Buddha Institute of Technology

Gorakhpur

Department of Mechanical Engineering

ALLOTTMENT BASED ON COMPETENCY SKILLS

Academic Session: July – Dec 2022

Name of the Staff	Mr. Puneet Kumar Bhatia
Area of Specialization	Maintenance Engineering
Subject Allotted	Industrial Engineering

Sl. #	Course Code	Course Title	Semester	Theory/Practical
1.	KME503	Industrial Engineering	V Sem Batch A	Theory

HOD

Course Outcome and Programme Outcome

Program	**:** B. Tech.
Branch	**:** ME
Semester	**:** V
Session	**:** 2022-23
Name of the Course	**:** Industrial Engineering
Code	**:** KME-503
Name of the Course Instructor	**:** Puneet Kumar Bhatia
Designation	**:** Assistant Professor
Department	**:** Mechanical Engineering

Description of the Course Outcome:

CO	After completion of the course students will be able to:
KME503	Understand the concept of production system, productivity, facility and process planning in various industries
KME503	Apply the various forecasting and project management techniques
KME503	Apply the concept of break-even analysis, inventory control and resource utilization using queuing theory.
KME503	Apply principles of work study and ergonomics for design of work systems
KME503	Formulate mathematical models for optimal solution of industrial problems using linear programming approach

Buddha Institute of Technology, Gorakhpur	
Department: Mechanical Engineering	
Academic Semester: July – Dec 2022	

Semester: V	Section: A	Course Code: KME503	Course: Industrial Engineering
Course Instructor: Mr. Puneet Kumar Bhatia		Contact Hours /week: 04	# of credits: 03
CIE Marks: 50		SEE Marks:100	Exam Hours: 03

Prerequisites if any:			
Code No	Course Name	Description	Semester

Content delivery:	Chalk & Board, DLP, System/Laptop with social media videos

ModuleNo	Contents of Module	Hrs	COs
	COURSE SYLLABUS:		
1	**Overview of Industrial Engineering**: Types of production systems, concept of productivity, productivity measurement in manufacturing and service organizations, operations strategies, liability and process design. **Facility location and layout**: Factors affecting facility location; principle of plant layout design, types of plant layout; computer aided layout design techniques; assembly line balancing; materials handling principles, types of material handling systems, methods of process planning, steps in process selection, production equipment and tooling selection, group technology, and flexible manufacturing.	14	CO1
2	**Production Planning and control**: Forecasting techniques – causal and time series models, moving average, exponential smoothing, trend and seasonality; aggregate production planning; master production scheduling; materials requirement planning (MRP) and MRP-II; routing, scheduling and priority dispatching, concept of JIT manufacturing system **Project Management**: Project network analysis, CPM, PERT and Project crashing	10	CO2
3	**Engineering economy and Inventory control**: Methods of depreciation; break-even analysis, techniques for evaluation of capital investments, financial statements, time-cost trade-off, resource levelling; Inventory functions, costs, classifications, deterministic inventory models, perpetual and periodic inventory control systems, ABC analysis, and VED analysis. Queuing Theory: Basis of Queuing theory, elements of queuing theory, Operating characteristics of a queuing system, Classification of Queuing models.	11	CO3
4	**Work System Design**: Taylor's scientific management, Gilbreths's contributions; work study: method study, micro-motion study, principles of motion economy; work measurement –time study, work sampling, standard data, Predetermined motion time system (PMTS); ergonomics; job evaluation, merit rating, incentive schemes, and wage administration. Product Design and Development: Principles of product design, tolerance design; quality and cost considerations; product life cycle; standardization, simplification, diversification, value engineering and analysis, and concurrent engineering	10	CO4
5	**Operational Analysis**: Formulation of LPP, Graphical solution of LPP, Simplex Method, Sensitivity Analysis, degeneracy and unbound solutions. transportation and assignment models; Optimality test: the stepping stone method and MODI method, simulation.	12	CO5

COURSE OUTCOMES: At the end of the Course, the Student will be able to:

KME503	Understand the concept of production system, productivity, facility and process planning in various industries
KME503	Under Apply the various forecasting and project management techniques
KME503	Apply the concept of break-even analysis, inventory control and resource utilization using queuing theory
KME503	Apply principles of work study and ergonomics for design of work systems
KME503	Formulate mathematical models for optimal solution of industrial problems using linear programming approach

Mapping of CO v/s PO:

	PO-1	PO-2	PO-3	PO-4	PO-5	PO-6	PO-7	PO-8	PO-9	PO-10	PO-11	PO-12
KME054.1	3	3	3	2	2	–	–	–	–	–	–	2
KME054.2	–	–	2	1	–	2	–	–	–	2	1	2
KME054.3	–	–	2	1	–	–	–	–	–	2	1	2
KME054.4	–	–	3	1	–	2	3	–	–	2	1	2
KME054.5	–	–	2	1	–	1	–	–	–	2	1	2

Correlation levels: 1-Slight (Low)   2-Moderate (Medium)   3-Substantial (High)

Mapping of CO v/s PSO:

	PSO1	PSO2
KME503.1	3	3
KME503.2	3	3
KME503.3	3	3
KME503.4	3	3
KME503.5	3	3

Gap in the syllabus	NA

Topics to be covered beyond syllabus	NA

Assessment Methodologies:

Sl. No.	Description	Type
1	Student Assignment	Direct
2	Internal assessment	Direct
3	University exam	Direct
4	Student feedback	Indirect
5	Alumni feedback	Indirect
6	Employers feedback	Indirect

LESSON PLAN

Lecture #	Module #	Topics	RBT Levels	Course Outcome Mapping	Planned Date	Actual Date	Faculty Sign	Remarks
1		Types of production systems, concept of productivity			22/8/22			
2		productivity measurement in manufacturing and service organizations			23/8/22			
3		operations strategies liability and process design.			24/8/22			
4		Factors affecting facility location; principle of plant layout design			25/8/22			
5		**Tutorial-1**			26/8/22			
6	1	types of plant layout; computer aided layout design techniques	L2, L3, L4	CO1	27/8/22			
7		assembly line balancing; materials handling principles			29/8/22			
8		types of material handling systems, methods of process planning			30/8/22			
9		steps in process selection, production equipment and tooling selection group technology			31/8/22			
10		**Tutorial-2**			1/9/22			
11		moving average exponential smoothing			2/9/22			

12		flexible manufacturing Forecasting techniques – causal and time series models			3/9/22			
13		trend and seasonality aggregate production planning			5/9/22			
14		master production scheduling			6/9/22			
15		**Tutorial-3**			7/9/22			
16		materials requirement planning (MRP) and MRP‑II			8/9/22			
17		routing, scheduling and priority dispatching			9/9/22			
18		concept of JIT manufacturing system			12/9/22			
19		Project network analysis Project network analysis			13/9/22			
20		**Tutorial-4**			14/9/22			
21		CPM PERT and Project crashing PERT and Project crashing			15/9/22			
22		Methods of depreciation; break‑even analysis			16/9/22			
23		techniques for evaluation of capital investments			22/9/22			
24	**2**	financial statements, time‑cost trade‑off	**L2**	**CO2**	23/9/22			
25		**Tutorial -5**			24/9/22			
26		classifications, deterministic inventory models			1/10/22			
27		perpetual and periodic inventory control systems			3/10/22			
28		Operating characteristics of a queuing system			6/10/22			
29		Classification of Queuing models.			10/10/22			

30		**Tutorial-6**			11/10/22			
31		Taylor's scientific management			12/10/22			
32		Gilbreths's contributions			13/10/22			
33		work study: method study micro‑motion study			14/10/22			
34		principles of motion economy; work measurement –time study			15/10/22			
35	**3**	**Tutorial-7**	**L2**	**CO3**	18/10/22			
36		Work sampling, standard data			27/10/22			
37		Predetermined motion time system (PMTS); ergonomics; job evaluation			28/10/22			
38		merit rating, incentive schemes, and wage administration			29/10/22			
39		Principles of product design, tolerance design; quality and cost considerations;			31/10/22			
40		**Tutorial-8**			1/11/22			
41		product life cycle; standardization, simplification, diversification			7/11/22			
42		value engineering and analysis, and concurrent engineering			8/11/22			
43		Formulation of LPP			11/11/22			
44	**4**	resource levelling; Inventory functions, costs	**L2**	**CO4**	12/11/22			
45		**Tutorial-9**			14/11/22			
46		Graphical solution of LPP			15/11/22			
47		Simplex Method			16/11/22			

48		Sensitivity Analysis			17/11/22		
49		degeneracy and unbound solutions			18/11/22		
50		**Tutorial-10**			19/11/22		
52		transportation and assignment models			22/11/22		
53		Optimality test: the stepping stone method and MODI method, simulation			23/11/22		
54		Optimality test: the stepping stone method and MODI method, simulation			24/11/22		
55		Optimality test: the stepping stone method and MODI method, simulation			25/11/22		
56		**Tutorial-11**			26/11/22		

*L1 – Remembering; L2 – Understanding; L3 – Applying; L4 – Analysing; L5 – Evaluating; L6 - Creating

Literature:

Text Books:

1. I Industrial Engineering and Production Management by Martand T Telsang S. Chand Publishing
2. Industrial Engineering and Production Management by M. MahajanDhanpatRai& Co. (P) Limited

Reference Books:

1. *Production and Operations Management by Adam, B.E. & Ebert, R.J., PHI*

Sample Questions:

Question No.	Questions
1	What are the chief functions of Industrial Engineering department? List them
2	What is purpose of designing organizational structure?.
3	What are the various dimensions of planning function?
4	What is the principle of Group Technology?
5	What advantage is obtained by Method study?
6	What is the purpose of work sampling?
7	What is intrinsic value of a product?
8	How does product layout differ from process layout?
9	Explain the qualities of an Industrial Engineer.
10	Discuss all the relevant factors in Taylor's Scientific Management.
11	Discuss the factors affecting plant location.
12	What are the methods of recording of data? Explain.
13	What is the contribution of Taylor in managing an enterprise? What are the further evolutions in the theory given by him?
14	Compare and contrast among product, process and combination layouts. Elucidate your answer with relevant example from industry.
15	What is the role of questioning technique in work analysis? What is the eventual outcome of this task?
16	Write short notes on man –machine chart
17	Give the symbol of motion study
18	Define value Engineering
19	Define term group technology
20	How ergonomics help to improve system technology

Assessment rubrics that is going to be adopted for direct attainment is depicted in below table

Level of Achievement	Elaboration on Course Grading Description	Bench Mark Set (Out of 50)
Excellent (A)	The Student's performance is outstanding in almost all the intended course learning outcomes	40 to 50
Good (B)	The student's performance is good in most of the intended course learning outcomes.	30 to 40
Marginal (C)	The student's performance is barely satisfactory. It marginally meets the intended course learning outcomes	20 to 30
Fail (F)	The Students performance is inadequate. Student fails to meet many of the intended course learning outcomes	Less than 20