GUJARAT TECHNOLOGICAL UNIVERSITY (GTU)

Competency-focused Outcome-based Green Curriculum-2021 (COGC-2021)
Semester-V

Course Title: Industrial Management
(Course Code: 4355102)

Diploma programme in which this course is offered	Semester in which offered
Computer Aided Costume Design and Dress Making	5th Semester

1. RATIONALE

This course will give the basic understanding of practices followed by industrial engineers in industry for optimum use of all kind of resources and also gives an understanding for the importance of the working condition and environment at the workplace. This course will introduce and make the students aware about various techniques which are used to develop an improved production method, different arrangements of working time followed in the industry.

2. COMPETENCY

The purpose of this course is to help the student to attain the following industry identified competency through various teaching learning experiences:

- **Manage an enterprise with ideal working condition.**

3. COURSE OUTCOMES (COs)

The practical exercises, the underpinning knowledge and the relevant soft skills associated with this competency are to be developed in the student to display the following COs:

a) Interpret productivity in an enterprise.
b) Practice ideal working condition and environment at workplace.
c) Employ work study in an enterprise.
d) Apply suitable method study for the selected work.
e) Use appropriate work measurement techniques.

4. TEACHING AND EXAMINATION SCHEME

Teaching Scheme (In Hours)			Total Credits (L+T+P/2)	Examination Scheme				
				Theory Marks		Practical Marks		Total Marks
L	T	P	C	CA	ESE	CA	ESE	
3	-	0	3	30*	70	-	-	100

(*): Out of 30 marks under the theory CA, 10 marks are for assessment of the micro-project to facilitate integration of COs and the remaining 20 marks is the average of 2 tests to be taken during the semester for assessing the attainment of the cognitive domain UOs required for the attainment of the COs.

***Legends: L**-Lecture; **T** – Tutorial/Teacher Guided Theory Practice; **P** -Practical; **C** – Credit, **CA** - Continuous Assessment; **ESE** -End Semester Examination.*

5. SUGGESTED PRACTICAL EXERCISES

The following practical outcomes (PrOs) are the sub-components of the COs. *Some of the **PrOs** marked **'*'** are compulsory, as they are crucial for that particular CO at the 'Precision Level' of Dave's Taxonomy related to 'Psychomotor Domain'*.

Sr. No.	Practical Outcomes (PrOs)	Unit No.	Approx. Hrs. required
	NA		

Note

i. *More **Practical Exercises** can be designed and offered by the respective course teacher to develop the industry relevant skills/outcomes to match the COs. The above table is only a suggestive list.*

ii. *The following are some **sample** 'Process' and 'Product' related skills (more may be added/deleted depending on the course) that occur in the above listed **Practical Exercises** of this course, which are embedded in the COs and ultimately the competency.*

Sr. No.	Sample Performance Indicators for the PrOs	Weightage in %
	NA	

6. MAJOR EQUIPMENT/ INSTRUMENTS REQUIRED

These major equipment with broad specifications for the PrOs is a guide to procure them by the administrators to usher in uniformity of practical in all institutions across the state.

Sr. No.	Equipment Name with Broad Specifications	PrO.No.
	NA	

7. AFFECTIVE DOMAIN OUTCOMES

The following ***sample*** Affective Domain Outcomes (ADOs) are embedded in many of the above-mentioned COs and PrOs. More could be added to fulfill the development of the competency.

a) Work as a leader/a team member.
b) Follow ethical practices.
c) Practice environmental friendly methods and processes. (Environment related)

The ADOs are best developed through the laboratory/field-based exercises. Moreover, the level of achievement of the ADOs according to Krathwohl's 'Affective Domain Taxonomy' should gradually increase as planned below:

i. 'Valuing Level' in 1st year
ii. 'Organization Level' in 2nd year.
iii. 'Characterization Level' in 3rd year.

8. UNDERPINNING THEORY

Only the major Underpinning Theory is formulated as higher level UOs of *Revised Bloom's taxonomy* for development of the COs and competency. If required, more such higher level UOs could be included by the course teacher to focus on attainment of COs and competency.

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different level)	Topics and Sub-topics
Unit – I Productivity	1a. Define productivity 1b. Explain productivity 1c. Organize various tasks of management	1.1. Definition and Meaning of Productivity 1.2. Productivity in an enterprise. 1.3. Task of management
Unit – II Working condition and Working Environment	2a. Create proper working condition 2b. Explain the ideal environment of the workplace 2c. Explain the importance of Working premises, good housekeeping, Lighting, personal protective equipment and Ergonomics 2d. Apply Occupational safety criteria in an organization 2e. Modify working environment to prevent industrial accident, noise and vibration	2.1 Working conditions of the organization and Environment of the work place 2.1.1 Occupational safety and health organization 2.1.2 Safety criteria 2.1.3 Prevention of industrial accidents 2.1.4 Working premises 2.1.5 Good Housekeeping 2.1.6 Lighting 2.1.7 Noise and vibration 2.1.8 Climatic conditions 2.1.9 Personal protective equipment 2.1.10 Ergonomics 2.1.11 Working time 2.1.12 Work-related welfare facilities
Unit– III Work Study	3a. Explain Work study and its importance 3b. Select various techniques of Work Study 3c. Identify various procedure for work study 3d. Justify role of human element in an enterprise	3.1. Meaning and importance of Work Study. 3.2. Techniques of Work Study and their relationship. 3.3. Basic Procedure for Work study. 3.3.1 Select 3.3.2 Record 3.3.3 Examine 3.3.4 Develop 3.3.5 Evaluate 3.3.6 Define 3.3.7 Install 3.3.8 Maintain 3.4. Role of human element in the enterprise.
Unit– IV Method Study	4a. Explain method study 4b. Identify the factors to be considered for selection of work for method study 4c. Distinguish various process chart symbols	4.1. Definition and Meaning of Method study. 4.2. Factors considered while selecting the work for method study. 4.2.1 Economic consideration 4.2.2 Technical consideration

Unit	Unit Outcomes (UOs) (4 to 6 UOs at different level)	Topics and Sub-topics
	4d. Describe principles of motion economy	4.2.3 Human consideration 4.3. Process chart symbols 4.4. Principle of motion economy 4.4.1 Use of the human body 4.4.2 Arrangement of the workplace 4.4.3 Design of tools and equipment 4.5. Workplace layout 4.6. Methods of Method study 4.6.1 The string diagrams 4.6.2 Flow Process chart 4.6.2.1. Worker type 4.6.2.2. Material type 4.6.2.3. Equipment type 4.6.3 The Multiple activity charts 4.6.4 Man, and Machine chart 4.6.5 Two handed charts
Unit– V Work Measurement	5a. Explain work measurement and its importance 5b. Discuss various terminologies used for work measurement 5c. Select techniques of work measurement 5d. Choose appropriate time study equipment	5.1. Definition of Work Measurement 5.2. Importance of Work Measurement 5.3. Terminologies used for Work Measurement 5.3.1 Basic time 5.3.2 Standard time 5.3.3 Rating 5.3.4 Allowances 5.3.5 SAM and SMV 5.3.6 Elementary Breakdown 5.3.7 Qualified worker 5.3.8 Average worker 5.4. Techniques of Work Measurement 5.4.1 Work Sampling 5.4.2 Structured Estimating 5.4.3 Time Study 5.4.3.1 Concept of Time study 5.4.3.2 Time study equipment 5.4.3.3 Time study forms 5.4.4 Predetermined time standards 5.4.4.1 Definition and Meaning of PTS 5.4.4.2 Advantages of PTS

***Note**: The UOs need to be formulated at different level of Revised Bloom's Taxonomy' to accelerate the attainment of the COs and the competency.*

9. SUGGESTED SPECIFICATION TABLE FOR QUESTION PAPER DESIGN

Unit No.	Unit Title	Teaching Hours	Distribution of Theory Marks			
			R Level	U Level	A	Total Marks
I	Productivity	04	3	4	0	07
II	Working condition and Working Environment	08	3	3	8	14
III	Work Study	08	3	4	3	10
IV	Method Study	12	4	8	10	22
V	Work Measurement	10	3	6	8	17
Total		**42**	**16**	**25**	**29**	**70**

Legends: *R=Remember, U=Understand, A=Apply and above (Revised Bloom's taxonomy)*

Note*: This specification table provides general guidelines to assist student for their learning and to teachers to teach and question paper designers/setters to formulate test items/questions to assess the attainment of the UOs. The actual distribution of marks at different taxonomy levels (of R, U and A) in the question paper may vary slightly from above table.*

10. SUGGESTED STUDENT ACTIVITIES

Other than the classroom and laboratory learning, following are the suggested student-related ***co-curricular*** activities which can be undertaken to accelerate the attainment of the various outcomes in this course. Students should conduct following activities in group and prepare reports of about 5 pages for each activity. They also collect/record physical evidences for their (student's) portfolio which may be useful for their placement interviews:

a) Assign internet-based assignments.
b) Give seminar on any relevant topic.
c) Assign teacher guided self learning activities.

11. SUGGESTED SPECIAL INSTRUCTIONAL STRATEGIES (if any)

These are sample strategies, which the teacher can use to accelerate the attainment of the various outcomes in this course:

a) Massive open online courses (***MOOCs***) may be used to teach various topics/sub topics.
b) Guide student(s) in undertaking micro-projects.
c) ***'L' in section No. 4***means different types of teaching methods that are to be employed by teachers to develop the outcomes.
d) About ***20% of the topics/sub-topics*** which are relatively simpler or descriptive in nature is to be given to the students for ***self-learning***, but to be assessed using different assessment methods.
e) With respect to ***section No.11***, teachers need to ensure to create opportunities and provisions for ***co-curricular activities***.
f) Guide students on how to address issues on environment and sustainability
g) Make students understand the relevant topic using animation, video and presentations.

12. SUGGESTED MICRO-PROJECTS

Only one micro-project is planned to be undertaken by a student that needs to be assigned to him/her in the beginning of the semester. In the first four semesters, the micro-project is group-based. However, in the fifth and sixth semesters, it should preferably be ***individually*** undertaken to build up the skill and confidence in every student to become problem solver so that s/he contributes to the projects of the industry. In special situations where groups have to be formed for micro-projects, the number of students in the group should ***not exceed three.***

The micro-project could be industry application based, internet-based, workshop-based, laboratory-based or field-based. Each micro-project should encompass two or more COs which are in fact, an integration of PrOs, UOs and ADOs. Each student will have to maintain dated work diary consisting of individual contribution in the project work and give a seminar presentation of it before submission. The total duration of the micro-project should not be less than ***16 (sixteen) student engagement hours*** during the course. The student ought to submit micro-project by the end of the semester to develop the industry-oriented COs.

A suggestive list of micro-projects is given here. This has to match the competency and the COs. Similar micro-projects could be added by the concerned course teacher:

a) **Productivity:** Draw the flow chart related to Role of management in coordinating the resources of an enterprise.
b) **Method study:** Prepare a string diagram showing movement of any student in the department.
c) **Process symbols:** Prepare a chart showing various process symbols used for method study.
d) **Working condition & Environment**: Prepare a project report of garment unit with ideal working conditions and working environment.
e) **Work measurement**: Prepare an assignment on methods / terminologies of work measurement.

13. SUGGESTED LEARNING RESOURCES

Sr. No.	Title of Book	Author	Publication with place, year and ISBN
1	Productivity enhancement in manufacturing operations	K. C. Alexander and Dr. A. K. Raj	Notion India Pvt. Ltd. (2017) ISBN-13: 9781947429413
2	Introduction to Work study	George Kanawaty	International labour organization (1992) ISBN:9221071081
3	Essential of work study (method study and work measurement)	Shyam Bhatawdekar and Dr. Kalpana Bhatawdekar	Publishing Division of Prodcons Group (2012) ASIN: B008RYYWJQ
4	Industrial Safety Management	Pravin M. Pathak, Jayant P. Khairnar	Notion India Pvt. Ltd. (2022) ISBN-13: 9798886676044
5	Production Planning and Control	Ramachandran S., Devraj R., Rasidhar L.	Airwalk pubications; 1st edition (3 January 2017) ASIN : B01N7OQRLB

14. SOFTWARE/LEARNING WEBSITES

a) https://educationleaves.com/what-is-work-study/
b) https://www.managementstudyguide.com/work-study-and-industrial-engineering.htm
c) https://businessjargons.com/work-measurement.html
d) https://businessjargons.com/work-measurement.html

15. PO-COMPETENCY-CO MAPPING

Semester I	Industrial Management (Course Code: 4355102)						
	POs and PSOs						
Competency & Course Outcomes	PO 1 Basic & Discipline specific knowledge	PO 2 Problem Analysis	PO 3 Design/ development of solutions	PO 4 Engineering Tools, Experimentation &Testing	PO 5 Engineering practices for society, sustainability & environment	PO 6 Project Management	PO 7 Life-long learning
Competency	**Manage an enterprise with ideal working condition.**						
CO a) Interpret productivity in an enterprise	3	2	2	2	2	2	3
CO b) Practice ideal working condition and environment at workplace.	3	2	2	2	2	2	3
CO c) Employ work study in an enterprise	3	3	2	2	2	2	3
CO d) Apply suitable method study for the selected work.	3	3	2	2	2	2	3
CO e) Use appropriate work measurement techniques	3	2	2	2	2	2	3

Legend: '**3'** for high, '**2**' for medium, **'1'** for low or **'-'** for no correlation of each CO with PO

16. COURSE CURRICULUM DEVELOPMENT COMMITTEE

GTU Resource Persons

Sr. No.	Name and Designation	Institute	Contact No.	Email
1	Dr. F. V. Kugashiya HOD in CACD&DM	GGP, Ahmedabad	9825697874	farjanakugashiya@gmail.com
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