# GUJARAT TECHNOLOGICAL UNIVERSITY, AHMEDABAD, GUJARAT

## COURSE CURRICULUM
## COURSE TITLE : AIRPORT ENGINEERING
## (COURSE CODE: 3366002)

| Diploma Programme in which this course is offered | Semester in which offered |
|---|---|
| Transportation Engineering | Sixth |

## 1. RATIONALE

Air transport plays a very vital role in the development and growth of economy of any country. Airport is an essential requirement for air transport system. Number of large, medium and small airports is increasing in country day by day, some of these airports are owned by private sector companies. Construction and maintenance of these airports requires services of civil engineers. Therefore, knowledge and understanding of various construction and maintenance aspects of differnt airport units are very important for diploma engineers working at site in order to make transportation system safe and efficient. At diploma level, students are expected to study about these aspects of airport so as to develop their understanding in order to construct and maintain different part of the airports and heliports. There are growing job opportunities also in this sector.

## 2. COMPETENCY

The course content should be taught and curriculum should be implemented with the aim to develop required skills in the students so that they are able to acquire following competency:

- **Construct/maintain taxiways, runways, aprons and terminal areas of airport and heliports.**

## 3. COURSE OUTCOMES (COs)

The theory should be taught and practical should be carried out in such a manner that students are able to acquire required learning out comes in cognitive, psychomotor and affective domain to demonstrate following course outcomes.

i. Plan airport layout incorporating its different features
ii. Execute construction of runway and taxiway and aprons as per geometric design for all parameters.
iii. Assure desire quality in construction of runway
iv. Check the requirements of terminal area as per drawing and design
v. Check the visual aids for air traffic control system.
vi. Explain various elements of Heliports and its planning aspects

## 4. TEACHING AND EXAMINATION SCHEME

| Teaching Scheme (In Hours) | | | Total Credits (L+T+P) | Examination Scheme | | | | |
|---|---|---|---|---|---|---|---|---|
| | | | | Theory Marks | | Practical Marks | | Total Marks |
| L | T | P | C | ESE | PA | ESE | PA | |
| 3 | 0 | 2 | 5 | 70 | 30 | 20 | 30 | **150** |

**Legends: L**-Lecture; **S/T-** Tutorial/Teacher guided theory Practice – Studio; **P** - Practical; **C** – Credit; **ESE** - End Semester Examination; **PA** - Progressive Assessment

## 5. COURSE CONTENT DETAILS

| Unit | Major Learning Outcomes (In Cognitive Domain) | Topics and Sub-topics |
|---|---|---|
| **Unit – I Airport Planning** | 1a. Describe the airport classifications with various terminologies<br>1b. Explain aircraft components and its function<br>1c. Describe location and planning aspects of various airport elements | 1.1 Airport classifications<br>1.2 Air transport authorities, air transport activities.<br>1.3 Aircraft components and their functions<br>1.4 Regional planning |
| | 1d. Estimate future air traffic for development of new airport<br>1e. Describe the requirements of an ideal airport layout with sketches. | 1.5 Location and planning of airport elements- airfield, terminal area, obstructions, approach zone,zoning laws<br>1.6 Airport capacity, size and site selection<br>1.7 Estimation of future air traffic<br>1.8 Development of new airport<br>1.9 Ideal airport layout. |
| **Unit-II Runway and Taxiway Design** | 2a. Describe the wind rose with regard to runway orientation.<br>2b. Explain the factors affecting the runway length, corrections to runway length, runway geometrics and runway patterns<br>2c. Describe the items considered in the geometric design of runway and taxiway.<br>2d. Describe design and quality parameters for pavement of runway. | 2.1 Wind rose and orientation of runway<br>2.2 Factors affecting runway: basic runway length, corrections to runway length, runway geometrics and runway patterns (configurations).<br>2.3 Factors affecting taxiway: taxiway geometric elements, layout, exit, taxiway, location and geometrics, holding apron, turnaround facility.<br>2.4 Design and quality considerations for pavement of runway |

| Unit | Major Learning Outcomes (In Cognitive Domain) | Topics and Sub-topics |
|---|---|---|
| | 2e. Describe the apron design criteria<br>2f. Describe the hanger design criteria<br>2g. Describe the fuel storage area selection criteria<br>2h. Describe the factors for the design of the surface and subsurface drainage systems | 2.5 Aprons: locations, size, gate positions, aircraft parking, configurations and parking systems<br>2.6 Hangers: site selection, planning and design considerations,<br>2.7 Airport drainage: aims, functions, requirements, surface and subsurface drainage systems<br>2.8 Fuel storage area: blast and erosion control.<br>2.9 Airport grading |
| **Unit – III Terminal Area Design** | 3a. Describe elements of terminal area and its requirements<br>3b. Describe the requirements of parking area and circulation network for vehicles. | 3.1 Terminal area elements and requirements<br>3.2 Terminal building functions, space requirements<br>3.3 Location planning concepts<br>3.4 Vehicular parking area and circulation network. |
| **Unit –IV Air Traffic Control and Visual Aids** | 4a. Describe the objectives and need of air traffic control system.<br>4b. Describe the requirements of landing information system | 4.1 Airport traffic control: objectives, control system/aids, control network<br>4.2 Visual aids controlling factors: landing information system, airport markings and lighting |
| **Unit – V Heliport Design** | 5a. Describe the requirements for the design of Heliports | 5.1 Planning of Heliports: site selection, size of landing area, orientation of landing area, terminal area, heliport marking, heliport lighting. |

## 6. SUGGESTED SPECIFICATION TABLE WITH HOURS AND MARKS (Theory)

| Unit No. | Unit Title | Teaching Hours | Distribution of Theory Marks | | | |
|---|---|---|---|---|---|---|
| | | | R Level | U Level | A Level | Total Marks |
| I | Airport Planning | 09 | 04 | 06 | 05 | 15 |
| II | Run Way and Taxiway Design | 13 | 04 | 06 | 10 | 20 |
| III | Terminal Area Design | 08 | 02 | 05 | 06 | 13 |
| IV | Air Traffic Control and Visual Aids | 08 | 04 | 04 | 05 | 13 |
| V | Heliport Design | 4 | 02 | 03 | 04 | 09 |
| | **Total** | **42** | **16** | **24** | **30** | **70** |

**Legends: R** = Remember**, U** = Understand**, A=** Apply and above Level (Bloom's revised taxonomy)

**Note:** This specification table shall be treated as a general guideline for students and teachers. The actual distribution of marks in the question paper may vary slightly from above table

## 7. SUGGESTED EXERCISES/PRACTICALS

The practical/exercises should be properly designed and implemented with an attempt to develop different types of skills **(outcomes in psychomotor and affective domain)** so that students are able to acquire the competencies/programme outcomes. Following is the list of practical exercises for guidance.

***Note**: Here only outcomes mainly in psychomotor domain are listed as practical/exercises. However, if these practical/exercises are completed appropriately, they would also lead to development of certain outcomes in affective domain which would in turn lead to development of **Course Outcomes** related to affective domain. Thus over all development of **Programme Outcomes (**as given in a common list at the beginning of curriculum document for this programme) would be assured.*

*Faculty should refer to that common list and should ensure that students also acquire outcomes in affective domain which are required for overall achievement of Programme Outcomes/Course Outcomes.*

| S. No. | Unit No. | Practical Exercise (Outcomes in Psychomotor Domain) | Approx. Hours Required |
|---|---|---|---|
| 1 | I | Draw sketches of layout of airport with brief description | 04 |
| 2 | I | Collect details about runway requirements for different types/sizes of aircrafts. | 04 |
| 3 | II | Visit to nearby airport and prepare a report on types of runway and taxiway : | 04 |
| 4 | II | Analyse 'Wind Rose Diagram' | 02 |
| 5 | IV | Draw sketches of traffic control aids | 02 |
| 6 | I toV | Prepare a report on runways and taxiways of major International airports of state and country | 04 |
| 7 | I to V | Give presentation of 10 minutes each in the group of three students on the seminar topic given by faculty | 04 |
| 8 | II | Design runway and taxiway for given aircraft requirements and shape and size of available land for airport. | 04 |

## 8. SUGGESTED STUDENT ACTIVITIES

Students will carry out activities such as:

i. Visit to nearby airport and prepare a report.
ii. Refer and study different codes related to Airport design.
iii. Work in group for preparing a model (to scale)of airport with all landing and takeoff markings.

## 9. SPECIAL INSTRUCTIONAL STRATEGIES (if any)

i. Ask students to choose a topic related to airports and explore internet/library to prepare a presentation and then present it in Seminars/Symposiums.
ii. Arrange expert lecture by engineers of Airport Authority of India Ltd.
iii. Arrange visit to nearby airport/helipad/heliport.

## 10. SUGGESTED LEARNING ACTIVITIES

**A) Books**

| S. No. | Title of Book/Journals | Author | Publication |
|---|---|---|---|
| 1. | Airport Engineering: Planning and Design | Subhash C. Saxena | CBS Publisher |
| 2. | Airport Engineering | Rangwala | Charotar Publishing House, Anand |
| 3. | Airport Engineering: Planning, Design and Development of 21st Century Airports | Norman J. Ashford, Saleh Mumayiz, Paul H. Wright | |
| 4. | Airport Planning and Design | S.K. Khanna, M.G. Arora, | Nem Chand Bros., Roorkee. |
| 5. | Air Transportation Planning and Design | Virender Kumar and Satish Chandra | Galgotia Publications, New Delhi. |
| 6. | The Planning and Design of Airports | Robort Hornjeff | McGraw-Hill Book Co. New Delhi. |

**B) Major Equipment/ Instrument**

No major equipments or instruments are required.

**C) Software/Learning Websites**

i. www.airports.deerns.com
ii. www.en.wikipedia.org/wiki/Airport

## 11. COURSE CURRICULUM DEVELOPMENT COMMITTEE

**Faculty Members from Polytechnics**

- **Prof. (Mrs.) A.T Jha**, Lecturer in Civil, Govt. Polytechnic, Vadnagar
- **Prof. (Mrs.)Shruti B Khara**, Lecturer in Civil, Govt. Polytechnic, Himmatnagar

**Faculty Members from NITTTR Bhopal**

- **Dr Subrat Roy**, Professor, Department of Civil and Environmental engineering
- **Dr Shashi Kant Gupta,** Professor and Coordinator for state of Gujarat.