**IPS Academy, Institute of Engineering & Science**

(A UGC Autonomous Institute, Affiliated to RGPV, Bhopal)

Scheme & Syllabus

**Civil Engineering Department**

(U.G.NBA Accredited up to June 2023)

**Bachelor of Technology (B.Tech.)**

**Honors in Transportation Planning**

(To be offered to students of Civil Engineering Department)

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| --- | --- | --- | --- | --- | --- | --- | --- |
| **S.No.** | **Semester** | **Subject Code** | **Subject Name** | **Contact Hours**  **per week** | | | **Total Credits** |
| **L** | **T** | **P** |
| 1 | V | HOCE-TP-501 | Airport Planning and Design | 3 | 1 | - | 4 |
| 2 | VI | HOCE-TP-601 | Transportation Economics and Finance | 3 | 1 | - | 4 |
| 3 | VII | HOCE-TP-701 | Intelligent Transportation Systems | 3 | 1 | - | 4 |
| 4 | VIII | HOCE-TP-801 | Advanced Traffic Engineering | 2 | 1 | - | 3 |
| **Total** | | | | **11** | **4** | **-** | **15** |
| **Total Academic Engagement and Credits** | | | | **15** | | | **15** |

**HOCE-TP-501 Airport planning and design**

**Course Objective**:

To make the students conversant with the types of pavements and their design. To make them learn the importance of orientation of runways, Air traffic control devices and airport drainage.

## Course Contents: (40 hrs.)

**Module 1: ( 08 hrs)**.

**Introduction:** Growth of air transport, airport organization and associations, Classifications of airports airfield components, airport traffic zones and approach areas.

**Aircraft Characteristics Related to Airport Design:** Components, size turning radius, speed, airport characteristics

**Module 2: ( 08 hrs)**

**Airport planning, surveys and Design :** Airport Site Selection, Runway length and width, sight distances, longitudinal and transverse grades, runway intersections, taxiways, clearances, aprons, numbering, holding apron, noise control , Problems

**Module 3: ( 08 hrs)**

**Planning and Design of the Terminal area:** Operational concepts, space relationships and area requirements, vehicular traffic and parking at airports.

**Capacity and Delay:** Factors affecting capacity, Determination of runway capacity related to delay, gate capacity, taxiway capacity

**Module 4: ( 08 hrs)**

**Airport Grading and Drainage:** Grading of airport area, hydrology, design of drainage systems, construction methods, layout of surface drainage and subsurface drainage system, Problems.

**Module 5: ( 08 hrs)**

**Air Traffic Control and Aids:** Runways and taxiways markings, day and night landing aids, airport lighting, ILS and other associated aids.

**Course Outcomes:**

**CO1** Analyse the various components of an airport and aircraft characteristics affecting the design of airports.

**CO2** Design the runway and taxiway geometrics based on the likely aircrafts using the airport.

**CO3** Plan the requirements of terminal area and suggest an optimum layout for the terminal area based on passenger and baggage volume.

**CO4** Provide a suitable method of grading and leveling work involved in the area along with drainage provisions for surface and subsurface water flows.

**CO5** Understand the various air traffic control aids required for safe landing and take-off of aircrafts at the airport.

**List of Text / Reference Books**

1. “Planning and Design of Airports” - Robert Horenjeff, 2nd edition, McGraw Hill Book Co.
2. “Airport engineering”- g. Glushkov, v.babkov, mir publuishers, moscow.
3. “airport planning and design”- khanna, arora and jain, nem chand and bros., roorkee
4. Harry.r.cedergern. “drainage of airfield pavements”- john wiley and sons.
5. Virender Kumar and Satish Chandra, “Airport Planning and Design”- Galotia Publication press.

**HOCE-TP-601 Transportation Economics and Finance**

**Course Objective**:

To know Economic evaluation of transportation projects, ownership financing of transport, economic function of transportation, road user and transportation cost, finance and taxation

**Course Contents: (40 hrs.)**

**Module 1: (10 hrs)**.

**Economic evaluation of transport plans** Need for economic evaluation, cost and benefits of transport projects, time horizon in economic assessment, basic principles of economic evaluation, interest rate, method of economic evaluation, benefit cost ratio method, first year rate of return, net present value method, internal rate of return method, and comparison of various methods of economic evaluation.

**Module 2: (08 hrs)**

**Vehicle operating costs** Introduction, road user cost study in India , components of VOC, factors affecting VOC, fuel consumption relationship, spare parts consumption, maintenance and repairs, labour cost, tyre life, lubricants, utilization, and fixed costs.

**Module 3: (06 hrs)**

**Value of travel time savings** Introduction, classes of transport users enjoying travel time savings, methodology for monetary evaluation of passengers’ travel time, review of work in India on passengers’ travel time

**Module 4: (10 hrs)**

**Accident costs** Introduction, relevance of accident costing for a developing country, review of alternative methodologies for accident costing, Indian studies.

Traffic congestion, traffic restraints and road pricing Congestion as a factor in road traffic, traffic restraint, road pricing

**Module 5: ( 06 hrs)**

**Highway finance** Basic principles, distribution of highway cost, sources of revenue, highway financing in India.

**Course Outcomes:**

CO1 Providing a solid introduction to transportation demand and cost analysis.

CO2 Evaluate economic aspects of transportation project

CO3 Estimate vehicle operating costs

CO4 Evaluate travel time saving

CO5 Interpret road pricing factors.

**List of Text / Reference Books**

1. Principles of Transportation engineering by Chakroborty & Das, Prentice Hall, India. 2
2. Highway Engg by S.K Khanna & CEG Justo, Nem Chand Bros., Roorkee
3. Principles and practices of Highway engg by L.R Kadyali, Khanna Publishers, Delhi.Edition
4. Principles of Transportation and Highway engg by G.V Rao, Tata Mc graw- Hill Publishing Co.Ltd. N.Delhi
5. Harral Clell G., A Manual for the Economic Appraisal of Transport Projects, World Bank Report, Washington D.C

**HOCE-TP-701 Intelligent Transportation Systems**

**Course Objective**:

To familiarize the students with latest techniques of transportation systems, to learn the techniques of existing toll system using ITS

## Course Contents: (42 hrs.)

**Module 1: ( 06 hrs)**

Introduction to ITS, including where ITS fits; roles and responsibilities Advanced Traveller Information Systems (ATIS), including functionality; business models; field trip to Smart Route Systems  
**Module 2: ( 06 hrs)**

Advanced Transportation Management Systems (ATMS), including network operations; incident detection; congestion pricing, tolling, HOT lanes, example deployments

**Module 3: (10 hrs)**

Fleet-oriented ITS services, including Advanced Public Transportation Systems (APTS); BRT; Commercial Vehicle Operation s (CVO); Intermodal Freight , including International Operations and Supply Chains ITS and Technology, including automated highway systems (AHS); sensors, electronic toll collection (ETC); dedicated short range communication ,and standards

**Module 4: (10 hrs)**

Regionally-scaled ITS deployment, including regional architecture; organizational an d institutional issues; standards; developed vs. developing countries; ITS and strategic regional transportation planning; Integrating infrastructure and operations planning

**Module 5: ( 10hrs)**

Critical ITS Issues, including (as time permits) ITS and security; safety; human factors; privacy; sustainability; funding (as contrasted with conventional infrastructure); technology deployment/R &D/policy; other institutional issues Conclusion, including regional ITS planning and architecture presentation; the future of ITS; International ITS Programs Case Studies: applications in bus transport, metro and highways; Emerging Issues.

**Course Outcomes:**

CO1: Understand ITS & ATIS

CO2: Explain about Advanced Transportation Management System

CO3: Know about APTS, CVO, new technology and ETC

CO4: Details about regional architecture, integration of infrastructure and operational planning

CO5: Summarizes about ITS issues in terms of various factors and emerging issues

**List of Text / Reference Books**

1. Ghosh, S., Lee, T.S. Intelligent Transportation Systems: New Principles and Architectures, CRC Press, 2000.

2. Mashrur A. Chowdhury, and Adel Sadek, Fundamentals of Intelligent Transportation Systems Planning, Artech House, Inc., 2003.

3. R.P Roess, E.S. Prassas, W.R. McShane. Traffic Engineering, Pearson Educational International, Third Edition, 2004.

**HOCE-TP-801 Advanced Traffic Engineering**

**Course Objective**:

To know the traffic flow characteristics, To study various traffic surveys, To understand the Traffic Signal timing design and Traffic Flow theories.

## Course Contents: (42 hrs.)

**Module 1: ( 08 hrs)**.

Introduction to Traffic Engineering Properties of Traffic Engineering Elements, Road Vehicle performance

Traffic Studies Volume studies, Speed studies, Origin and destination studies and parking studies

**Module 2: ( 08 hrs)**

Traffic Control devices Various Traffic Control devices, Principles of Intersection Design, Design of signalized and unsignalized intersections, Signal Coordination , Traffic Regulations and Statistical methods

**Module 3: ( 06 hrs)**

Traffic Safety and Level-of-service Accidents, Lighting, Capacity and Level-of-service analysis

**Module 4: ( 12 hrs)**

Uninterrupted traffic Flow Theory Fundamentals of Traffic flow theory, Uninterrupted Traffic flow including Macroscopic and Microscopic Traffic flow models

Interrupted traffic Flow Theory Fundamentals of Interrupted Traffic Flow, Shockwave Analysis, Car following theory, Queuing Theory, Vehicle arrival: Gap and Gap acceptance Simulation of Traffic Systems

**Module 5: ( 08 hrs)**

Interrupted traffic Flow Theory Fundamentals of Interrupted Traffic Flow, Shockwave Analysis, Car following theory, Queuing Theory, Vehicle arrival: Gap and Gap acceptance Simulation of Traffic Systems

**List of Experiments**

1Traffic volume studies

2 Speed studies

3 O & D studies

4 Signalised and non-signalised intersection studies

5 Parking surveys

6 Design service volume and capacity studies

7 Introduction to various Softwares

**Course Outcomes:**

**CO1**Use the Traffic survey analysis for management of traffic and for designing new road infrastructure,

**CO2** Ability to design various types of intersections,

**CO3** Implementation of Traffic Control devices and traffic regulations,

**CO4**Applications of Traffic flow theories in solving congestion problems

**CO5** Use of simulation techniques

**List of Text / Reference Books**

1.Kadiyali, L. R., Traffic Engineering and Transport Planning,. Khanna Publishers

2 O’Flaherty C A, “Transport Planning and Traffic Engineering”, Butterworth Heinemann, Elsevier, Burlington, MA 2006

3 Mannering Fred L., Kilarski Walter P. and Washburn Scott S., Principles of Traffic Engineering and Traffic Analysis, Third Edition, Wiley 2007

4 Roess, R. P., Prassas, E. S., and McShane, W. R., Traffic Engineering, 4th Edition, Prentice Hall 2010

5 Chakroborty Partha and Animesh Das, Principles of Transportation Engineering, Prentice hall