



INSTITUTE OF AERONAUTICAL ENGINEERING

(Autonomous)

Dundigal, Hyderabad -500 043

AERONAUTICAL ENGINEERING

COURSE DESCRIPTOR

Course Title	AIRPORT OPERATIONS				
Course Code	AAE530				
Programme	B.Tech				
Semester	VII	AE			
Course Type	Elective				
Regulation	IARE - R16				
Course Structure	Theory			Practical	
	Lectures	Tutorials	Credits	Laboratory	Credits
	3	-	3	-	-
Chief Coordinator	Dr. Yagya Dutta Dwivedi, Professor, AE				
Course Faculty	Dr. Yagya Dutta Dwivedi, Professor, AE				

I. COURSE OVERVIEW:

This course is intended to give outline about the airport operations used in aviation industry. Present course covers commercial services, general aviation services, hub system, system planning, methods of ground handling of baggage and equipments are used for these works. This describes about passenger terminals, cargo operations, safety and accessibility issues in the airport system. It also elucidates about operational administration and performance issues to get best output from the existing optimum resources. Students are expected to learn management aspects of airport operations, airport planning, and other activities undertaken at airports.

II. COURSEPRE-REQUISITES:

Level	Course Code	Semester	Prerequisites	Credits
UG	AAE001	III	Introduction to aeronautical Engineering	3

III. MARKSDISTRIBUTION:

Subject	SEE Examination	CIE Examination	Total Marks
Airport Operations	70 Marks	30 Marks	100

IV. DELIVERY / INSTRUCTIONAL METHODOLOGIES:

✗	Chalk & Talk	✓	Quiz	✓	Assignments	✗	MOOCs
✓	LCD / PPT	✓	Seminars	✗	Mini Project	✗	Videos
✗	Open Ended Experiments						

V. EVALUATION METHODOLOGY:

The course will be evaluated for a total of 100 marks, with 30 marks for Continuous Internal Assessment (CIA) and 70 marks for Semester End Examination (SEE). Out of 30 marks allotted for CIA during the semester, marks are awarded by taking average of two CIA examinations or the marks scored in the make-up examination.

Semester End Examination (SEE): The SEE is conducted for 70 marks of 3 hours duration. The syllabus for the theory courses is divided into five units and each unit carries equal weightage in terms of marks distribution. The question paper pattern is as follows. Two full questions with “either” or “choice” will be drawn from each unit. Each question carries 14 marks. There could be a maximum of two sub divisions in a question.

The emphasis on the questions is broadly based on the following criteria:

50 %	To test the objectiveness of the concept.
50 %	To test the analytical skill of the concept OR to test the application skill of the concept.

Continuous Internal Assessment (CIA):

CIA is conducted for a total of 30 marks (Table 1), with 25 marks for Continuous Internal Examination (CIE), 05 marks for Quiz/ Alternative Assessment Tool (AAT).

Table 1: Assessment pattern for CIA

Component	Theory		Total Marks
	CIE Exam	Quiz / AAT	
CIA Marks	25	05	30

Continuous Internal Examination (CIE):

Two CIE exams shall be conducted at the end of the 8th and 16th week of the semester respectively. The CIE exam is conducted for 25 marks of 2 hours duration consisting of two parts. Part–A shall have five compulsory questions of one mark each. In part–B, four out of five questions have to be answered where, each question carries 5 marks. Marks are awarded by taking average of marks scored in two CI Examinations.

Quiz / Alternative Assessment Tool (AAT):

Two Quiz exams shall be online examination consisting of 25 multiple choice questions and are to be answered by choosing the correct answer from a given set of choices (commonly four). Marks shall be awarded considering the average of two quizzes for every course. The AAT may include seminars, assignments, term paper, open ended experiments, five minutes video and MOOCs.

VI. HOW PROGRAM OUTCOMES ARE ASSESSED:

Program Outcomes (POs)		Strength	Proficiency assessed by
PO 1	Engineering knowledge: Apply the knowledge of mathematics, science, engineering fundamentals, and an engineering specialization to the solution of complex engineering problems.	2	Assignments
PO 2	Problem analysis: An ability to identify, formulate and solve problems in key areas of Aerodynamics, Structures, Propulsion, Flight Dynamics and Control, Design, Testing, Space and Missile Technologies and Aviation of Aeronautical Engineering discipline.	1	Assessing real-world problems by case study

3 = High; 2 = Medium; 1 = Low

VII. HOW PROGRAM SPECIFIC OUTCOMES ARE ASSESSED:

Program Specific Outcomes (PSOs)		Strength	Proficiency assessed by
PSO 1	Professional skills: Able to utilize the knowledge of aeronautical/aerospace engineering in innovative, dynamic and challenging environment for design and development of new products.	2	Lectures, Assignments, Seminars
PSO2	Problem-solving Skills: Imparted through simulation language skills and general purpose CAE packages to solve practical, design and analysis problems of Components to complete the challenge of airworthiness for flight vehicles.	2	Tutorials, Software Practice
PSO 3	Practical implementation and testing skills: Providing different types of in house and training and industry practice to fabricate and test and develop the products with more innovative technologies	1	Seminar
PSO 4	Successful career and entrepreneurship: To prepare the students with broad aerospace knowledge to design and develop systems and subsystems of aeronautical/aerospace allied systems to become technocrats.	-	-

3 = High; 2 = Medium; 1 = Low

VIII. COURSE OBJECTIVES:

The course should enable the students to:	
I	Understand about the commercial airport operations, functions, planning and facilities needed.
II	Describe about the procedure of ground handling of baggage and also to know about handling process, equipments, and technologies used
III	Explain about airport operation management, pavement management, rescue and safety hazards management.

IV	Impart knowledge on basics of airport terminals, ATC, and control access in different airport areas.
V	Apply the administrative and performance processes to get efficient output.

IX. COURSE OUTCOMES (COs):

COs	Course Outcome	CLOs	Course Learning Outcome
CO 1	Understand about the commercial airport operations, functions, planning and facilities needed.	CLO 1	Remember about the difference between general aviation and commercial airports.
		CLO 2	Understand the hub and its types used in airport system.
		CLO 3	Describe airport planning and master plan.
		CLO 4	Explain about forecasting, design alternatives and land use for the airport operations.
CO 2	Describe about the procedure of ground handling of baggage and also to know about handling process, equipment's, and technologies used.	CLO 5	Remember ground, passenger and ramp handling procedure.
		CLO 6	Understand departure, control methods and divisions of responsibilities.
		CLO 7	Describe baggage handling process and equipment's requires for this purpose.
		CLO 8	Explain about organization management and performance matrices.
CO 3	Explain about airport operation management, pavement management, resource, fire fighting, safety, hazardous materials handling managements.	CLO 9	Remember airport operations and pavement management
		CLO 10	Understand the aircraft rescue and firefighting system
		CLO 11	Understand safety aspects like bird and wild life hazards management.
		CLO 12	Remember the factors affecting the security at commercial and general aviation airport.
CO 4	Explore the airport terminal services, Air traffic control system, access system, Tele-communication, Meteorology, Aeronautical information system	CLO 13	Remember the airport technical services available in any airport.
		CLO 14	Understand the Tele-communication, meteorology and airport access.
		CLO 15	Remember the factors affecting airport access and its modes during airport operations.
		CLO 16	Understand the safety management system and Air Traffic control procedure.
CO 5	Outline the operational administration and performance related to airport monitoring, equipment's and human resource considerations.	CLO 17	Understand the strategic and tactical administration of an airport.
		CLO 18	Remember the managing operations performance and its key factors.
		CLO 19	Understanding the factors of airport operations and control centers.
		CLO 20	Remember the best practices used for any commercial airport operations and future needs.

X. COURSE LEARNING OUTCOMES(CLOs):

CLO Code	CLO's	At the end of the course, the student will have the ability to:	PO's Mapped	Strength of Mapping
AAE530.01	CLO 1	Remember about the difference between general aviation and commercial airports.	PO 1	2
AAE530.02	CLO 2	Understand the hub and its types used in airport system.	PO1	2

AAE530.03	CLO 3	Describe airport planning and master plan.	PO1	2
AAE530.04	CLO 4	Explain about forecasting, design alternatives and land use for the airport operations.	PO 1	2
AAE530.05	CLO 5	Remember ground, passenger and ramp handling procedure.	PO 1	2
AAE530.06	CLO 6	Understand departure, control methods and divisions of responsibilities.	PO 1	1
AAE530.07	CLO 7	Describe baggage handling process and equipment's requires for this purpose.	PO 2	2
AAE530.08	CLO 8	Explain about organization management and performance matrices.	PO 2	2
AAE530.09	CLO 9	Remember airport operations and pavement management	PO 2	1
AAE530.10	CLO 10	Understand the aircraft rescue and firefighting system	PO 2	2
AAE530.11	CLO 11	Understand safety aspects like bird and wild life hazards management.	PO 2	2
AAE530.12	CLO 12	Remember the factors affecting the security at commercial and general aviation airport.	PO 2	1
AAE530.13	CLO 13	Remember the airport technical services available in any airport.	PO 1	1
AAE530.14	CLO 14	Understand the Tele-communication, meteorology and airport access.	PO 2	2
AAE530.15	CLO 15	Remember the factors affecting airport access and its modes during airport operations.	PO 1	2
AAE530.16	CLO 16	Understand the safety management system and Air Traffic control procedure.	PO2	2
AAE530.17	CLO 17	Understand the strategic and tactical administration of an airport.	PO1	1
AAE530.18	CLO 18	Remember the managing operations performance and its key factors.	PO2	2
AAE530.19	CLO 19	Understanding the factors of airport operations and control centers.	PO 1	2
AAE530.20	CLO 20	Remember the best practices used for any commercial airport operations and future needs.	PO 2	1

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XI. MAPPING COURSE OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES

Course Outcomes (COs)	Program Outcomes (POs)		Program Specific Outcomes (PSOs)		
	PO 1	PO 2	PSO 1	PSO 2	PSO 3
CO 1	2	-	2	2	1
CO 2	2	2	2	2	1
CO 3	-	2	-	2	1
CO 4	2	2	2	2	1
CO 5	2	2	2	2	1

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XII. MAPPING COURSE LEARNING OUTCOMES LEADING TO THE ACHIEVEMENT OF PROGRAM OUTCOMES AND PROGRAM SPECIFIC OUTCOMES:

Course Learning Outcomes (CLOs)	Program Outcomes (POs)												Program Specific Outcomes (PSOs)			
	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2	PSO3	PSO4
CLO 1	2												2			
CLO 2	2													2		
CLO 3	2														1	
CLO 4	2												2			
CLO 5	2													2		
CLO 6	1													2		
CLO 7		2													1	
CLO 8		2											2			
CLO 9		1													1	
CLO 10		2												2		
CLO 11		1													1	
CLO 12		1													1	
CLO 13	1												2			
CLO 14		2													1	
CLO 15	2													2		
CLO 16		2													1	
CLO 17	1												2			
CLO 18		2													1	
CLO 19	2													2		
CLO 20		1													1	

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XIII. ASSESSMENT METHODOLOGIES – DIRECT

CIE Exams	PO 1, PO 2, PSO1, PSO2, PSO3	SEE Exams	PO 1, PO 2, PSO1, PSO2, PSO3	Assignments	PO 4	Seminars	PO 2
Laboratory Practices	-	Student Viva	-	Mini Project	-	Certification	-
Term Paper	-						

XIV. ASSESSMENT METHODOLOGIES-INDIRECT

✓	Early Semester Feedback	✓	End Semester OBE Feedback
✗	Assessment of Mini Projects by Experts		

XV. SYLLABUS

UNIT-I	THE AIRPORT AS AN OPERATIONAL SYSTEM
Private airports and public use airports, commercial service airports and primary commercial service airports, general aviation airports, reliever airports; Hub classification, large hubs, medium hubs, small hubs, non-hubs; Components of an airport, airside, landside; Airport as a system, function of the airport complexity of airport operation; Airport planning: Airport system planning, airport master plan, airport layout plan- forecasting, facilities requirements, design alternatives. Financial plans, land use planning, environmental planning.	
UNIT-II	GROUND HANDLING AND BAGGAGE HANDLING
Ground handling: Passenger handling; Ramp handling; Aircraft ramp servicing; Ramp layout; Departure control; Division of ground handling responsibilities; Control of ground handling efficiency; Baggage handling: Context, history and trends; Baggage handling processes; Equipment, systems and technologies, process and system design drivers; Organization; Management and performance metrics.	
UNIT-III	PASSENGER TERMINAL AND CARGO OPERATIONS
Airport operations management: Introduction, pavement management, aircraft rescue and fire fighting (ARFF); Snow and ice control, safety inspection programs. Bird and wildlife hazard management; Airport security: Security at commercial service airports, security at general aviation airports; The future of airport security.	
UNIT-IV	AIRPORT TECHNICAL SERVICES AND ACCESS
Airport technical services, The scope of technical services; Safety management system; Air traffic control. Tele-communications; Meteorology; Aeronautical information; Airport access. Access as part of the airport system, Access users and modal choice, Access interaction with passenger, Access modes, In town and other off; Airport terminals, Factors affecting access; Mode choice.	
UNIT-V	OPERATIONAL ADMINISTRATION AND PERFORMANCE
Operational administration and performance: Strategic context; Tactical approach to administration of airport operations; Managing operational performance; Key success factors for high; Performance; Airport operations control centers: The concept of airport operations; airport operations control system; The airport operations consideration; Airport performance monitoring; Design and equipment considerations; Organizational and human resources considerations; Leading AOCCSs; Best practices in airport operations.	
Text Books:	
<ol style="list-style-type: none"> 1. Norman J. Ashford, H. P. Martin Stanton, Clifton A. Moore, Pierre Coutu, —Airport Operationsl, McGraw Hill, 3rd Edition, 2013. 2. 2. R. Horonjeff, F. X. McKelvey, W. J. Sproule, S. B. Young, —Planning and Design of Airportsl, McGraw Hill, 5th Edition, 2010. 	
Reference Books:	
<ol style="list-style-type: none"> 1. A. Kazda, R. E. Caves, —Airport Design and Operationl, Elsevier, 2nd Edition, 2007. 2. A. T. Wells, S. B. Young, —Airport Planning and Managementl, McGraw Hill, 6th Edition, 2011. 	
Web References:	
<ol style="list-style-type: none"> 1. https://memberfiles.freewebs.com/94/47/55224794/documents/airport%20planning%20and%20management.pdf 2. https://books.google.co.in/books?id=RYSR6cu4YSBcC&dq=Planning%20and%20Design%20of%20Airports&source=gbssimilarbooks 	

XVI. COURSE PLAN:

The course plan is meant as a guideline. Probably there may be changes.

Lecture No	Topics to be covered	Course Learning Outcomes (CLOs)	Reference
1-2	Introduction to airport operation, Private airports and public use airports. Commercial service airports and primary commercial service airport.	CLO1	T1.1.1,2 T2.2.1,2
3-4	general aviation airports, reliever airports; Hub classification, large hubs, medium hubs, small hubs, non-hubs	CLO1	T1.1.3 T2.2.4,5
5-6	Components of an airport, airside, landside; Airport as a system, function of the airport complexity of airport operation	CLO2	T1.1.4,5
7-8	Airport planning: Airport system planning, airport master plan, airport layout plan-	CLO2	T1.1.6,7
9-10	Forecasting, facilities requirements, design alternatives. Financial plans, land use planning, environmental planning.	CLO3	T1.1.8,9
11	Ground handling: Passenger handling, Ramp handling.	CLO3	T1.2.1
12	Aircraft ramp servicing; Ramp layout.	CLO4	R1.2.2,3
13-14	Departure control; Division of ground handling responsibilities;	CLO4	T1.2.4
15-16	Control of ground handling efficiency; Baggage handling: Context, history and trends;	CLO5	T1.2.5,6
17-18	Baggage handling processes; Equipment, systems and technologies.	CLO5	T1.2.8
19-20	Process and system design drivers; Organization; Management and performance metrics.	CLO6	T1.3.2,3
21-22	Airport operations management: Introduction, pavement management.	CLO6	T1.3.4,5
23-24	Aircraft rescue and fire fighting (ARFF); Snow and ice control,	CLO7	T1.3.6,7
25	Safety inspection programs.	CLO7	T1.3.8,9
26	Bird and wildlife hazard management.	CLO8	T1.4.2,3
27-28	Airport security: Security at commercial service airports.	CLO8	T1.4.4
29-30	security at general aviation airports; The future of airport security	CLO9	T1.4.6
31	Airport technical services:.	CLO9	R1.4.7
32	The scope of technical services; Safety management system; Air traffic control.	CLO10	T1.5.3
33	Tele communications; Meteorology; Aeronautical information; Airport access.	CLO10	T1.5.4
34	Access as part of the airport system.	CLO11	T1.5.5
35-36	Access users and modal choice.	CLO11	T1.6.1
37-38	Access interaction with passenger.	CLO12	T1.6.2
39-40	Access modes.	CLO12	T1.6.6
41-42	In town and other off; Airport terminals.	CLO13	T1.6.6
43-44	Factors affecting access; Mode choice.	CLO13	T2. 3.2
45-46	Operational administration and performance:	CLO14	T2.3.4
47	Strategic context; Tactical approach to administration of airport operations;	CLO15	R2.3.7

48-49	Managing operational performance; Key success factors for high; Performance.	CLO15	T2.3.4 R2. 4.2
50	Airport operations control centers.	CLO16	T2.4.4
51	The concept of airport operations; airport operations control system.	CLO16	T2. 4.5 R2. 4.2
52	The airport operations consideration; Airport performance monitoring;	CLO17	T2.5.3
53	Design and equipment considerations;	CLO18	T2. 5.2
54	Organizational and human resources considerations.	CLO19	R2.5.8
55	Leading AOCCSs; Best practices in airport operations	CLO20	R2.5.8

XVII. GAPS IN THE SYLLABUS - TO MEET INDUSTRY / PROFESSION REQUIREMENTS:

S No	Description	Proposed actions	Relevance with POs	Relevance with PSOs
1	Airport computerized baggage handling concepts.	Seminar by expert	PO1, PO2	PSO1, PSO2
2	Passenger flow simulations and its concepts.	Seminar by expert	PO1, PO2	PSO1, PSO2, PSO3

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