

II - MID TERM TEST – 2017-18

Class	:	B.TECH. 4TH YEAR	Semester	:	VIII
Branch	:	MECHANICAL ENGINEERING		Time	: 1 HOUR
Subject	:	CIMS		Max. Marks:	20

Q.1 What is group technology (GT) and its benefits? What are the two major tasks that a company must undertake when it implements GT? **6**

Q.2 What is the difference between a hierarchical structure and chain-type structure in a classification and coding system? **4**

Q.3 Describe Following: **6**

(i) Production flow analysis (ii) MRP II (iii) Retrieval CAPP

Q.4 Explain noncontact nonoptical inspection technique? **4**

or

Q.4 Explain Coordinate measuring machines ? **4**

Ans. 1)

Group technology is a manufacturing philosophy in which a similar parts are identified and group together as a part family, in order to taken the advantages of their similarities in design and manufacturing.

In addition ,there increase trend achiving a higher level of integration between the design and manufacturing activities of a company.

The above two objective can be achieved by using a manufacturing philosophy known as group.

Benefits of GT

Reduced material handling.

Reduced tool set-up time.

Reduced work- in- process.

Promotes standardization of tooling, fixture and setups.

Simplified process planning and production scheduling.

Better work satisfaction.

Better product quality and productivity.

There are **two major tasks** that a company must undertake when it implements group technology. These two tasks represent significant obstacles to the application of GT.

Identifying the part families. If the plant makes 10,000 different parts, reviewing all of the part drawings and grouping the parts into families is a substantial task that consumes a significant amount of time.

Rearranging production machines into machine cells. It is time consuming and costly to plan and accomplish this rearrangement and the machines are not producing during the changeover.

Ans.2)

Monocode or hierarchical code A monocode (hierarchical code) provides a large amount of information in a relatively small number of digits.

Useful for storage and retrieval of design related information such as **part geometry, material, size**, etc.

It is difficult to capture information on manufacturing sequences in hierarchical manner, so applicability of this code in manufacturing is rather limited.

Chain-type structure, known as a polycode, in which the interpretation of each symbol in the sequence is always the same; it does not depend on the value of preceding symbols, so symbols are independent of each other.

Each digit in specific location of the code describes a unique property of the workpiece.

It is easy to learn and useful in manufacturing situations where the manufacturing process have to be described.

The length of a Polycode may become excessive because of its unlimited combinational features.

Ans.3)

i) Production Flow Analysis

The production flow analysis uses manufacturing data into identify part families.

Parts that go through common operations are grouped into part families.

The machines used to perform these common operations may be grouped as a **cell**, consequently this technique can be used in facility layout (factory layout)

Production flow analysis involve following steps:

(1) Data collection (2) Sorting of operations (3) Preparation of PFA chart (4)Data analysis

ii) Manufacturing resource planning (MRPII) is defined as a method for the effective planning of all resources of a manufacturing company.

MRP II serves as an extension of MRP(closed loop manufacturing resource planning, also abbreviated as CLMRP).

- Financial accounting incorporated
- Sales
- Operations Planning
- Simulate capacity requirements of different possible Master Production Schedules.
- MRP 2 is the incremental information integration business process strategy implemented using hardware and modular software application linked to central database that store business data and information.

iii) Retrieval Computer Aided Process Planning

Also known as data **Variant** method.

Process plan for a new part is generated by recalling, identifying and retrieving an existing plan for a similar part and making necessary modifications for new part known as ‘Master Part’

Coding and classification schemes of group technology (GT) used, number of algorithms, mathematical models are developed for family part formation and plan retrieval.

Using existing system can save a tremendous amount of time and manpower.

Ans.4)

Non-contact non-optical Inspection Techniques Other potential inspection techniques that are non-contact and non-optical are outlined in brief in Non-contact non-optical inspection techniques Technique Description

Electrical Field An electrically active probe creates an electrical field which is affected by the proximity of an object to the probe. In typical applications, the object to be inspected is placed at a set proximity to the probe, and the effect on the electrical field is measured. This procedure is

repeated at different distances from the probe, and results are compared against each other to complete inspection procedure.

Radiation Uses x-ray radiation to accomplish non-contact inspection on metals and weld-fabricated products. The amount of radiation absorbed by the metal is measured and compared against standards. This allows metals that do not absorb sufficient amounts of radiation to be quickly spotted as flawed.

Ultrasonic Inspection Uses very high frequency sound as an inspection mechanism. Methods can be either manually-performed or performed automatically. Automated methods include emitting ultrasonic waves from a probe and reflecting them off the object to be inspected, to create a sound pattern. This sound pattern can be compared against the sound pattern produced by an ideal object for inspection purposes. If the produced sound pattern matches the standard pattern the object passes the test; otherwise it fails.

Or

Ans.4)

Co-ordinate Measuring Machines In co-ordinate metrology the actual shape and dimensions of an item are measured, and compared against desired shape and dimensions, as might be specified on a part drawing. Co-ordinate measuring machines (CMM) is an electromechanical system that has been designed to evaluate relevant dimensions of an item against a required standard.

Coordinate-measuring machines include three main components:

- The main structure which include three axes of motion. The material used to construct the moving frame has varied over the years. Granite and steel were used in the early CMM's. there may be four types of arrangement
 - i) cantilever ii) Bridge type iii) Column Type iv) Gantry
- Probing system It is the part of a CMM that sense the different parameters required for the calculation. Appropriate probes have to be selected and placed in the spindle of the CMM. Originally, the probes were solid or hard, such as tapered plugs for locating holes.
- Data collection and reduction system - In a CMM, the computer and the software are an inseparable part. They together represent one system. The efficiency and cost effectiveness of a CMM depend to a large extent on the software. typically includes a machine controller, desktop computer and application software.