

GANPAT UNIVERSITY									
FACULTY OF ENGINEERING & TECHNOLOGY									
Programme	Diploma Engineering				Branch	Mechanical Engineering			
Semester	V				Version	1.0.0.0			
Effective from Academic Year		2020-21			Effective for the batch Admitted in			July 2018	
Subject code	1ME2503		Subject Name		INDUSTRIAL ENGINEERING.				
Teaching scheme					Examination scheme (Marks)				
(Per week)	Lecture(DT )		Practical(Lab.)		Total		CE	SEE	Total
	L	TU	P	TW					
Credit	3	0	1	0	4	Theory	40	60	100
Hours	3	0	2	0	5	Practical	30	20	50

Pre-requisites:

Course Learning Outcomes:
<p>The course content should be taught and implemented with an aim to develop different skills leading to the achievement of the following competencies and course learning outcomes:</p> <p>CO1. Improve productivity using work study and method study techniques.</p> <p>CO2. Analyze work content and calculate standard time in a given situation.</p> <p>CO3. Apply Statistical Quality Control tools in a given situation.</p> <p>CO4. Apply Ergonomics for human comfort at work place</p> <p>CO5. Appreciate the emerging trends in industrial engineering</p>

Course Content				
Name of UNIT	Unit Content	Unit Learning Outcomes	Marks	Hrs
<b>UNIT – 1 (Introduction)</b>	1.1 Introduction of Industrial Engineering. 1.2 Definition 1.3 Objectives 1.4 Various techniques 1.5 Basic concept of Productivity 1.6 Basic concept of work study 1.7 Basic concept of SQC	1a. Importance of Industrial engineering, Productivity, work study and statistical quality control(SQC) 1b. Scope and applications of industrial engineering	05	05
<b>UNIT – 2 (Work Study)</b>	2.1 Work study-Definition, techniques and role of productivity. 2.2 Importance of human factors in application of work study techniques. 2.3 Basic procedure of method study.	2a. Concept of work study, method study and work measurement. 2b. Describe importance and procedure of work study, method study and work measurement. 2c. Prepare in the standard formats the outline	25	16

	<p>2.4 Methods of recording data for method study using standard symbols, process charts and diagrams.</p> <p>2.5 Preparation of operation (outline) process chart for given mechanical assembly.</p> <p>2.6 Process planning-Basic concept, meaning, importance, functions, procedure and forms used.</p> <p>2.7 Information required for process planning and information available from process planning.</p> <p>2.8 Prepare process plan for given mechanical components, take 2 to 3 components.</p> <p>2.9 Preparation of flow process chart and flow diagram for given mechanical components having at least 6 to 8 major operations.</p> <p>2.10 Given the process plan, operation process chart and flow diagram, develop questioning techniques in analyzing data for method study. Also develop and improve the method, based on analysis of given data.</p> <p>2.11 Basic principles of motion economy</p> <p>2.12 Plant layout: Definition and concept.</p> <p>2.13 Types of plant layout, their applications, advantages, disadvantages, limitations and comparisons.</p> <p>2.14 Role of material handling systems in industries.</p> <p>2.15 Material handling equipment- Classification, types, specifications, applications ,advantages, disadvantages, Limitations and selection criteria.</p>	<p>process chart, flow process chart, flow diagrams, man machine chart and process plan for given data.</p> <p>2d. Modify given process plan and flow diagram for improvements.</p> <p>2e. Explain principles of motion economy.</p> <p>2f. Analyze work content and calculate standard time in a given situation.</p> <p>2g. Explain various types of plant layouts with their merits, demerits and their application.</p> <p>2h. Describe importance and applications of material handling equipment.</p>		
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<p><b>UNIT – 3 (Quality Assurance)</b></p>	<p>3.1 Basic concept and importance of quality, quality control, inspection, quality assurance (QA), statistical quality control (SQC) and reliability.</p> <p>3.2 Explain in brief QA tools</p> <p>3.3 Basic concept of total quality cycle, quality of design, quality of performance, quality of conformity and total quality.</p> <p>3.4 Fundamentals of statistics- types of variations, frequency, class boundary and midpoint, frequency distribution, frequency histogram, frequency bar chart and polygon chart.</p> <p>3.5 Frequency distribution curve, central tendency or dispersion and range, mode, median and mean, standard deviation and variance with numeric examples.</p> <p>3.6 Concept of probability and normal distribution.</p> <p>3.7 Area under normal distribution and Problems on normal distribution.</p> <p>3.8 Introduction to binomial and Poisson distribution.</p>	<p>3a. Appreciate importance of quality.</p> <p>3b. Define quality, quality control (QC), quality assurance (QA), statistical quality control (SQC) and reliability</p> <p>3c. Differentiate between inspection and quality control.</p> <p>3d. Calculate mean, mode, median and standard deviation for simple data.</p> <p>3e. Prepare suitable frequency distribution chart for a given data.</p> <p>3f. Determine central tendency and dispersion in a given situation.</p> <p>3g. Calculate probabilities using normal distribution.</p> <p>3h. Define binomial and Poisson distribution.</p>	<p>10</p>	<p>06</p>
<p><b>UNIT – 4 (Statistical Quality Control)</b></p>	<p>4.1 Basic Concept of variability.</p> <p>4.2 Explain SQC tools and statistical fundamentals.</p> <p>4.3 Concept and differences between variables and attributes.</p> <p>4.4 Explain Control charts in details for variable quality- types, objectives, applications, calculations of control limits and range/mean, methods to plot and interpretations (X bar-R chart) and examples.</p> <p>4.5 Explain Control charts in details for attribute quality- types, objectives, applications, calculations of control limits and range/mean, methods to plot</p>	<p>4a. Explain various tools of SQC.</p> <p>4b. Compare variables and attributes</p> <p>4c. Calculate control limits, range / mean and prepare control charts.</p> <p>4d. Calculate number/ percentage of items falling in and outside specifications limits from mean and standard deviation using normal distribution curve.</p> <p>4e. State and explain various methods of acceptance of incoming materials</p> <p>4f. Prepare and operate single and double</p>	<p>10</p>	<p>10</p>

	<p>and interpretations (p, np, 100p and c chart) and examples.</p> <p>4.6 Explain Process capability – meaning, definition and method to calculate, numeric examples.</p> <p>4.7 Acceptance sampling: Quality control of incoming raw material and components, Concepts of random sampling, Sampling plans: definition, terminology, types (Single, double and multiple), implementing plans based on given input, OC curve-concept, need, types and importance, interpretation of given OC curve.</p>	<p>sampling plans on the basis of given lot size, AQL and inspection level.</p> <p>4g. Describe process capability, Explain consumers and producers risk, State the importance of OC curve and interpret OC curves in a given situation.</p>		
<p><b>UNIT – 5</b> <b>(Recent trends in Industrial Engineering)</b></p>	<p>5.1 Introduction of ISO and its role, ISO standard series and quality managements system.</p> <p>5.2 Explain Total Quality Control (TQC) and Total Quality Management (TQM) in details-philosophical concepts.</p> <p>5.3 Basic concept of six sigma and its applications.</p> <p>5.4 Basic concept and applications of Kaizen.</p> <p>5.5 Definition, objectives, advantages, disadvantages and applications of ergonomics.</p> <p>5.6 Concept of Normal and maximum work area.</p> <p>5.7 Necessity requirements of Environmental work place.</p>	<p>5a. Explain ISO, TQC, TQM, Six SIGMA and Kaizen techniques and its applications in Industries and businesses.</p> <p>5b. Define and explain ergonomics.</p> <p>5c. Explain types of workloads and show normal and maximum work area.</p> <p>5d. Explain environmental requirements of workplace area and working conditions.</p>	10	08
		Total	60	45

List of Practical			
No.	Unit	Name of Practical	
1	Chapter No.2	Construction of operation(outline) process chart (OPC)	
2	Chapter No.2	Construction of flow process chart (FPC) and flow diagram	
3	Chapter No.2	Construction of man and machine chart	
4	Chapter No.2	Performance rating	
5	Chapter No.2	Planning and undertaking stop watch time study	
6	Chapter No.3	Frequency distribution	
7	Chapter No.4	Control chart for variable quality (X bar-R chart)	
8	Chapter No.4	Control chart for attribute quality ( P-chart)	
9	Chapter No.4	Control chart for attribute quality (C-chart)	
10	Chapter No.4	Acceptance sampling	
List of Instruments / Equipment / Trainer Board			
1	Cumulative Decimal stop watch		
2	50 number of buttons in different six colours, Wooden disc and MS pin		
3	100 number of MS pin		
4	1000 number of Washers and sampling rack		
5	Random print out A4 size paper copies		
Link of Text Books			
No	Title of Books	Authors	Publication
1	Industrial engineering & Production Management	Martin Telsang	S.chand
2	Industrial engineering & Management	O.P.Khanna	Dhanpat Rai
List of Reference Books			
No	Title of Reference Books	Authors	Publication
1	Industrial Engineering (IE) and Management	Author C.Natha Muni Reddy	New age international Publishers.
2	Handbook of Industrial engineering and operations management	Gavriel Salvendy	Institute of Industrial Engineers
3	Comprehensive Industrial Engineering.	M. J Manek	Laxmi Publications (P) Ltd., New Delhi.
Link of Learning Web Resource			
1	<a href="http://en.wikipedia.org/wiki/Industrial_engineering">http://en.wikipedia.org/wiki/Industrial_engineering</a>		
2	<a href="http://www.iiie-india.com/IIIE/industrial-engineering.php">http://www.iiie-india.com/IIIE/industrial-engineering.php</a>		
3	http://www.youtube.com/watch?v=3WmfSfNjr4w Receiver Operating Characteristic Curves Work ...)		