

Advanced Manufacturing Processes [AMP]

T.Y. Diploma : Sem V
[ME/PG/PT]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	–
Oral Exam	–	–
Term Work	–	25@
Class Test (Two Test)	–	25 (each)

@ – Internal Assessment

SYLLABUS

1. Non traditional machining processes

- Need and importance of nontraditional machining processes, its classifications
- Electrical discharge Machining.
- Principle of working, Setup of EDM, Dielectric fluid, tools (electrodes), Process parameters, Output characteristics, Applications e.g. micro hole drilling, curve hole drilling.
- Wire cut EDM - Principle of working, Setup of WEDM, controlling Parameters, Applications.
- **Laser Beam Machining** : Physical principle of Laser, Laser action in ruby rod, Types of Lasers. Set-up for LBM. Characteristics, controlling Parameters, Applications, Application of Laser Beam for Welding (LBW)
- Other non traditional machines such as ECM, AJM, USM, LBM, PAM etc. Principle of working, Applications.

2. CNC milling machines

- Concept of CNC milling machine
- Vertical and horizontal machining center: Constructional features, Axis identification, Electronic control system. Automatic tool changer and tool magazine.
- CNC programming: Preparatory functions (G code), miscellaneous functions (M code), Part programming including subroutines and canned cycles.
- Specific programming examples like simple curvilinear milling, use of sub-routine, use of canned cycle
- Principles of computer aided part programming.

3. Machine Tool Automation:

- Introduction and Need
- Single spindle automates, transfer lines.
- Elements of control system, Limit switches, Proximity switches, Block diagram for feedback and servo control system,
- Introduction to PLC, Block diagram of PLC.

4. Special Purpose Machines (SPM)

- Concept, General elements of SPM, elementary SPM machines like Turret and Capstan lathe
- Principles of SPM design, Productivity improvement by using SPM

5. Maintenance of Machine Tools:

- Need and importance of maintenance activity
- Types of maintenance.
- Basic maintenance practices for simple machine element, viz Bearing, Coupling, Shaft and pulley etc.
- Repair cycle analysis, Repair complexity, Maintenance manual, Maintenance records, Housekeeping.
- Introduction to Total Productive Maintenance (TPM).

Reference

1. Manufacturing Science (*Amitabh Ghosh , Mallik*) East-West Press Pvt. Ltd.
2. Production Technology (*HMT, Bangalore*) Tata Mc-Graw Hill
3. CNC machines (*Pabla B. S. M. Adithan*) New Age international limited.
4. Industrial maintenance (*H.P.Garg*) S. Chand & Co. Ltd.
5. Non conventional Machining (*P. K. Mistra*) Narvasa Publishining House
6. Maintenance Engg. Handbook (*Lindley R. Higgins*) Mc-Graw Hill
7. Manufacturing Processes (*Begman, Amsted*) John Willey and Sons.
8. Fundamental of metal cutting and machine tools (*B. L. Juneja*) New age international limited.
9. Technology of Machine Tools. (*Steve Krar, Albert Check*) Mc-Graw-Hill International.
10. CAD/CAM Principals and Applications (*P. N. Rao*) Tata McGrow-Hill
11. Manufacturing Technology Metal Cutting & Machine tools (*P. N. Rao*) Tata McGrow-Hill

Power Engineering [PEN]

T.Y. Diploma : Sem V

[ME]

EVALUATION SYSTEM

	Time	Marks
Theory Exam	3 Hrs.	100
Practical Exam	–	50#
Oral Exam	–	–
Term Work	–	25@
Class Test (Two Test)	–	25 (each)

@ – Internal Assessment, # – External Assessment

SYLLABUS

1. I.C. Engine

- Power Cycles - Carnot, Otto, Diesel, Dual, Brayton Cycle, representation on P-V, T-S diagram and Simple numerical on Otto cycle & diesel cycle.
- Classification of I.C. Engines
- Two stroke and four stroke Engines Construction and working, comparison, valve timing Diagram, Turning moment diagram
- Brief description of I.C. Engine combustion (SI & CI), scavenging, preignition, detonation, supercharging, turbo charging, simple Carburetor, M.P.F.I., fuel injection pump
- List of fuel, lubricant additives and their advantages.

2. I.C. Engine Testing and Pollution Control

- Engine terminology: Stroke, bore, piston speed, mep, compression & cut-off ratio etc. Engine Testing - I.P., B.P. Mechanical, Thermal relative and volumetric efficiency, BSFC, Heat Balance sheet. Morse Test, Motoring test
- List of fuel, lubricant additives and their advantages. Pollution Control
 - Pollutants in exhaust gases of petrol and diesel engines, their effects on environment, exhaust gas analysis for petrol and diesel engine, Catalytic Converter, Bharat stage I, II, III norms.

3. Air Compressor

- Introduction, Classification of air compressors, Definition: - Pressure ratio, Compressor capacity, Free Air Delivered, Swept volume, Uses of compressed air, Single stage, multi stage, single acting, double acting
- Reciprocating air compressor
 - Construction and working of single stage and two stage compressor
 - Efficiency: - Volumetric, Isothermal & Mechanical (Only simple numerical)
 - Advantages of multi staging.
- Rotary Compressor
 - Construction and working of screw, lobe, vane, centrifugal compressors & Axial flow compressor (No numerical)
 - Comparison and applications of reciprocating and rotary compressors
 - Purification of air to remove oil, moisture and dust
- Methods of energy saving in air compressors.

4. Gas Turbine And Jet Propulsion

- Classification and applications of gas turbine.
- Constant volume and constant pressure gas turbines.
 - Closed cycle and open cycle gas turbines and their comparison.
- Methods to improve thermal efficiency of gas turbine-Regeneration, inter-cooling, reheating using T-0 diagram (no analytical treatment)
- Jet Propulsion – Principles of turbojet, turbo propeller, Ram jet.
- Rocket propulsion – Solid propellants, solid propellant rocket and liquid propellants, components of liquid propellants, liquid propellant rocket.

5. Refrigeration and Air- Conditioning

- Introduction : Reversed carnot cycle, Bell coleman cycle; COP of Heat Pump and refrigerator, Tonnes of Refrigeration.
- Vapour compression system : Vapour compression refrigeration cycle(Simple numerical)
Basic components of Vapour Compression Cycle, their function and location. Simple vapour absorption refrigeration system. Applications- Water cooler Domestic refrigerator, Ice plant & cold storage.
- Psychrometry – Psychrometric Properties of air, Dalton's law of partial pressure psychrometric chart & processes (No simple numerical)
- Air conditioning systems – Definition of Air conditioning and classification of Air conditioning Systems.(Elementary treatment) Application- Window air conditioner.

Reference

1. Course in Thermal Engineering (*V. M. Domkundwar*) Dhanpat Rai & Co
2. Thermal Engineering (*P.L.Ballaney*) Khanna Publishers
3. Text Book of Thermal Engineering (*R.S.Khurmi*) S.Chand & Co. Ltd
4. Heat Engine Vol.-I (*Patel. Karamchandani*) Acharya Publication
5. Automobile Engineering (*R. k. Jain*) Tata McGraw Hill
6. I.C Engines (*V.Ganeshan*) Tata Mc-Grawhill

Incomplete

Measurements and Control [MCO]

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SYLLABUS

- 1. Significance of measurement**, types of measurement, classification of instruments
 - Static terms and characteristics- Range and Span, Accuracy and Precision, Reliability, Calibration, Hysteresis and Dead zone, Drift, Sensitivity, Threshold and Resolution, Repeatability and Reproducibility, Linearity.
 - Dynamic characteristics- Speed of response, Fidelity and Dynamic errors, Overshoot.
 - Measurement of error- Classification of errors, environmental errors, signal transmission errors, observation errors, operational errors.
 - Transducers : Classification of transducers, active and passive, resistive, inductive, capacitive, piezo-resistive, thermo resistive

Note : Simple numericals on above topics
- 2. Control systems**
 - Block diagram of automatic control system, closed loop system, open loop system, feed back control system, feed forward control system, servomotor mechanism,
 - Comparison of hydraulic, pneumatic, electronic control systems,
 - Proportional control action, integral control action, derivative control action, PID control action.
 - Applications of measurements and control for setup for boilers, air conditioners, motorspeed control

Note : No numericals on above topics.
- 3. Displacement measurement:**
 - Capacitive transducer, Potentiometer, LVDT, RVDT, Specification, selection & application of displacement transducer.

Note : No numericals on above topics.
- 4. Temperature measurements:**
 - Non-electrical methods- bimetal and liquid in glass thermometer, pressure thermometer
 - Electrical methods- RTD, platinum resistance thermometer, thermistor, Thermoelectric methods - elements of thermocouple, law of intermediate temperature, law of intermediate metals, thermo emf measurement.
 - Quartz thermometer,
 - Pyrometers- radiation and optical

Note: No numericals on above topics.
- 5. Flow measurements:**
 - Variable head flow meters-Venturi, Flow nozzle, Orifice plate, Pitot tube
 - Variable area meter-Rota meter

- Variable velocity meter-Anemometer
 - Special flow meter- Hot wire anemometer, Electromagnetic flow meter, Ultrasonic flow meter
- Note :** Simple numericals on above topics.

6. Miscellaneous Measurement:

- Acoustics measurement- Sound characteristics -intensity, frequency, pressure, power - sound level meter, piezoelectric crystal type.
- Humidity measurement -Hair hygrometer, Sling psychrometer, Recording psychrometer
- Liquid level measurement - direct and indirect methods

Note : No numericals on above topics.

- Force & Shaft power measurement -Tool Dynamometer (Mechanical Type), Eddy Current Dynamometer, Strain Gauge Transmission Dynamometer.
- Speed measurement -Eddy current generation type tachometer, incremental and absolute type, Mechanical Tachometers, Revolution counter & timer, Slipping Clutch Tachometer, Electrical Tachometers, Eddy current Drag Cup Tachometer, Magnetic and photoelectric pulse counting methods, Contact less Electrical tachometer, Inductive Pick Up, Capacitive Pick Up, Stroboscope
- Strain Measurement-Stress-strain relation, types of strain gauges, strain gauge materials, resistance strain gauge- bonded and unbounded, types(foil, semiconductor, wire wound gauges), selection and installation of strain gauges load cells, rosettes.

Note : Simple numerical on above topics.