM: Groover M.P, Zimmers E.W, Prentice Hall of India.

REFERENCE BOOKS:

1. Approach to Computer Integrated Design and Manufacturing: Nanua Singh, John Wiley and Sons, 1998.
2. Production Management Systems: A CIM Perspective: Browne J, Harhen J, Shivnan J, Addison Wesley, 2nd Ed. 1996.



SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8th Semester

Subject: I Modern Manufacturing Processes

Subject CODE: ME-446B

Detailed Content

UNIT NO.1 Ultrasonic & Abrasive Jet M/C Processes

- Topic No.1: Limitations of conventional manufacturing processes
- Topic No.2: Need of unconventional manufacturing processes
- Topic No.3: Classification of Modern Manufacturing Processes and its future possibilities.
- Topic No.4: ULTRASONIC MACHINING- Introduction, Basic Principle of USM,
- Topic No.5: Elements of Process, tool feed mechanism, cutting tool system design,
- Topic No.6: Effect of parameters on MRR
- Topic No.7: Economic considerations, applications
- Topic No.8: Limitations of the process, advantages and disadvantages.
- Topic No.9: ABRASIVE JET MACHINING- Process description, features of AJM,
- Topic No.10: Parameters in AJM, metal removal rate (MRR) in AJM.
- Topic No.11: Advantages, limitations and Practical applications of AJM.
- Topic No.12: Water Jet Machining- Jet cutting equipments, process details

UNIT NO.2 Chemical Machining

- Topic No.13: Basic technique of chemical machining
- Topic No.14: Mechanism of metal removal
- Topic No.15: Process variables, advantages and applications
- Topic No.16: Electrochemical machining, principle of ecm process
- Topic No.17: Ecm process detail, chemical reactions in ecm, tool work gap
- Topic No.18: Process variables and characteristics in ecm
- Topic No.19: Advantages, disadvantages and application of ecm
- Topic No.20: Electrochemical grinding - material removal, surface finish,
- Topic No.21: Accuracy, advantages & applications.

UNIT NO.3 (A) Thermal Spark Erosion Processes

- Topic No.22: Electric Discharge Machining (EDM) or spark erosion machining processes
- Topic No.23: Practical aspects of spark erosion machining
- Topic No.24: Mechanism of metal removal
- Topic No.25: Spark erosion generators, electrode feed control, dielectric fluids, flushing
- Topic No.26: Electrodes for spark erosion, selection of electrode material
- Topic No.27: Tool electrode design, surface finish
- Topic No.28: Machining accuracy, machine tool selection, applications
- Topic No.29: Wire cut EDM. Advantages and disadvantages of spark erosion machining.

UNIT NO.3 (B) Laser Beam Machining

- Topic No.30: LBM- Introduction, lasing process, Laser machining system
- Topic No.31: Thermal effect on workpiece
- Topic No.32: Calculation of MRR, description of laser drilling machine, cutting speed and accuracy of cut, advantages

UNIT NO.4 Plasma Arc & Electron Beam Machining

- Topic No.33: PAM: introduction, non thermal generation of plasma types of plasma arc
- Topic No.34: The stabilized arc, mechanism of plasma torch,
- Topic No.35: Mechanism of metal removal
- Topic No.36: PAM parameters, equipments for D.C. plasma torch unit, safety precautions,
- Topic No.37: Economics, other applications of plasma jets.
- Topic No.38: ELECTRON BEAM MACHINING (EBM) – Description of the process
- Topic No.39: Need for high vacuum in EBM
- Topic No.40: Process parameters in EBM
- Topic No.41: Advantages and disadvantages of EBM, Electron beam welding.



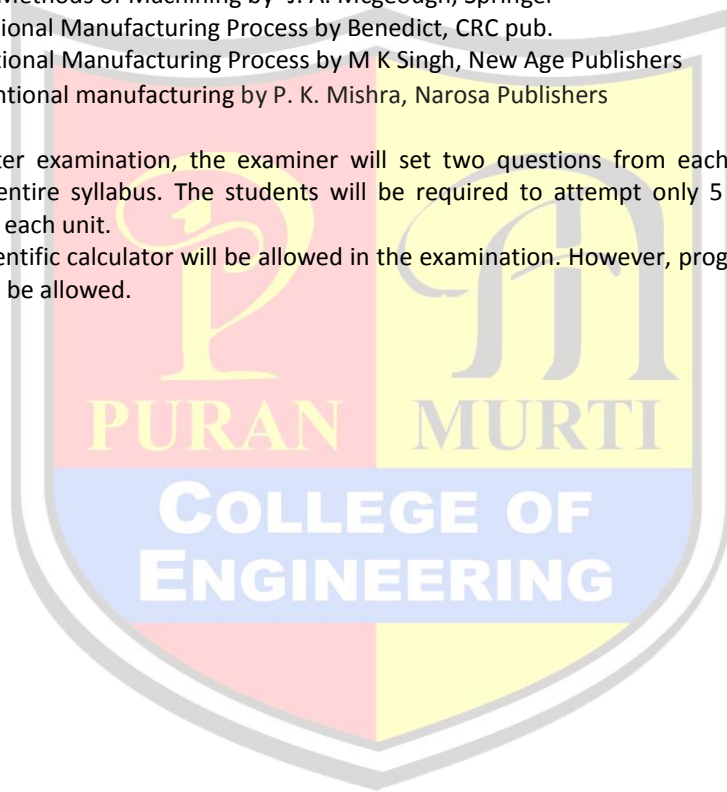
Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
4	-	-	4	25	75	3 hours	100

Text Books:

1. Advanced Machining Processes by V.K. Jain. Allied Publishers Pvt Ltd
2. Modern Machining Methods by M. Adithan, Khanna Publishers
3. Modern Machining Processes by P.C. Pandey and H.S. Shan. Tata McGraw- Hill
4. Advanced Methods of Machining by J. A. Mcgeough, Springer
5. Non-Traditional Manufacturing Process by Benedict, CRC pub.
6. Unconventional Manufacturing Process by M K Singh, New Age Publishers
7. Nonconventional manufacturing by P. K. Mishra, Narosa Publishers

Note:

1. In the semester examination, the examiner will set two questions from each unit (total 08 questions in all), covering the entire syllabus. The students will be required to attempt only 5 questions selecting at least one question from each unit.
2. The use of scientific calculator will be allowed in the examination. However, programmable calculator and cellular phone will not be allowed.





SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8th Semester

Subject: Seminar

Subject Code: AER 406B

Detailed Content

The objectives of the course remains

- To learn how to carry out literature search
- To learn the art of technical report writing
- To learn the art of verbal communication with the help of modern presentation techniques

A student will select a topic in emerging areas of Engineering & Technology and will carry out the task under the observation of a teacher assigned by the department.

He/ She will give a seminar talk on the same before a committee constituted by the chairperson of the department. The committee should comprise of three faculty members from different specializations. The teacher associated in the committee will be assigned 2 hours teaching load per week.

However, guiding students' seminar will not be considered towards teaching load.

The format of the cover page and the organization of the body of the seminar report for all the undergraduate programs will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	2	2	50	-	-	50



SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8th Semester

Subject: Project

Subject Code: AER 407B

Detailed Content

The project started in VII Semester will be completed in VIII Semester and will be evaluated through a panel of examiners consisting of the following:

Chairperson of Department : Chairperson
Project coordinator : Member
External expert : To be appointed by the University

The student will be required to submit two copies of his/her project report to the department for record (one copy each for the department and participating teacher).

Project coordinator will be assigned the project load of, maximum of 2 hrs. per week including his own guiding load of one hr. However, the guiding teacher will be assigned maximum of one period of teaching load irrespective of number of students/groups under him/her.

The format of the cover page and the organization of the body of the report for all the B. Tech. will be finalized and circulated by the Dean, Faculty of Engineering and Technology.

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week				Internal Assessment	External Assessment (Examination)		
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	8	8	75	125	3Hrs	200



SYLLABUS: B Tech (Aero)

Department: Aeronautical Engineering– 8th Semester

Subject: General Fitness For The Profession

Subject Code: GFAER – 408B

Detailed Content

The purpose of this course is to inculcate a sense of professionalism in a student along with personality Development in terms of quality such as receiving, responding, temperament, attitude and outlook. The student Efforts will be evaluated on the basis of his/ her perfor. / achievements in different walks of life.

The evaluation will be made by the committee of examiners constituted as under:

1. Dean, Faculty of Engineering & Technology/ Director /Principal of affiliated college:Chairperson
2. Chairperson of the department : Member
3. External expert : Appointed by the university

A. The student will present a written report before the committee with following in view:

The student will present before the committee his/her achievements during the current academic session in the form of a written report highlighting followings:

- I. Academic Performance -----
- II. Extra Curricular Activities / Community Service, Hostel Activities **(12 Marks)**
- III. Technical Activities / Industrial, Educational tour **(12 Marks)**
- IV. Sports/games **(16Marks)**

Note: Report submitted by the students should be typed on both sides of the paper.

- B.** A student will support his/her achievement and verbal & communicative skill through presentation before the examiners. **(40 Marks)**

C. Faculty Counselor Assignment (20 Marks)

It will be the duty of the student to get evaluated by respective faculty counselor and to submit the counselor assessment marks in a sealed envelope to the committee.

A counselor will assess the student which reflects his/her learning graph including followings:

1. Discipline throughout the year
2. Sincerity towards study
3. How quickly the student assimilates professional value system etc.
4. Moral values & Ethics

Study Scheme				Evaluation Scheme			Total Marks
Lectures per week		Internal Assessment		External Assessment (Examination)			
L	T	P	Credits	Max. Marks	Max. Marks	Exam Duration	
-	-	-	4	100	-	-	100