

# **ADVANCED DIPLOMA IN M&E ENGINEERING**

## **MODULE SYNOPSIS**

### **Module : Analytical Mathematics**

#### **Aims & Objectives**

- This module will enhance the analytical understanding and techniques which helps in solving varied engineering tasks and forms the base for other engineering modules.

#### **Learning Outcomes**

- Analyse and model engineering situations and solve problems using algebraic methods
- Analyse and model engineering situations and solve problems using trigonometric methods
- Analyse and model engineering situations and solve problems using calculus
- Analyse and model engineering situations and solve problems using statistics and probability

### **Module : Principles of Engineering (M&E)**

#### **Aims & Objectives**

- Engineering Science provides students with the basic understanding of the fundamental principles involved in Mechanical and Electrical engineering which forms the base for many engineering design and operation.

#### **Learning objectives/Outcome:**

- Determine the behavioural characteristics of elements of static engineering systems
- Determine the behavioural characteristics of elements of dynamic engineering system
- Apply DC theory to solve electrical and electronic engineering problems
- Apply single phase AC theory to solve electrical and electronic engineering problems
- Determine the behavioural characteristics of materials subjected to complex loading systems
- Determine the behavioural characteristics of loaded beams and cylinders
- Determine the dynamic parameters of power transmission system elements
- Determine the dynamic parameters of rotating systems

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## **MODULE SYNOPSIS**

### **Module : Engineering Design**

#### **Aims & Objectives**

- Ability to use the techniques, skills and modern engineering tools to design.
- Ability to collect and analyse data required for experiments in order to design.
- An ability to identify, formulate and solve engineering problems
- Equip students with site communication skills including oral, written and drawing.

#### **Learning Outcomes**

- Identifies the specific role and responsibilities of the engineer within the broad design framework of the built environment.
- Understand the link between concept, modeling/analysis and detailed design in generating a 'total' solution to a design project and to communicate the outcome of this work through drawing and written submission.
- Understanding of how professional practice operates and skills of communication (including written, drawing, oral/discussion/argument/reasoning) that will best allow the clear description and definition of the engineering solution to other built environment professionals.
- Develops group working skills, including personal accountability and responsibility.

### **MODULE: Fluid Mechanics**

#### **Aims and Objectives:**

- The aim of this unit is to extend learners' knowledge of the principles of fluid mechanics and the techniques used to predict the behaviour of fluids in engineering applications.

#### **Learning Outcomes:**

- Determine the behavioural characteristics and parameters of static fluid systems
- Understand the effects of viscosity in fluids
- Determine the behavioural characteristics and parameters of real fluid flow
- Understand the operating principles of hydraulic machines.

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## **MODULE SYNOPSIS**

### **Module: Circuit Analysis & Design**

#### **Aims & Objectives**

- The aims and objectives of Circuit Analysis can be summarized as developing the ability to analyse linear systems at an appropriate level of accuracy. This should be achieved with speed and efficiency, using appropriate tools, and with a high degree of confidence in the outcome.

#### **Learning Outcomes**

- After completing the course the student should be able to analyze a DC or an AC electric circuit using the techniques learned in class. The student should be able to simplify electric circuits and obtain their equivalent circuit. In addition, the student should be able to solve circuit problem containing operational amplifiers. The student should be able to perform sinusoidal steady-state power calculations and to analyze first order RC, RL, and RLC circuits. The student should be able to draw and interpret schematic diagrams of electric circuits and recognize the symbolic representation of the basic circuit elements.
- The responsibility of a professional to work through a problem until they have total confidence in the outcome
- This is the major focus of the subject. For a complete listing of the knowledge domain see the subject description. Emphasis is on time and frequency responses. The purpose is to show how classical differential equation solution techniques and Laplace transforms can be applied to electrical circuits

### **Module: Strength of Materials**

#### **Aims & Objectives**

- This subject is useful for a detailed study of forces and their effects along with some suitable protective measures for the safe working condition. This knowledge is very essential for an engineer to enable him in designing all types of structures and machines.
- To develop the theoretical basis and to derive the theories of the strength of materials with sound mathematical principles and to enable students to systematically solve engineering problems regardless of difficulty.
- Students should be able to develop confidence and competence in solving intermediate to advanced level of strength of materials problems for design purposes.

#### **Learning Outcomes**

- Fundamental concepts of Strength of Materials and definition of simplified models for the interpretation of the stress and strain states in linear elements, related to effects of normal stress (tension-compression) and bending moment (plane and curved bending), present in statically determinate or statically once indeterminate frame structures. Understanding the functioning of a structure in Ultimate Limit State (General Criteria for Safety Verification).

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## **MODULE SYNOPSIS**

### **MODULE: Mechatronics Systems**

#### **Aims & Objectives:**

- This unit will develop learners' understanding of a range of mechatronic systems that are used in industrial and domestic environments and enable them to produce specifications for mechatronic products.

#### **Learning Outcomes:**

- Understand the applications of a range of mechatronic systems and products
- Understand electro-mechanical models and components in mechatronic systems and products
- Produce a specification for a mechatronic system or mechatronic product
- Apply mechatronic design philosophies to carry out a design analysis.

### **Module: Electrical Machines**

#### **Aims & Objectives**

To expose the students to the basic principles of Electro mechanical Energy Conversion in Electrical Apparatus and the operation of Transformers and DC Machines.

- To familiarize the constructional details, the principle of operation, prediction of performance, the methods of testing the transformers and three phase transformer connections.
- To introduce the principles of electromechanical energy conversion in singly and multiply excited systems.
- To study the working principles of electrical machines using the concepts of electromechanical energy conversion principles and derive expressions for generated voltage and torque developed in all Electrical Machines.
- To study the working principles of DC machines as Generator and Motor, types, determination of their no-load/load characteristics, starting and methods of speed control of motors.
- To estimate the various losses taking place in D.C. machines and to study the different testing methods to arrive at their performance.

#### **Learning Outcomes**

- Demonstrate knowledge of electrical supply equipment and be able to make selections from theoretical considerations.
- Analyse and describe aspects of the construction, principle of operation, applications, methods of speed control, and methods of direction reversal of d.c. machines
- Analyse and describe aspects of the construction, principle of operation, applications, methods of speed control, and methods of direction reversal of a.c. machines
- Describe the construction, application and operation of single phase and three phase transformers

# **ADVANCED DIPLOMA IN M&E ENGINEERING**

## **MODULE SYNOPSIS**

### **MODULE: Computer Aided Design & Manufacturing**

#### **Aims & Objectives:**

- This unit will develop learners' understanding of the practical applications of a Computer-aided design and Computer-aided Manufacture (CAD/CAM) system.
- The aim of this unit is to provide learners with a broad and in-depth knowledge of manufacturing processes and techniques that can be applied to a range of materials for a variety of manufacturing applications.

#### **Learning Outcomes:**

- Produce a component drawing suitable for transfer onto a CAM system and produce a simple 3D surface
- Transfer data generated in CAD to a CAM system for subsequent machining
- Simulate the cutter paths on CAM system to optimise the machining sequences
- Understand how to transfer a generated tape file to a CNC machine and produce the component.
- Select suitable conventional machining processes and techniques for generating geometrical forms for a given component specification
- Select suitable moulding and shaping processes for a given component specification
- Select suitable non-conventional machining techniques for a given component specification.

### **Module: Project Cycle**

#### **Aims & Objectives**

- The aim will be develop the skills and essential knowledge throughout the project cycle. The Project cycle shall includes the project plan, design, implementation and evaluation.
- This modules provides opportunities to develop skills in decision making, problem solving and communication, integrated with the knowledge, understanding and skills developed in many of the other units within the programme, in order for learners to complete a realistic project.
- Learners will select, plan, implement and evaluate a project and present the final outcomes, in terms of the process and the product. Learners will also develop the ability to work individually and/or with others, within defined timescales and given constraints, to produce acceptable and viable solutions to an agreed brief. If this is a group project, each member of the team must be clear about their responsibilities at the start of the project and tutors must ensure that everyone is accountable for each aspect of the work and makes a contribution to the end result. Learners must work under the supervision of programme tutors or work-based managers.

#### **Learning Outcomes**

On successful completion of this unit a learner will:

- Be able to formulate a project
- Be able to implement the project within agreed procedures and to specification
- Be able to evaluate the project outcomes
- Be able to present the project outcomes.

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## **MODULE SYNOPSIS**

### **Module : Occupational skills**

#### **Aims & Objectives**

- This unit provides learners with the opportunity to acquire effective occupational skills required for effective employment.
- Learners at all levels of education and experience require honed employability skills as a prerequisite for entering the job market. This unit gives learners an opportunity to assess and develop an understanding of their own responsibilities and performance in, or when entering, the workplace. Learners will consider the skills required for general employment such as interpersonal and transferable skills, and the dynamics of working with others in teams or groups including leadership and communication skills. This unit also deals with the everyday work requirement of problem solving which includes the identification or specification of the 'problem', strategies for its solution and the evaluation of the results through reflective practices.

#### **Learning outcomes**

On successful completion of this unit a learner will:

- Be able to determine own responsibilities and performance
- Be able to develop interpersonal and transferable skills
- Understand the dynamics of working with others
- Be able to develop strategies for problem solving

### **Module : Project Work**

#### **Aims & Objectives**

- The project aims to develop the ability of students to integrate the skills learnt in the modules of the course into a 'total' Construction management solution. To develop and demonstrate simple research of topic proposed by the lecturer that is relevant to their elective to the programme. The student will form a group maximum of 3 persons and complete the project work. The group project will help student to obtain skills like teamwork, integrated project, leadership and organising skills.

#### **Learning Outcomes**

- This project is designed to help students further develop their research skills with respect to finding, exploring, reading and learning how to mobilise high quality academic literature.
- The project also forms a good test of students' grasp of research, essay writing and study skills. These skills will also expose students' grasp of strategic management theory and concepts per se and their connection to practice in the built environment.