V SEMESTER

Industrial Engineering and Management		Semester	V
Course Code	**BIP501**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- Understand the basic concepts of management, planning, organizing and staffing.
- Acquire the knowledge to become entrepreneur.
- Comprehend the requirements towards the small-scale industries and project preparation.

Teaching-Learning Process (General Instructions)
These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

Module-1

MANAGEMENT: Introduction - Meaning - nature and characteristics of Management, Scope and Functional areas of management - Management as a science, art of profession - Management & Administration - Roles of Management, Levels of Management, and Development of Management Thought -early management approaches - Modem management approaches.

PLANNING: Nature, importance and purpose of planning process Objectives - Types of plans (Meaning Only) - Decision making Importance of planning - steps in planning & planning premises - Hierarchy of plans

Module-2

ORGANIZING AND STAFFING: Nature and purpose of organization Principles of organization - Types of organization - Departmentation Committees Centralization Vs Decentralization of authority and responsibility Nature and importance of staffing Process of Selection & Recruitment.

DIRECTING & CONTROLLING: Meaning and nature of directing Leadership styles, Motivation Theories, Communication - Meaning and importance - coordination, meaning and importance and Techniques of Co Ordination. Meaning and steps in controlling.

Module-3

ENTREPRENEUR: Meaning of Entrepreneur; Evolution of .the Concept; Functions of an Entrepreneur, Types of Entrepreneur, Entrepreneur - an emerging. Class. Concept of Entrepreneurship - Evolution of Entrepreneurship, Development of Entrepreneurship; Stages in entrepreneurial process; Role of entrepreneurs in Economic Development t; Entrepreneurship in India; Entrepreneurship – its Barriers.

Module-4

SMALL SCALE INDUSTRIES: Definition; Characteristics; Need and rationale; Objectives; Scope; role of SSI in Economic Development. Advantages of SSI Steps to start and SSI - Government policy towards SSI; Different Policies of SSI; Government Support for SSI during 5 year plans. Impact of Liberalization, Privatization, Globalization on SSI Effect of WTO/GA TT Supporting Agencies of Government for SSI, Meaning, Nature of support; Objectives; Functions; Types of Help; Ancillary Industry and Tiny Industry.

Module-5

INSTITUTIONAL SUPPORT: Different Schemes; TECKSOK; KIADB; KSSIDC; KSIMC; DIC Single Window Agency; SISI; NSIC; SIDBI; KSFC.

PREPARATION OF PROJECT: Meaning of Project; Project Identification; Project Selection; Project Report; Need and Significance of Report; Contents; Formulation; Guidelines by Planning Commission for Project report; Network Analysis; Errors of Project Report; Project Appraisal. Identification of business opportunities: Market Feasibility Study; Technical Feasibility Study; Financial Feasibility Study & Social Feasibility Study.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Explain about the management and planning.
2. Apply the knowledge on planning, organizing, staffing, directing and controlling.
3. Describe the requirements towards the small-scale industries and project preparation.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Principles of Management, P. C.Tripathi,P.N. Reddy, Tata McGraw Hill,
2. Dynamics of Entrepreneurial Development & Management, Vasant Desai, Publishing House.
3. Entrepreneurship Development, Poornima. M.Charantimath, Small Business Enterprises –Pearson, 2006 (2& 4).
4. Management Fundamentals-Concepts, Application , Skill , RobersLusier –Thomson
5. Entrepreneurship Development, S.S.Khanka, S.Chand& Co
6. Management, StephenRobbins, Pearson Education/PHI, 17th Edition, 2003

Web links and Video Lectures (e-Resources):

- www.nptel.ac.in
- https://www.smartzworld.com/notes/management-and-enterpreneurship-notes-me-vtu/
- https://www.maggubhai.com/management-process-organising-and-staffing/
- https://tutorstips.com/difference-between-directing-and-controlling/
- https://cleartax.in/s/small-scale-industries-ssi#:~:text=Small%20Scale%20Industries%20(SSI)%20are,50%20crore.

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Computer Integrated Manufacturing and Automation		Semester	**V**
Course Code	**BIP502**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	**Theory**		

Course objectives:

- To learn the basic concepts of Computer Integrated Manufacturing and the benefits that can be achieved by integrating technology with manufacturing systems.
- To have a fundamental knowledge of CNC Machine Tools.
- To imbibe the basic knowledge of Robotics and their application to production
- To develop the fundamental skill sets in CNC Programming
- To inculcate the fundamental knowledge CIM, Group Technology and Flexible Manufacturing

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Encourage collaborative Learning (Group Learning) in the class.
3. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
4. Individual teachers can device innovative pedagogy to improve teaching-learning.

MODULE-1

Introduction: Role of computers in design and manufacturing, influence of computers in manufacturing environment, product cycle in conventional and computerized manufacturing environment, introduction to CAD/CAM/CIM.

Production Concepts and Mathematical Models: Manufacturing lead time, Operation time, Capacity, Availability, Work-in-process, Problems.

MODULE-2

CNC Machine Tools: Turning tool geometry, milling tooling systems, tool presetting, ATC, work holding, CNC machine tools, overview of different CNC machining centers, CNC turning centers.

MODULE-3

AI & Robotics:

AI based Robot Architecture & Applications in Automated Manufacturing, Robot Vision & Motion, AI Search Algorithms For Robot Planning and Manipulation, Multi agent and swarm robotics, Robot to Robot and Robot to human coordination (Cobots - collaborative robotics) Reliable & Trusted AI in Robotics.

MODULE-4

Automated material Handling Storage: Material functions, types of material handling equipment, analysis of material handling systems, design of system, conveyor system, automated guided vehicle systems, automated storage/retrieval systems, caroused storage systems work in process storage, interfacing handling & storage with manufacturing.
MODULE-5
CNC Programming: Steps involved in development of a part program, manual part programming-milling and turning, ISO programming in drilling, milling and turning with numerical problems.

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	Study of functions assigned to Alphabets and Symbols. G and M codes, grouping of codes, Assigned and Unassigned, Model and Non Model codes.
2	Writing the program for Step Turning
3	Writing the program for Taper Turning
4	Writing the program for Threading
5	Writing the program for Milling
6	Writing the program for key ways
7	Writing the program for Drilling
8	Writing the program for counter boring
	Demonstration Only
9	Exercises on Robots
	General Configuration of
	a. Robot.
	b. Different Programming methods

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

- Outline the use of computers and NC technology in CIM systems.
- Understand the concepts of CNC machine tool technology.
- Comprehend the applications of robots in CIM.
- Develop CNC programs for turning and milling operations.
- Plan and control the CIM systems effectively. Apply the GT and FMS in actual manufacturing practice

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the

syllabus and the second test after covering 85-90% of the syllabus.

- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scoredby the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Books

- CAD/CAM Principles and Applications, P.N. Rao, TMH, New Delhi, 2002.
- CAD/CAM Mikell P-groover, Emory W.Zimrners, Jr Pearson Education inc 2003
- CAD/CAM/CIM P.Radhakrishnan, S.Subramanyan New Age InternationalPublication, Revised ThirdEdition 2007.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v= OaBMsUgqgQ
- https://workshopinsider.com/an-overview-of-cnc-machining/
- https://aibusiness.com/author.asp?section_id=789&doc_id=773741
- https://www.designedconveyor.com/2019/11/04/the-4-types-of-material-handling-equipment/
- https://www.youtube.com/watch?v=YoslM2Sxihs

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

• At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Design of Machine Elements		Semester	V
Course Code	**BIP503**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	50 hours	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	**Theory**		

Course objectives:

- Enable students to attain the basic knowledge required to understand, analyze, design and select machine elements required in transmission systems.
- Reinforce the philosophy that real engineering design problems are open-ended and challenging
- Impart design skills to the students to apply these skills for the problems in real life industrial applications
- Inculcate an attitude of team work, critical thinking, communication, planning and scheduling through design projects

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Encourage collaborative Learning (Group Learning) in the class.
3. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
4. Individual teachers can device innovative pedagogy to improve teaching-learning.

MODULE-1

DESIGN FOR STATIC STRENGTH: Design considerations; Codes and Standards, static loads and factor of safety. Theories of failure: Maximum Normal Stress Theory, Maximum Shear Stress Theory, Distortion energy theory. Failure of Brittle and Ductile materials. Stress concentration. Determination of stress concentration factor.

MODULE-2

DESIGN FOR FATIGUE STRENGTH: S – N Diagram, fatigue. Endurance limit. Modifying factors: Load, Size and Surface finish effects. Fatigue stress concentration factor. Fluctuating stresses. Goodman and Soderberg Relationship. Stresses due combined loading.

MODULE-3

DESIGN OF SHAFTS: Design of shafts subjected to torsion, bending moment and combined torsion moment and axial loading. ASME and BIS Codes for design of transmission shafting. Design for strength and rigidity. Shafts under fluctuating loads and combined loads.

MODULE-4

DESIGN OF GEARS: Introduction to Spur, Helical and Bevel Gears. Design of Spur gear, Lewis equation, form factor, stresses in gear tooth, Dynamic load and wear load.

MODULE-5

RIVETED JOINTS AND WELDED JOINTS: Types of riveted joints, failures of riveted joints, Boiler joint, Efficiency. Types of welded joints, Strength of butt and fillet welds, eccentrically loaded welds.

DESIGN OF SPRINGS: Types of springs, Stresses in Coil springs of circular and non-circular cross-sections. Tension and compression springs. Stresses in Leaf springs.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

1. Able to understand various forces acting on a body
2. Will be able to design shafts, gears, springs
3. Will be able to design various kind of joints
4 .Will be able to put together all the above and design a complex machine

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.

4. Marks scoredby the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

- Mechanical Engineering Design, Joseph Edward Shigley, Tata McGraw Hill New Delhi – 1986
- Machine Design VL. Maleev and Hartman CBS Publishers and Distributors Delhi – 1983
- Design of Machine Elements V. B. Bahandari Tata McGraw Hill, New Delhi 2000
- Machine Design Robert. L. Norton Pearson Education Asia, New Delhi – 2001
- Theory and Problems of Machine Design Hall, Holowinko, Laughlin Schaums Outline Series 2002
- Elements of Machine Design N. C. Pandey and C. S. Shah Chorotar Publishing house 2002

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=-bg9qerlMgs
- https://www.youtube.com/watch?v=nnqpBMufX4I
- https://www.youtube.com/watch?v=TOAanx0QPKs
- https://www.youtube.com/watch?v=8bml2pK6Ra0

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Energy Engineering Lab		Semester	**V**
Course Code	**BIPL504**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	03
Examination type (SEE)	**Practical**		

Course objectives:

- To Study the fundamentals of Hydraulic Power Pumps, Actuators and Motors.
- To develop a sound knowledge of control components in Hydraulic Systems.
- To have basic skills to design Hydraulic Circuits and analyze them.
- To acquire the fundamental knowledge on pneumatic control

Sl.NO	**Experiments**
1	a) Study of components of Hydraulic circuit. b) Study of symbols for components in hydraulic circuits
2	To study the performance of Ruston oil engine and to draw it's characteristics curves.
3	To study the performance of vertical oil engine and to draw its characteristics curves.
4	Determination of viscosity of lubricating oil using Say bolt – Viscometers and torsional viscometer
5	Study of flow through pipes for fluid transport a) minor loses b) major loses
6	Valve timing diagram for 4 stroke vertical oil engine and 4 stroke horizontal oil engine.
7	To measure the volumetric flow rate of the fluid by using a)Orifice meter b) venturimeter

8	To measure the area of plane figure by tracing its boundary line by using planimeter.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Understand the properties of a fluid.
- Will be able to handle and design complex hydraulic circuits
- Understand the various parameters affecting a engine

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are**50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.

- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

- https://learnmech.com/components-fuctions-hydraulic-syste/
- https://blogmech.com/valve-timing-diagram/
- https://www.machinerylubrication.com/Read/411/oil-viscosity
- https://www.hkdivedi.com/2015/12/major-and-minor-losses-in-pipes.html

Professional Elective Course

Engineering Economy		Semester	V
Course Code	**BIP515A**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To acquire a clear understanding of the fundamentals of engineering economics.
- To learn the concepts of decision making, problem solving, and comparison of the alternatives and elements of cost.
- To inculcate an understanding of concept of money and its importance in the evaluation of projects.
- To illustrate concept of money and its importance in evaluating the projects.
- To evaluate the alternatives based on the present annual worth and equivalent annual worth methods

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Videos/animation films to explain the content, wherever possible.
3. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
4. Show the different ways to solve the same problem and encourage the students to adopt creative ways to solve them.
5. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1
Introduction: engineering decision – makers, engineering and economics, problem solving, intuition and analysis, tactics and strategy with an example. **Interest and Interest Factors**: Interest rate, simple interest compound interest, interest formulae, time value equivalence exercises, problems and discussion
Module-2
Present Worth Comparison: Conditions for present worth comparisons, rule 72, and basic present worth comparisons, present worth equivalence, net present worth, assets with equal and unequal lives, comparison of assets assume to have infinite lives, exercises and problems. **Equivalent Annual Worth Comparisons:** Situations for equivalent annual worth comparison, net annual worth of a single project, comparison of net annual worth's, definitions of asset life, comparison of assets with equal and unequal lives, exercises and problems.
Module-3
Depreciation: Introduction, Reasons for Depreciation, Various methods of depreciation, Numerical Problems on all the methods of Depreciation.
Module-4
Replacement Analysis: Introduction, Reasons for Replacements - Deterioration, obsolescence, inadequacy, replacement criteria problems, Replacements of assets considering and ignoring time value of money. Group Replacements. Numerical Problems on the above types of Replacement Problems.
Module-5
Estimating and Costing: components of costs such as direct material cost, direct labour cost, Fixed, over – heads, factory costs, administrative – over heads, first cost, selling price, calculation of the total cost of various components, mensuration, estimation of simple components.
Course outcome (Course Skill Set) At the end of the course, the student will be able to : • Recall the basic concepts of decision making, problem solving, tactics and strategy. • Defining the time value of money concept, interest formulae. • Explain the comparison by present worth method for different lives of the asset. Compare the asset on the basis of EAW comparison. • Explain the concepts of depreciation and replacement criteria. • Calculate the total cost of a component and explain the process for estimating simple components.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

- Engineering economy Riggs J.L. McGraw Hill 2002
- Engineering economy Paul Degarmo Macmillan Pub, Co. 2001
- Engineering Economy NVR. Naidu, KM Babu and New Age International Pvt. Ltd 2006
- Industrial Engineering and Management O.P Khanna DhanpatRai and Sons 2000
- Engineering Economy Theusen G. PHI 2000

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=9yj6CtMUsYU
- https://www.investopedia.com/terms/c/compoundinterest.asp
- https://www.youtube.com/watch?v=ZSoLPCHsknA
- https://www.youtube.com/watch?v=r0aDjTLxy5c
- https://www.youtube.com/watch?v=r0aDjTLxy5c

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Kinematics of Machines		Semester	V
Course Code	**BIP515B**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To understand the concept of machines, mechanisms and related terminologies.
- To expose the students to various mechanisms and motion transmission elements.
- To analyze a mechanism for displacement, velocity and acceleration at any point in a moving link.
- To understand the theory of cams, gears and gear trains.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
2. Chalk and Talk method for Problem Solving.
3. Arrange visits to show the live working models other than laboratory topics.
4. Adopt collaborative (Group Learning) Learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students Analytical skills and develops thinking skills such as evaluating, generalizing, and analyzing information.
6. Conduct Laboratory Demonstrations and Practical Experiments to enhance experiential skills.

Module-1

Introduction: Definitions; Link or element, kinematic pairs, Degrees of freedom, Grubler's criterion (without derivation), Kinematic chain, Mechanism, Structure, Mobility of Mechanism, Inversion, Machine. Kinematic Chains and Inversions: Inversions of Four bar chain; Single slider crank chain and Double slider crank chain and
their inversions

Module-2

Mechanisms: Quick return motion mechanisms-Drag link mechanism, Whitworth mechanism and Crank and slotted lever Mechanism. Straight line motion mechanisms Peaucellier's mechanism and Robert's mechanism. Intermittent Motion mechanisms -Geneva wheel mechanism and Ratchet and Pawl mechanism.

Module-3

Velocity and acceleration analysis of mechanisms: Velocity and acceleration analysis of Four Bar mechanism, slider crank mechanism and Simple Mechanisms by vector polygons: Relative velocity and acceleration of particles in a common link, relative velocity and accelerations of coincident Particles on separate links- Coriolis component of acceleration. Angular velocity and angular acceleration of links.

Module-4

Gears : Gear terminology, Law of gearing, Characteristics of involute action, Path of contact, Arc of contact, Contact ratio of Spur, Helical, Bevel and Worm gears, Interference in involute gears. Methods of avoiding interference, Back lash. Comparison of involute and cycloidal teeth.

Gear trains: Types of Gear trains, velocity ratio, Train value, Algebraic and tabular methods of finding velocity ratio of epicyclic gear trains. Tooth load and torque calculations in epicyclic gear trains.

Module-5

Cams: Types of cams, Types of followers. Displacement, Velocity and, Acceleration time curves for cam profiles. Disc cam with reciprocating follower having knife-edge, roller and flat-face follower, Disc cam with oscillating roller follower. Follower motions including SHM, Uniform velocity, uniform acceleration and retardation and Cycloidal motion.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

- Knowledge of mechanisms and their motion.
- Understand the inversions of four bar mechanisms.
- Analyse the velocity, acceleration of links and joints of mechanisms.
- Analysis of cam follower motion for the motion specifications.
- Analyse the gear trains speed ratio and torque.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Theory of Machines by Rattan S. S. Tata McGraw-Hill Publishing Company Ltd., New Delhi 3rd edition 2009
2. Theory of Machines by Sadhu Singh Pearson Education (Singapore) Pvt. Ltd, Indian Branch New 2006
3. Theory of Machines & Mechanisms J. J. Uicker, , G.R. Pennock, J.E. Shigley, OXFORD 3rd Ed., 2009
4. Mechanism and Machine theory Ambakar, PHI

Web links and Video Lectures (e-Resources):

- https://www.slideshare.net/taruian/module-1-introduction-to-kinematics-of-machinery
- https://www.youtube.com/watch?v=U_IhtlI9mlo
- https://www.youtube.com/watch?v=U5ahwRUuAtA
- https://www.youtube.com/watch?v=Co4YlavCpeQ
- https://www.slideshare.net/Mohd_Limdi/kinematics-of-machines-gear-and-gear-trains
- https://www.youtube.com/watch?v=IlCeurr9wKI

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students, instruct the students to prepare Exercise problems
3. Organizing Group wise discussions and Mechanism based activities
4. Quizzes and Discussions
5. Seminars and assignments

Automation in Manufacturing		Semester	**V**
Course Code	**BIP515C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To understand the concepts of automation in manufacturing systems
- To impart the knowledge of a line balancing and assembly systems
- To explore the idea of robotics and understand the computerized manufacturing planning
- To gain the knowledge of automated inspection and shop floor control
- To understand the concepts of additive manufacturing and latest trends in manufacturing

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Industrial and Production Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
4. Encourage collaborative (Group Learning) Learning in the class.
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.

Module-1

Introduction: Production system facilities, Manufacturing support systems, Automation in production systems, Automation principles &strategies Manufacturing Operations: Manufacturing operations, Product/production relationship, Production concepts and Mathematical models & costs of manufacturing operations. Problems on
mathematical models

Module-2

Line Balancing: Methods of line balancing, Numerical problems on largest candidate rule, Kilbridge's and Wester's method, and ranked positional weights method, computerized line balancing methods. Automated Assembly System: Design for automated assembly, types of automated assembly system, Parts feeding devices, Analysis of single and multi station assembly machines.

Module-3
Computerized Manufacture Planning and AGVS: Computer aided process planning (CAPP), Retrieval and Generative systems, and benefits of CAPP. Material requirement planning, Inputs to MRP system, working of MRP, Outputs and benefits. Automated Guided Vehicles System: Applications, Guidance and routing, Industrial Robotics: Definition, Robot anatomy, Joints and links, Robot configurations, Robot control systems, Accuracy and repeatability, End effectors, Sensors in robotics. Industrial robot applications: Material handling, Processing, assembly and inspection.
Module-4
Inspection Technologies: Automated inspection, coordinate measuring machines construction, Operation &programming, Software, application &benefits, Flexible inspection system, Inspection probes on machine tools, Machine vision, Optical inspection techniques & Non-contact Non-optical inspection technologies. Shop Floor Control and Automatic Identification Techniques: Shop floor control, Factory data collection system, Automatic identification methods, Bar code technology, Automatic data collection systems. An Introduction to QR Code Technolog.
Module-5
Additive Manufacturing Systems: Basic principles of additive manufacturing, Slicing CAD models for AM, Advantages and limitations of AM technologies, Recent trends in manufacturing, Hybrid manufacturing. Future of Automated Factory: Trends in manufacturing, the future automated factory, Human workers in future automated factory, Social impact.
Course outcome (Course Skill Set) At the end of the course, the student will be able to : 1. Explain the basics of productions, automation system and manufacturing operations. Solve the simple problems on mathematical model. 2. Analyze and solve problems on line balancing 3. Explain CAPP and MRP system and analyze the AGVS 4. Understand the inspection technologies and shop floor control 5. Explain the modern trends in additive manufacturing and automated factory

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Automation, Production Systems and Computer-Integrated Manufacturing MikellPGroover PHI Learning 3rd Edition, 2009
2. CAD / CAM Principles and Applications P N Rao, Tata McGrawHill. 3rd Edition, 2015
3. Additive Manufacturing Technologies: Rapid Prototyping to Direct Digital Manufacturing, Ian Gibson, David W. Rosen, BrentStucker2nd Ed. (2015)
4. Understanding Additive Manufacturing Andreas GebhardtHanser Publishers 2011
5. Systems Approach to ComputerIntegrated Design and Manufacturing Dr.Nanua Singh, Wiley 1996
6. CAD/CAM/CIM P. Radhakrishnan, S. Subramanyan, U.RajuNew Age International Revised Third Edition 2007

Web links and Video Lectures (e-Resources):

- https://www.slideshare.net/kiran555555/automation-in-manufacturing-five-unit-notes
- https://tulip.co/glossary/what-is-line-balancing-how-to-achieve
- https://www.isa.org/intech-home/2018/july-august/features/automated-guided-vehicles-improve-production
- https://new.siemens.com/global/en/products/automation.html?gclid=EAIaIQobChMIufvd3KL89gIVljMrCh1BHwevEAMYAiAAEgINJ_D_BwE
- https://www.automate.org/userAssets/riaUploads/file/Additive_Manufacturing_and_Automation.pdf
- https://www.youtube.com/watch?v=v-3TmN4HhLc&list=PLwdnzlV3ogoW31clPN6Dn6c8Ia-n36vXk

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students
3. Instruct the students individual to prepare module wise ppt
4. Organizing Group wise discussions and Automation based activities
5. Quizzes and Discussions

Marketing Management		Semester	**V**
Course Code	**BIP515D**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To analyze markets and identify appropriate segmentation criteria to discover promising market niches.
- To develop an effective marketing strategy, including a marketing mix, for a product/service.
- To list and explain the critical components of a marketing plan.
- To demonstrate an awareness of the opportunities and challenges of marketing in a global environment.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Videos/animation films to explain the content, wherever possible.
3. Encourage collaborative Learning (Group Learning) in the class.
4. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Discuss how every concept can be applied to the real world thus helping to improve the student's understanding.
6. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1

INTRODUCTION: Historical development of marketing management, Definition of Marketing, Coremarketing concepts, Marketing Management philosophies, Micro and Macro Environment, importance ofmarketing in the India Socio – economic system.

CONSUMER MARKETS AND BUYING BEHAVIOR: Characteristics affecting consumer behaviour, Types of buying decisions, Buying decision process, Classification of consumer products, Marketsegmentation.

Module-2

MARKETING INFORMATION SYSTEMS AND RESEARCH: Components of marketing informationsystem– benefits & uses marketing research system, marketing research procedure, measurement of market demand.

MARKETING OF INDUSTRIAL GOODS: Nature and importance of the Industrial market, classification of industrial products, participants in the industrial buying process, major factors influencing industrial buying behaviour, haracteristics of industrial market demand. Determinants of industrial market demand Buying.

Module-3

PRODUCT PLANNING AND DEVELOPMENT: The concept of a product, features of a product,classification of products, product policies – product planning and development, product line, product mix –factors influencing change in product mix, product mix strategies, meaning of New – product; major stages innew – product development, product life cycle.

BRANDING: Branding, Reasons for branding, functions of branding,features and types of brands, kinds of

brand name.
LABELLING: Types, functions, advantages and disadvantages
PACKAGING: Meaning, growth of packaging, function of packaging, kinds of packaging.

Module-4

PRICING: Importance of Price, pricing objectives, factors affecting pricing decisions, procedure for pricedetermination, kinds of pricing, pricing strategies and decisions.
DISTRIBUTION: Marketing channels – functions, types of channels of distribution, number of channel levels. Physical distribution – importance, total systems concept, strategy, use of physical distribution.

Module-5

PERSONAL SELLING: Objectives of personal selling, establishing the Sales force objectives, sales – forcestrategy, sales force structure and size, salesmanship, qualities of good salesman, types of salesman, major stepsin effective selling.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

- Identify market and appropriate segmentation criteria to discover promising market niches.
- Describing the benefits and the emerging trends of marketing research.
- Apply steps of research design in marketing research for a product and list out the source of research data in collecting data needed to the market research.
- Construct the structured format for preparing the questionnaire to analyse the market.
- Evaluate the optimum sample size required for hypothesis testing.
- Plan a research report by synthesizing the marketing information and applying it to the real world.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

9. The question paper will have ten questions. Each question is set for 20 marks.
10. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
11. The students have to answer 5 full questions, selecting one full question from each module.
12. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Principles of Marketing, Philip Kotler, Prentice Hall, 11th Edn.
2. Marketing Management, Philip Kotler, Prentice Hall, 11th Edn.
3. Fundamentals of Marketing, Wiliam J Stanton, McGraw Hill, 1984
4. Marketing Management Text & Cases, Rajagopal, Vikas Publishing House, ISBN 81-259-0773-4
5. Marketing Management, Michael R Czinkota, Vikas Publishing House, 2nd Edition ISBN 981-240-366-3.

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=Io_mSvKptdc
- https://www.youtube.com/watch?v=Y3nq53BQC-E
- https://www.youtube.com/watch?v=IBHD6xebid8
- https://www.youtube.com/watch?v=podqXzkZHJU
- https://www.youtube.com/watch?v=LrG63GTXq4M
- https://www.youtube.com/watch?v=8771jY9BXp8
- https://www.youtube.com/watch?v=WAd5bpkNTQU
- https://www.youtube.com/watch?v=Yqodce5-Ucs
- https://www.youtube.com/watch?v=eU-EQjg7Y9g
- https://www.youtube.com/watch?v=S95nSdqVzhc

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, assignments are to be given under each of the topics covered.

Mini Project		Semester	V
Course Code	**BIP586**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:4:0	SEE Marks	--
Total Hours of Pedagogy	--	Total Marks	100
Credits	02	Exam Hours	03
Examination type (SEE)	**Practical**		

Research Methodology and IPR		Semester	V
Course Code	**BRMK557**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	02
Examination type (SEE)	**Theory**		

Environmental Studies		Semester	V
Course Code	**BESK508**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:0:0:0	SEE Marks	50
Total Hours of Pedagogy	30	Total Marks	100
Credits	02	Exam Hours	02
Examination type (SEE)	**Theory**		

National Service Scheme (NSS)		Semester	V
Course Code	**BNSK559**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		

Physical Education (PE)		Semester	V
Course Code	**BPEK559**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		

Yoga		Semester	V
Course Code	**BYOK559**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		

VI SEMESTER

Work Study and Ergonomics		Semester	VI
Course Code	**BIP601**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:2:0	SEE Marks	50
Total Hours of Pedagogy	40 hours Theory + 8-10 Lab slots	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	**Theory**		

Course objectives:

- To develop concepts related to principles of productivity & work study as a tool for increasing the efficiency and effectiveness in organizational systems.
- To study the existing method, compare and propose a new method.
- To provide the usage of the various tools and techniques used in work measurement.
- To develop basic ideas of ergonomics and its design.
- To develop concepts related Man-Machine Interfaces and Design of Displays and controls

Teaching-Learning Process (General Instructions)

1. These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.
2. Lecturer method (L) does not mean only the traditional lecture method, but a different type of
3. teaching method may be adopted to develop the outcomes.
4. Show Videos/animation films to explain the content, wherever possible.
5. Encourage collaborative Learning (Group Learning) in the class.
6. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
7. Discuss how every concept can be applied to the real world thus helping to improve the students understanding.
8. Individual teachers can device innovative pedagogy to improve teaching-learning

MODULE-1

Productivity: Introduction, Basic work content, Design defects, Proper selection of process, Role of Management, Role of workers, Benefits of higher productivity: productivity measurement approaches at the enterprise level: productivity of materials, land, buildings, machines and man power:

Techniques for productivity improvement: Introduction: work content and ineffective time: Improving productivity by reducing work content & by reducing inefficient time: Management of productivity.

Work study: Definition, objectives, Basic procedure, the human factor in the application of work study. The influence of working conditions on work study (Safety and health, fire prevention, Layout, environment conditions)

MODULE-2

Method study I / work simplication: Definition and objectives procedures, Selection of jobs.

Recording Tools and Techniques: Operation process chart, flow process charts (Man type-Material type) , Flow diagram, critical examination, Develop the improved method.

Method study II/ Work simplication II: Tools for recording the movement of workers: String diagram, travel chart, multiactivity chart, and Man & Machine process chart, Gang process chart, Two handed process chart (operator process chart), principles of motion economy.

Motion study/ work simplication II : Cyclograph and chrinocyclograph Therbling, micrometer study, SIMO chart; Define, install and maintain the improved method.

MODULE-3

Work measurement / Time study: Objectives, purpose/use techniques, Time study equipments**,** selection of job and operator for time study. Basic steps recording the information, examination of data, measurement of operation, rating and levelling, allowances, standard time.

Work Sampling: Procedure, sample size determination, estimation of standard time, advantages and disadvantages.

Synthetic data: Development of standard data, machine time calculation, practical systems of PMTS (work factor system, motion time measurement system, basic motion time study) advantages.

MODULE-4

Ergonomics: Introduction, definition, objectives, benefits, types, applications; Industrial engineering ergonomics: musculoskeletal disorders (MSD), characteristics, how to control MSD.

Physical Ergonomics: human anatomy, and some of the anthropometric, physiological and bio mechanical characteristics as they relate to physical activity.

Cognitive Ergonomics: mental processes, such as perception, memory, reasoning, and motor response, mental workload, and decision-making.

Organizational ergonomics: optimization of socio-technical systems, including their organizational structures, policies, processes. Communication, work design, design of working times, teamwork, cooperative work, and new work programs.

Environmental ergonomics: human interaction with the environment- characterized by climate, temperature, pressure, vibration, light.

MODULE-5

Man-Machine Interaction; Man-Machine interaction cycle, Man-machine interfaces;

Displays: Factors that control choice of display;

visual displays: qualitative displays (moving pointer displays, moving scale displays, digital displays Indicators), Quantitative displays, check- reading displays;

auditory displays. Factors affecting effectiveness of displays. Types of controls and their integration with displays.

PRACTICAL COMPONENT OF IPCC

Sl.NO	Experiments
1	Preparing the Outline process chart and Multiple Activity Chart
2	Construct the Flow process chart for various applications
3	Experiments on the principle of motion economy by Two handed process chart
4	Draw the Flow diagram and String diagram for various applications
5	Rating practice using: pin board assembly, dealing a deck of cards and marble collection activity
6	Determining the standard time for simple operations using stopwatch time study
7	Measurement of parameters (heart beat rate, calorie consumption) using walking simulator
8	Measurement of parameters (heart beat rate, calorie consumption, revolutions per minute) using ergonometer.
	Demonstration Only
9	Exercises on conducting method study for assembling simple components and office work
10	Development of Layout plans using SLP technique. Experiments on Line balancing.
11	Determination of standard time using PDA device and time study software
12	Exercises on estimating standard time using PMTS

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

1. Recollect the basic concepts of productivity, work content and work study and define the objective an scope of Work Study.
2. Define the various charts and to construct the charts on the basis of present method and develop a new / proposed method and identify the unnecessary movements.
3. Explain the basic work measurement techniques and to gain knowledge of measurement of work, rating and imbibe the concept of allowance in estimating Standard Time.
4. Determine the basic concepts of Ergonomics and demonstrate a sound knowledge of Ergonomics in engineering applications.
5. Demonstrate a sound knowledge of Man-Machine Interfaces and design of displays and controls in engineering systems

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.

- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scoredby the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Books

- Introduction to Work Study, ILO, 4th edition, 1992
- Human Factor in Engineering and Design by Mark. S. Sanders and Ernest. J, McCornick McGraw-Hill Book Co., Inc., New York, 1993
- Work Study and Ergonomics by S. Dalela and Sourabh, Standard publishers, 2013
- Human Factors Design Handbook by Wesley Woodson,Peggy Tillman and Barry Tillman, McGraw-Hill, 2nd edition, 1992
- Motion and Time Study by Ralph M. Barnes, Wiley International, 7th Edition

Web links and Video Lectures (e-Resources):

- www.nptel.ac.in
- https://youtu.be/gJDYV2SmFeY
- https://youtu.be/KktqRSxfTxo
- https://youtu.be/b05FPBjFH6A?list=PL6mZDY1bMAzhknOcAfFy_FI9vb5rzJzUv
- https://youtu.be/DlCDzSzsCDk
- https://youtu.be/nDUN_Kndxbc

- https://youtu.be/Fh6S5anFnbg
- https://youtu.be/pHc89bejapU
- https://youtu.be/wYvqHJ7FNAM
- https://youtu.be/1sb548iiuPY
- https://youtu.be/kQ-A9zvi7kA
- https://youtu.be/dVFtAEDlnRA
- https://youtu.be/ZrgYdAQ68T4

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Design of a reading table.
- Watering the garden.
- College layout for constructing flow diagram, string diagram.
- At the end of the lecture/presentation, exercises are to be taken up to solve problems related to the topics covered. Additional assignments are to be given under each of the topics covered.

Operations Research		Semester	**VI**
Course Code	**BIP602**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:2:0:0	SEE Marks	50
Total Hours of Pedagogy	50	Total Marks	100
Credits	04	Exam Hours	03
Examination nature (SEE)	**Theory**		

Course objectives:

- To enable the students to understand the scientific methods of providing various departments of an organization with a quantitative basis of decision making.
- To enable the students to understand the importance of various tools and techniques in finding optimal solutions to problems involving limited resources in the form of Men, Materials, and Machinery
- To enable the students to understand the various tools and techniques of Project Management

Teaching-Learning Process (General Instructions)

These are sample Strategies; that teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Videos/animation films to explain the content, wherever possible.
3. Encourage collaborative Learning (Group Learning) in the class.
4. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to adopt creative ways to solve them.
7. Discuss how every concept can be applied to the real world thus helping to improve the students' understanding.
8. Individual teachers can device innovative pedagogy to improve teaching-learning.

MODULE-1

Introduction: Evolution of OR, definition of OR, scope of OR, application areas of OR, steps (phases) in OR study, characteristics and limitations of OR, models used in OR, linear programming problem (LPP) -formulation and solution by graphical method.

Solution of Linear Programming Problems: The Simplex method, canonical and standard form of an LPP, slack, surplus and artificial variables, big M method and concept of duality, dual simplex method.

MODULE-2

Transportation Problem: Formulation of transportation problem, types, initial basic feasible solution using different methods, optimal solution by MODI method, degeneracy in transportation problems, application of transportation problem concept for maximization cases. Least Time Transportation Problems.

Assignment Problem: Formulation, types, application to maximization cases and Travelling Salesman Problem, Flight scheduling problem.

MODULE-3

Project Management using Network Techniques: Introduction, network construction - rules, Fulkerson's rule for numbering the events, AON and AOA diagrams; Critical path method (CPM) to find the expected completion time of a project, floats; Programme evaluation and review technique (PERT) for finding expected duration of an activity and project, determining the probability of completing a project in specified time, predicting the completion time of project; crashing of simple projects (network construction by AOA approach can be used for all the cases).

MODULE-4

Queuing Theory: Queuing systems and their characteristics, Pure-birth and Pure-death models (only equations), empirical queuing models – (M/M/1) and (M/M/C) models (no derivations) and their steady state performance analysis.

Game Theory: Formulation of games, types, solution of games with saddle point, graphical method of solving mixed strategy games, dominance rule for solving mixed strategy games.

MODULE-5

Sequencing: Basic assumptions, sequencing 'n' jobs on single machine using priority rules, sequencing using Johnson's rule-'n' jobs on 2 machines, 'n' jobs on 3 machines, 'n' jobs on 'm' machines. Sequencing 2 jobs on 'm' machines.

Course outcomes (Course Skill Set):

At the end of the course, the student will be able to:

1. Explain the meaning, definitions, scope, need, phases and techniques of OR.
2. Formulate LPP and derive optimal solutions by graphical method, Simplex method, Big-M method and Dual Simplex method.
3. Formulate Transportation, Assignment, and Travelling salesman problems and derive optimum solution.
4. Formulate game theory problems with competitive situations and derive solutions.
5. Explain waiting line problems and derive solution for (M/M/1) and (M/M/C) queuing models.
6. Construct network diagrams and determine critical path, slacks, and floats with deterministic (CPM) and Probabilistic (PERT) activity times. Obtain optimum time Networks through crashing.
7. Obtain optimum time sequences for n jobs with a single machine, n jobs-2 machines, n jobs-3 machines, n jobs-m machines and 2 jobs-n machines.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

CIE for the theory component of the IPCC (maximum marks 50)

- IPCC means practical portion integrated with the theory of the course.
- CIE marks for the theory component are **25 marks** and that for the practical component is **25 marks**.
- 25 marks for the theory component are split into **15 marks** for two Internal Assessment Tests (Two Tests, each of 15 Marks with 01-hour duration, are to be conducted) and **10 marks** for other assessment methods mentioned in 22OB4.2. The first test at the end of 40-50% coverage of the syllabus and the second test after covering 85-90% of the syllabus.
- Scaled-down marks of the sum of two tests and other assessment methods will be CIE marks for the theory component of IPCC (that is for **25 marks)**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the theory component of IPCC.

CIE for the practical component of the IPCC

- **15 marks** for the conduction of the experiment and preparation of laboratory record, and **10 marks** for the test to be conducted after the completion of all the laboratory sessions.
- On completion of every experiment/program in the laboratory, the students shall be evaluated including viva-voce and marks shall be awarded on the same day.
- The CIE marks awarded in the case of the Practical component shall be based on the continuous evaluation of the laboratory report. Each experiment report can be evaluated for 10 marks. Marks of all experiments' write-ups are added and scaled down to **15 marks**.
- The laboratory test **(duration 02/03 hours)** after completion of all the experiments shall be conducted for 50 marks and scaled down to **10 marks.**
- Scaled-down marks of write-up evaluations and tests added will be CIE marks for the laboratory component of IPCC for **25 marks**.
- The student has to secure 40% of 25 marks to qualify in the CIE of the practical component of the IPCC.

SEE for IPCC

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours**)

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scoredby the student shall be proportionally scaled down to 50 Marks

The theory portion of the IPCC shall be for both CIE and SEE, whereas the practical portion will have a CIE component only. Questions mentioned in the SEE paper may include questions from the practical component.

Suggested Learning Resources:

Books

1. Operations Research by P K Gupta and D S Hira, S Chand Publishing.
2. Operations Research: Theory and Applications by J K Sharma, Pearson Education Pvt. Ltd.
3. Introduction to Operations Research by H A Taha, PHI/Pearson Education Pvt. Ltd.
4. Operations Research by Pannerselvan, PHI/Pearson Education Pvt. Ltd.
5. Operations Research by S D Sharma, Kedarnath, Ramnath & Co.

Web links and Video Lectures (e-Resources):

- https://www.bbau.ac.in/dept/UIET/EME-601%20Operation%20Research.pdf
- https://www.youtube.com/watch?v=FdKgeeb4q3w
- https://www.youtube.com/watch?v=jemAWA_WQCE
- https://www.youtube.com/watch?v=gbL3vYq3cPk
- https://www.youtube.com/watch?v=M8POtpPtQZc
- https://www.youtube.com/watch?v=-YBlR1UF-UY
- https://www.youtube.com/watch?v=rCLlyT547MY
- https://www.youtube.com/watch?v=lwX8HvF7DYM
- https://www.youtube.com/watch?v=JxnPBrNccqY
- https://www.youtube.com/watch?v=Wgkcrtjrr7s
- https://www.youtube.com/watch?v=v5ZfvATEoDY
- https://www.youtube.com/watch?v=xGkpXk-AnWU
- https://www.youtube.com/watch?v=YueJukoFBMU
- https://www.youtube.com/watch?v=fSuqTgnCVRg
- https://www.youtube.com/watch?v=KUskbAasVCY
- https://www.youtube.com/watch?v=Z-YqfAA9lew
- https://www.youtube.com/watch?v=_g0Aw99V2Dc
- https://www.youtube.com/watch?v=Nrmr8mfELcY
- https://www.youtube.com/watch?v=USr10xc98II
- https://www.youtube.com/watch?v=4OdutS9mSZA
- https://www.youtube.com/watch?v=j8CbEoF9c6Y

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Professional Elective Course

Hydraulics and Pneumatics		Semester	**VI**
Course Code	**BIP613A**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

1. To Study the fundamentals of Hydraulic Power Pumps, Actuators and Motors.
2. To develop a sound knowledge of control components in Hydraulic Systems.
3. To have basic skills to design Hydraulic Circuits and analyze them.
4. To acquire the fundamental knowledge on pneumatic control.
5. To develop skill sets to handle Pneumatic Actuators , Valves, Pneumatic circuits and logic circuits

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Arrange visits to nearby sites to give brief information about the Industrial and Production Engineering structures.
3. Show Video/animation films to explain the infrastructures and the mechanism involved in the principle.
4. Encourage collaborative (Group Learning) Learning in the class.
5. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
6. Adopt Problem Based Learning (PBL), which fosters students' Analytical skills, develop thinking skills suchas the ability to evaluate, generalize, and analyze information rather than simply recall it.
7. Topics will be introduced in multiple representations.
8. Show the different ways to solve the same problem and encourage the students to come up with their own creative ways to solve them.

Module-1

Introduction to Hydraulic Power and Pumps: review of fluid mechanics, Pascal's Law, structure of hydraulic control system. pumps: pumping theory, pump classification, gear pumps- external and internal type, vane pumps- simple, balanced, pressure compensated types, piston pumps- radial and axial (both swash plate and bent axis type), pump performance.

Hydraulic Actuators and Motors: Linear hydraulic actuators - single acting, double acting, tandem cylinder, telescopic rod cylinder, mechanics of hydraulic cylinder loading, cylinder cushioning, hydraulic rotary actuators.

Module-2

Control Components in Hydraulic Systems: directional control valves (DCV), constructional features, 2/2,3/2,4/2,4/3 DCV, center configuration in 4/3 DCV- open, closed, tandem, regenerative, floating centre configuration, actuation of DCVs- manual, mechanical, solenoid, and indirect actuation, relays for the solenoid operation, check valve, pilot check valve, pressure control valves – direct and pilot operated types, pressure reducing valve, flow control valves- fixed throttle, and variable throttle, throttle check.

Module-3

Hydraulic Circuit Design and Analysis: control of single and double acting hydraulic cylinder, regenerative circuit, counter balance valve application, cylinder sequencing circuits, cylinder synchronizing circuits, speed control of hydraulic cylinder – meter in and meter out, speed control of hydraulic motors, relay circuit design for the operation of solenoid directional control valve- single and double solenoid relay circuit.

Module-4

Introduction To Pneumatic Control: choice of working medium, characteristics of compressed air, structure of pneumatic control system , supply, signal generators, signal processor, final control elements , actuators, production of compressed air – compressors - reciprocating and rotary type, preparation of compressed air – driers, filters, regulators.

Module-5

Pneumatic Actuators , Valves: linear cylinder – types, conventional type of cylinder – working, directional control valve, shuttle valve, quick exhaust value, twin pressure valve, direct and indirect actuation of pneumatic cylinder, memory valve, time delay valve.

Pneumatic circuits and logic circuits: supply air and exhaust air throttling, will dependent circuits, travel dependent controls – types – construction – practical applications, cylinder sequencing circuits, travel step diagrams, practical examples involving two or three cylinders, use of logic functions – OR, AND, NOR, NAND,YES, NOT functions in pneumatic applications, practical examples involving the use of logic functions.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

- Recall the basic concept of fluid mechanics; identify different components of hydraulic system
- Analyze the requirement of control components and their selection

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Fluid Power with applications, Anthony Esposito Pearson edition 2000
2. Oil Hydraulics Majumdar, S.R., TalaMcGRawHllL, 2002
3. Pneumatic systems- "Principles and Maintenance" ,Majumdar S.R ata McGraw-Hill, New Delhi 2005
4. Hydraulics and pneumatics Andrew Par Jaico Publishing House 2005
5. Industrial Hydraulics John Pippenger, Tyler Hicks McGraw Hill International Edition, 1980.
6. Hydraulic Control Systems Herbert E. Merritt, John Wiley and Sons,

Web links and Video Lectures (e-Resources):

- https://www.engineering.com/hydraulic-pumps/amp
- https://hydraulicsonline.com/technical-knowledge-hub-news/an-introduction-to-hydraulic-pumps/
- https://www.powermotiontech.com/hydraulics/hydraulic-pumps-motors/article/21884136/engineering-essentials-fundamentals-of-hydraulic pumps
- https://www.globalspec.com/reference/45968/203279/chapter-6-control-components-in-a-hydraulic- system
- https://whyps.com/hydraulic-system-components-and-their-functions
- https://engineeringlearn.com/pneumatic-control-system/
- https://www.youtube.com/watch?v=YlmRa-9zDF8
- https://www.youtube.com/watch?v=HzaWOFWV
- https://www.youtube.com/watch?v=HzaWOF
- https://www.youtube.com/watch?v=HzaWOFWVz6E
- https://www.processindustryforum.com/article/what-is-a-pneumatic-actuator
- https://www.powermotiontech.com/fluid-power-basics/pneumatics/article/21155572/automationdirect-4-basic-pneumatic-circuits
- https://www.electronics-tutorials.ws/combination/comb_1.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

1. Contents related activities (Activity-based discussions)
2. For active participation of students, instruct the students to prepare Exercise problems
3. Organizing Group wise discussions and machineries issues based activities
4. Quizzes and Discussions
5. Seminars and assignments

Simulation and Modelling of Manufacturing Systems		Semester	VI
Course Code	**BIP 613B**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- Define the basics of simulation modeling and replicating the practical situations in organizations
- Generate random numbers and random variates using different techniques.
- Develop simulation model using heuristic methods.
- Analysis of Simulation models using input analyzer, and output analyzer
- Explain Verification and Validation of simulation model.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Show Videos/animation films to explain the content, wherever possible.
3. Encourage collaborativeLearning (Group Learning) in the class.
4. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develop thinking skills such as the ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Show the different ways to solve the same problem and encourage the students to adopt creative ways to solve them.
7. Discuss how every concept can be applied to the real world thus helping to improve the students understanding.
8. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1
Principle of Computer Modelling and Simulation: Monte Carlo simulation. Nature ofcomputer- modeling and simulation. Limitations of simulation, areas of applications.System andEnvironment: Components of a system -discrete and continuous systems, Models of a system –avariety of modeling approaches. Simulation Software: Selection of simulation software,simulation packages.
Module-2
Discrete Event Simulation: Concepts in discrete event simulation, manual simulation using event scheduling, single channel queue, too server queue, simulation of inventory problem. **Statistical Models in Simulation:** Discrete distributions, continuous distributions. **Discrete Event Simulation:** Concepts in discrete event simulation, manual simulation usingevent scheduling, single channel queue, too server queue, simulation of inventory problem. **Statistical Models in Simulation:** Discrete distributions, continuousdistributions.
Module-3
Random Number Generation: Techniques for generating random numbers- Mid square method -the mod product method -Constant multiplier technique -Additive congruential method –Linear congruential method -Tests for random numbers -The Kolmogorov-Smimov test -the Chi-square test.
Module-4
Random Variable Generation: Inversion transforms technique-exponential distribution. uniform distribution, weibul distribution, continuous distribution, generating approximate normal variates-Erlang distribution.
Module-5
Empirical Discrete Distribution: Discrete uniform -distribution poisson distribution –geometricdistribution -acceptance -rejection technique for Poisson distribution gamma distribution **Design and Evalution of Simulation Experiments:** variance reduction techniques -antithetic variables, variables-verification and validation of simulation models.
Course outcome (Course Skill Set) At the end of the course, the student will be able to : 1. Describe the role of important elements of discrete event simulation. 2. Describe the role of important elements of and modeling paradigm 3. Conceptualize real world situations related to systems development decisions, originating from source requirements and goals through random number generation. 4. Develop skills to apply simulation software to construct and execute goal-driven system models through random Variable generation. 5. Interpret the model and apply the results to resolve critical issues in a real world environment through evalution of simulation experiments.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. **Discrete Event System Simulation** - Jerry Banks & .John S Carson II - Prentice Hall Inc.-1984.
2. **Systems Simulation** - Gordan. G. - Prentice Hall India Ltd - 1991.
3. **System Simulation with Digital Computer** - NusingDeo - Prentice Hall of India - 1979.
4. **Computer Simulation and Modeling** - Francis Neelamkovil - John Wilely& Sons - 1987.
5. **Simulation Modeling with Pascal -** RathM.Davis& Robert M O Keefe - Prentice Hall Inc. - 1989.

Web links and Video Lectures (e-Resources):

https://www.youtube.com/watch?v=gbOn3jRc_Wc
https://www.youtube.com/watch?v=Wp3jyLkfBQs
https://www.youtube.com/watch?v=WfEZMhpzsT8
https://www.youtube.com/watch?v=DBmYYpxjqvM
https://www.youtube.com/watch?v=O46ZlKEjjHE
https://www.youtube.com/watch?v=OH8MRT8eqRI
https://www.youtube.com/watch?v=yN6cvjtlQtY
https://www.youtube.com/watch?v=pt4v5l8-Pjw
https://www.youtube.com/playlist?list=PL3l_ZG2nBXNLoPB26LeNRVDP6oG6Sz8tu
https://www.youtube.com/watch?v=Oomz_iZ5d-0

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Finite Element Methods		Semester	**VI**
Course Code	**BIP613C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To learn the basic principles of finite element analysis procedure
- To understand heat transfer problems with application of FEM.
- Solve 1 D, 2 D and dynamic problems using Finite Element Analysis approach.
- To learn and apply finite element solutions to structural, thermal, dynamic problem to develop the knowledgeand skills needed to effectively evaluate finite element analyses.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Adopt different types of teaching methods to develop the outcomes through PowerPoint presentations and Video demonstrations or Simulations.
2. Chalk and Talk method for Problem Solving.
3. Adopt flipped classroom teaching method.
4. Adopt collaborative (Group Learning) learning in the class.
5. Adopt Problem Based Learning (PBL), which fosters students' analytical skills and develops thinking skills such asevaluating, generalizing, and analysing information.

Module-1

Introduction to Finite Element Method:

General steps of the finite element method. Engineering applications of finite element method. Advantages of the Finite Element Method.

Boundary conditions:

Homogeneous and non-homogeneous for structural, heat transfer and fluid flow problems. Potential energy method, Rayleigh Ritz method, Galerkin's method, Displacement method of finite element formulation. Convergence criteria, Discretisation process.

Types of elements:

1D, 2D and 3D, Node numbering, Location of nodes.

Module-2

Introduction to the stiffness (Displacement) method:

Introduction, Derivation of stiffness matrix, Derivation of stiffness matrix for a spring element, Assembly the total stiffness matrix by superposition. One-Dimensional Elements-Analysis of Bars and Trusses, Linear interpolation polynomials in terms of local coordinate's for1D, 2Delements. Higher order interpolation functions for 1D quadratic and cubic elements in natural coordinates, , , Constant strain triangle, Four-Nodded Tetrahedral Element (TET 4), Eight-Nodded Hexahedral Element (HEXA 3 8), 2D iso-parametric element, Lagrange interpolation functions.

Module-3

Beams and Shafts:

Boundary conditions, Load vector, Hermite shape functions, Beam stiffness matrix based on Euler-Bernoulli beam theory, Examples on cantilever beams, propped cantilever beams, Numerical problems on simply

supported, fixed straight and stepped beams using direct stiffness method with concentrated and uniformly distributed load.

Module-4

Heat Transfer:

Basic equations of heat transfer: Energy balance equation, Rate equation: conduction, convection, radiation, 1D finite element formulation using vibration method, Problems with temperature gradient and heat fluxes, heat transfer in composite sections, straight fins.

Module-5

Axi-symmetric Solid Elements:

Derivation of stiffness matrix of axisymmetric bodies with triangular elements, Numerical solution of axisymmetric triangular element(s) subjected to surface forces, point loads, angular velocity, pressure vessels.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Identify the application and characteristics of FEA elements such as bars, beams, plane and iso-parametric elements.
2. Develop element characteristic equation and generation of global equation.
3. Formulate and solve Axi-symmetric and heat transfer problems.
4. Apply suitable boundary conditions to a global equation for bars, trusses, beams, circular shafts, heat transfer, fluid flow, axi-symmetric and dynamic problems

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. A first course in the Finite Element Method Logan, D. L Cengage Learning 6th Edition 2016
2. Finite Element Method in Engineering Rao, S. S Pergaman Int. Library of Science 5th Edition 2010
3. Finite Elements in Engineering Chandrupatla T. R PHI 2nd Edition 2013
4. Finite Element Method J.N.Reddy McGraw -Hill International Edition
5. Finite Elements Procedures Bathe K. J PHI
6. Concepts and Application of Finite Elements Analysis Cook R. D., et al. Wiley & Sons 4th Edition 2003

Web links and Video Lectures (e-Resources):

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Course seminar
- Term project

Human Resource Management		Semester	**VI**
Course Code	**BIP613D**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	2:2:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To enable the students to understand the HR Management and system at various levels in general and in certain specific industries or organizations.
- To help the students focus on and analyse the issues and strategies required to select and develop manpower resources.
- To develop relevant skills necessary for application in HR related issues.
- To Enable the students to integrate the understanding of various HR concepts along with the domain concept in order to take correct business decisions.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Encourage collaborative Learning (Group Learning) in the class.
3. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
4. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1

INTRODUCTION: Evolution of HRM, Objectives, Functions and Policies.

HUMAN RESOURCE PLANNING: Uses and benefits, Man Power Inventory, Man Power Forecasting, Methods of Man Power Forecasting, job Description, Job Specification.

Module-2

RECRUITMENT: Sources of Man power, Advertisement, Short Listing of Candidates calling Candidates for selection Process.

SELECTION: Selection procedure – Written Test, Group Discussion. Interview – Different methods, advantages and limitations, Psychological testing – Advantages and limitations, Induction procedure, transfers, promotion, exit interview, (Tutorial on written test, Group Discussion, Interviews)

Module-3

TRAINING AND DEVELOPMENT: Identification of Training needs, Training Evaluation, Training Budget, Executive Development – Different Approaches, Non-executive development – Different methods.
PERFORMANCE APPRAISAL: Components (all round performance appraisal), Methods. Advantages and limitations of different methods, Personal Counseling based on Annual Confidential Reports.

Module-4

COUNSELLING AND HUMAN RESOURCE ACCOUNTING: Characteristics, Need, Function, Types, Suggestions for personnel development, communication function, communication process, effective communication. Human resource records, Advantages of HR accounting, Various methods of accounting.

Module-5

INDUSTRIAL RELATIONS: Indian trade union act, standing orders act, Indian factories act.
INDUSTRIAL DISPUTES AND SETTLEMENT: Indian Industrial Disputes act, Industrial disputes settlement machinery. Works committee, Board of Conciliation, Voluntary Arbitration, Compulsory arbitration, Court of inquiry, Industrial tribunal, Adjudication.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Synthesize information regarding the effectiveness of recruiting methods & selection procedures
2. Identify the various training methods and design a training program
3. Design a job description and job specification for various levels of employees.
4. List out the regulations governing employee benefit practices.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Human Resources Management – Dr. K Ashwathappa – Tata McGraw Hill - Edition 1999.
2. Management of Human Resources – CB Mamoria – Himalaya Publication House – 2003.
3. Personnel / Human resource Management – Decenoz and robbins- PHI - 2002
4. Industrial Relations – Arun Monappa – TMH - ISBN – 0-07-451710-8.
5. Human Resources Management – VSP Rao
6. Human Resources Management – Ravi Dharma Rao

Web links and Video Lectures (e-Resources):

- https://www.lkouniv.ac.in/site/writereaddata/siteContent/20200407095112659 9shaile_Evolution_of_Human_Resource_Management.pdf
- https://www.investopedia.com/terms/h/human-resource-planning.asp
- https://www.hrhelpboard.com/recruitment.htm
- https://www.accountingnotes.net/human-resource-management/selection-process/selection-process-in-hrm/17676
- https://www.hrhelpboard.com/training-development.htm
- https://www.startuphrtoolkit.com/performance-appraisal-in-hrm/
- https://backup.pondiuni.edu.in/storage/dde/downloads/hrmiv_hra.pdf
- https://www.legalserviceindia.com/legal/article-956-industrial-and-national-tribunal.html

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Open Elective Course

Total Quality Management		Semester	**VI**
Course Code	**BIP654A**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

1. Understand various approaches to TQM
2. Understand the characteristics of quality leader and his role.
3. Develop feedback and suggestion systems for quality management.
4. Enhance the knowledge in Tools and Techniques of quality management

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
- Encourage collaborative Learning (Group Learning) in the class.
- Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.

Module-1

Principles and Practice: Definition, basic approach, gurus of TQM, TQM Framework, awareness, defining quality, historical review, obstacles, benefits of TQM. Quality Management Systems: Introduction, benefits of ISO registration, ISO 9000 series of standards, ISO 9001 requirements.

Module-2

Leadership: Definition, characteristics of quality leaders, leadership concept, characteristics of effective people, ethics, the Deming philosophy, role of TQM leaders, implementation, core values, concepts and framework, strategic planning communication, decision making.

Module-3

Customer Satisfaction and Customer Involvement: Customer Satisfaction: customer and customer perception of quality, feedback, using customer complaints, service quality, translating needs into requirements, customer retention, case studies. Employee Involvement – Motivation, employee surveys, empowerment, teams, suggestion system, recognition and reward, gain sharing, Performance appraisal, unions and employee involvement, case
studies.

Module-4

Continuous Process Improvement: process, the Juran trilogy, improvement strategies, types of problems, the PDSA Cycle, problem-solving methods, Kaizen, reengineering, six sigma, case studies.

Statistical Process Control : Pareto diagram, process flow diagram, cause and effect diagram, check sheets, histograms, statistical fundamentals, Control charts, state of control, out of control process, control charts for variables, control charts for attributes, scatter diagrams, case studies.

Module-5

Tools and Techniques: Benching marking, information technology, quality management systems, environmental management system, and quality function deployment, quality by design, failure mode and effect analysis, product liability, total productive maintenance.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

- Explain the various approaches of TQM
- Infer the customer perception of quality
- Analyze customer needs and perceptions to design feedback systems.
- Apply statistical tools for continuous improvement of systems
- Apply the tools and technique for effective implementation of TQM.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Total Quality Management Dale H. Besterfield, Pearson Education India ISBN:8129702606, Edition 0
2. Total Quality Management, Engineers, M. Zairi head, Publishing.
3. Managing for Quality and Performance Excellence, James R. Evans and W M, Cengage Learning, 9th edition,
4. A New American TQM, four revolutions in management, Shoji Shiba,Alan Graham, Productivity press, Oregon, 1990.
5. Engineering Optimization Methods and Applications
6. Organizational Excellence through TQM, H. Lal, New age Publications, 2008.

7. Introduction to Operations Research- Concepts and Cases, F.S. Hillier. G.J. Lieberman, Tata McGraw Hill, 9th Edition, 2010

Web links and Video Lectures (e-Resources):

- https://www.investopedia.com/terms/t/total-quality-management-tqm.asp
- https://www.youtube.com/watch?v=VD6tXadibk0
- https://aboutthree.com/blog/five-important-factors-in-total-quality-management/
- https://www.youtube.com/watch?v=renlXcpK9sk
- https://www.youtube.com/watch?v=umqtSNPp5Dk
- https://study.com/academy/lesson/five-principles-of-total-quality-management-tqm.html
- https://www.greenlight.guru/blog/total-quality-management-principles

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Value Engineering		Semester	**VI**
Course Code	**BIP654B**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- Be able to relate value engineering to costs, and its application to decision making.
- Be able to use value engineering as an economic analysis tool.
- Be able to apply SMART methodology in group decision environment.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lectures and discussions
- Self study assignments
- Case studies and group discussions.

Module-1

INTRODUCTION TO VALUE ANALYSIS: Definition of Value, Value Analysis, Value Engineering, Value management, Value Analysis versus Value Engineering, Value Analysis versus Traditional cost reduction techniques, uses, Applications, advantages and limitations of Value analysis. Symptoms to apply value analysis, Coaching of Champion concept.

TYPE OF VALUES: Reasons for unnecessary cost of product, Peeling cost Onion concept, unsuspected areas responsible for higher cost, Value Analysis Zone, attractive features of value analysis. Meaning of Value, types of value & their effect in cost reduction. Value analysis procedure by simulation. Detailed case studies of simple products

Module-2

FUNCTIONAL COST AND ITS EVALUATION: Meaning of Function and Functional cost, Rules for functional definition, Types of functions, primary and secondary functions using verb and Noun, Function evaluation process, Methods of function evaluation. Evaluation of function by comparison, Evaluation of Interacting functions, Evaluation of function from available data, matrix technique, MISS technique, Numerical evaluation of functional **relationships and case studies.**

PROBLEM SETTING & SOLVING SYSTEM: A problem solvable stated is half solved, Steps in problem setting system, Identification, Separationand Grouping of functions. Case studies.

PROBLEM SETTING & SOLVING SYSTEM: Goods system contains everything the task requires. Various steps inproblem solving, case studies.

Module-3

VALUE ENGINEERING JOB PLAN: Meaning and Importance of Value Engineering Job plan. Phases of job plan proposed by different value engineering experts, Information phase, Analysis phase, Creative phase, Judgment phase, Development planning phase, and case studies. Cost reduction programs, criteria for cost reduction program, Value analysis change proposal.

Module-4

VALUE ENGINEERING TECHNIQUES: Result Accelerators or New Value Engineering Techniques, Listing, Role of techniques in Value Engineering, Details with Case examples for each of the Techniques.

ADVANCED VALUE ANALYSIS TECHNIQUES: Functional analysis system technique and case studies, Value analysis of Management practice (VAMP), steps involved in VAMP, application of VAMP to Government, University, College, Hospitals, School Problems etc., (service type problems).

TOTAL VALUE ENGINEERING: Concepts, need, Methodology and benefits.

Module-5

APPLICATION OF VALUE ANALYSIS: Application of Value analysis in the field of Accounting, Appearance Design, Cost reduction, Engineering, manufacturing, Management, Purchasing, Quality Control, Sales, marketing, Material Management Etc., Comparison of approach of Value analysis & other management techniques.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Able to understand the importance of value of a product
2. Find out unnecessary cost/ function involved in the product
3. Conduct value engineering methodology
4. Do value analysis using advanced value engineering techniques
5. Become a certified value engineer with additional course /training

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

- Techniques of Value Analysis and Engineering, Lawrence D.Miles, 2nd Edn.
- Value engineering for Cost Reduction and Product, M.S. Vittal, Systems Consultancy Services Edn, 1991.
- Value anagement, Value Engineering and Cost Reduction, Edward D Heller, Addison Wesley Publishing Company, 1991
- Value Analysis for Better Management, Warren J Ridge, American Management Association Edn, 1969.
- Getting More at Less Cost (The Value Engineering Way), G.Jagannathan, Tata Mcgraw Hill Pub.Comp. Edn, 1995.
- Value Engineering, Arther E Mudge, McGraw Hill Book Comp.Edn, 1981

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=L-TfAfip1ME
- https://www.youtube.com/watch?v=mJoaZ4GewyI
- http://www.simplynotes.in/e-notes/mbabba/productivity-management/value-analysis/
- https://www.youtube.com/watch?v=mJoaZ4GewyI
- https://www.value-eng.org/page/AboutVM

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Management Information Systems		Semester	**VI**
Course Code	**BIP654C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- To elevate students' awareness of information Technology and develop an in-depth and systematic understanding of key aspects of IT management.
- To help students gain a strategic perspective on business.
- To evaluate the value of emerging technologies and their competitive advantage.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
- Encourage collaborative Learning (Group Learning) in the class.
- Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
- Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1

Fundamentals of Information Systems: Information systems in business, fundamentals of information systems solving business problems with information systems.

Module-2

Information Systems for Business Operations: Business information systems, Transaction processing systems, management, information systems and decision support systems. Artificial intelligence technologies in business, information system for strategic applications and issues in information technology.

Module-3

Issues in Managing Information Technology: Managing information resources and technologies global information technology, management, planning and implementing change, integrating business change with IT, security and ethical challenges in managing IT, social challenges of information technology.

Module-4

E-Business Model: E-commerce frame work, Architectural frame work for e-commerce, Application services and transaction, Models – B2C Transactions, B2B Transactions, Intra-Organizational Transactions.

WWW Architecture: Client server structure of the web, e-Commerce architecture, Technology behind the web.

Module-5

Consumer Oriented E-Commerce: Consumer oriented Application: Finance and Home Banking, Home shopping, Home Entertainment, Mercantile Process Models, Consumers perspective, Merchants perspective.
Electronic Data Interchange (EDI): EDI Concepts, Applications in business – components of international trade, Customs Financial EDI, Electronic fund transfer, Manufacturing using EDI, Digital Signatures and EDI.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

- Understand the awareness of information Technology and develop an in-depth and systematic understanding of key aspects of IT management.
- Explain the gain a strategic perspective on business.
- Evaluate the value of emerging technologies and their competitive advantage.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

5. The question paper will have ten questions. Each question is set for 20 marks.
6. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
7. The students have to answer 5 full questions, selecting one full question from each module.
8. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Management Information systems- managing information technology in the internet worked. Jams. A O'Brien. Tata McGraw Hill publishing company limited. 2002.
2. Management Information Systems. Laaudon & Laudo. PHI. ISBN 81-203-1282.
3. Management Information Systems. S. Sadogopan. PHI 1998Edn. ISBN 81-203- 1180-9.
4. Information systems for modern management G.R. Murdick PHI 2nd Edition..4. Human Resources Management – Ravi Dharma Rao

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=xisFrwLkR58
- https://www.youtube.com/watch?v=T7eyTJA1qQ4
- https://www.nibusinessinfo.co.uk/content/examples-artificial-intelligence-use-business
- https://planningtank.com/computer-applications/strategic-information-system
- https://www.itproportal.com/features/ten-challenges-facing-it-managers-right-now-and-how-to-overcome-them/
- https://www.geeksforgeeks.org/ethical-issues-in-information-technology-it/
- https://www.bigcommerce.com/articles/ecommerce-website-development/ecommerce-frameworks/
- https://learn.financestrategists.com/finance-terms/b2c/?gclid=Cj0KCQjwmuiTBhDoARIsAPiv6L-s- GL7tTYIaXqdEzWojJv0k1wJVlN4VG0xJycy3nlsCf-aMUgDPRUaAgH0EALw_wcB
- https://www.boddunan.com/articles/computers-technology/37-new-technologies/14798-fundamentals- of-consumer-oriented-e-commerce.html
- https://www.edibasics.com/what-is-edi/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Industrial Hygiene & Occupational Safety and Health		Semester	**VI**
Course Code	**BIP654D**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	3:0:0:0	SEE Marks	50
Total Hours of Pedagogy	40	Total Marks	100
Credits	03	Exam Hours	03
Examination type (SEE)	**Theory**		

Course objectives:

- Identify the occupational health safety and hygiene hazards in workplace
- Explain the effects of chemicals such as organic solvents.
- Discuss the Biological and Ergonomical Hazards.
- Describe the Occupational health and toxicology.
- Discuss First aid & antidotes.
- Explain how work affect health and health affects work.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type ofteaching method may be adopted to develop the outcomes.
2. Show Videos/animation films to explain the content, wherever possible.
3. Encourage collaborative Learning (Group Learning) in the class.
4. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.

Module-1

Physical hazards : Noise, compensation aspects, noise exposure regulation, properties of sound, occupational damage, risk factors, sound measuring instruments, octave band analyzer, noise networks, noise surveys, noise control program, industrial audiometry, OSHA standardnon-ionizing radiations, effects, types, radar hazards, microwaves and radio-waves, lasers, TLVcold environments, hypothermia, wind chill index, control measures- hot environments, thermal comfort, heat stress indices, acclimatization,

estimation and control.

Module-2

Chemical hazards : Introduction to chemical hazards – Dangerous properties of chemicals, dust, gases, fumes, mist, vapors, smoke and aerosols – Route of entry to human system, recognition, evaluation and control of basic hazards – Degree of hazards – Concept of threshold limit values – Air sampling strategies. Personal exposure monitoring and Work environment monitoring of chemical hazards – Biological sampling & analysis – Industrial hygiene control methods: Substitution, changing the process, isolation, wet method, local exhaust ventilation.

Module-3

Biological and Ergonomical Hazards: Classification of Biohazardous agents –bacterial agents, rickettsial and chlamydial agents, viral agents, fungal, parasitic agents, infectious diseases - Biohazard control program, employee health program-laboratory safety program-animal care and handling-biological safety cabinets - building design. Work Related Musculoskeletal Disorders – carpal tunnel syndrome CTS- Tendon pain disorders of the neck- back injuries.

Module-4

Occupational health and toxicology : Concept and spectrum of health - functional units and activities of occupational health services, pre-employment and post-employment medical examinations - occupational related diseases, levels of prevention of diseases, notifiable occupational diseases such as silicosis, asbestosis, pneumoconiosis, siderosis, anthracosis, aluminosis and anthrax, lead-nickel, chromium and manganese toxicity, gas poisoning (such as CO, ammonia, coal and dust etc) their effects and prevention – cardio pulmonary resuscitation, audiometric tests, eye tests, vital function tests.

Module-5

First aid & antidotes: Fundamentals of first – aid burns, fractures, suffocation, toxic ingestion – bleeding wounds artificial respiratory, techniques – Bandaging, Antidotes. Industrial toxicology, local, systemic and chronic effects, temporary and cumulative effects, carcinogens entry into human systems.

Work physiology: Physiology of respiration, cardiac cycle, muscle contraction, nerve conduction system, etc. Anthropometry and fundamental of Bio-mechanics – Assessment of workload based on Human Physiological reactions – energy cost of work – Assessment of work capacity fatigue and rest allowances – Physiological test for assessment of occupational health Nutritional values of diets for exercise and work – Nutrition and physical fitness relationship – Environmental Physiology.

Course outcome (Course Skill Set)

At the end of the course, the student will be able to :

1. Understand the basic concepts of Industrial Hygiene , Occupational Health & Environment Toxicology.
2. Understand the benefits of Industrial Hygiene.
3. Understand the functions of Occupational Health Center.
4. Understand the Occupational Health related problems and its control in workplace.
5. Understand the Effects of various Toxicants in body

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous Internal Evaluation:

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester-End Examination:

Theory SEE will be conducted by University as per the scheduled timetable, with common question papers for the course (**duration 03 hours).**

1. The question paper will have ten questions. Each question is set for 20 marks.
2. There will be 2 questions from each module. Each of the two questions under a module (with a maximum of 3 sub-questions), **should have a mix of topics** under that module.
3. The students have to answer 5 full questions, selecting one full question from each module.
4. Marks scored shall be proportionally reduced to 50 marks

Suggested Learning Resources:

Books

1. Handbook of Occupational Health and Safety, NSC Chicago, 1982
2. Encyclopedia of Occupational Health and Safety, Vol. I & II, International Labour Organisation, Geneva, 1985.
3. McCornick, E.J. and Sanders, M.S., Human Factors in Engineering and Design, Tata McGraw-Hill, 1982.
4. R.K.Jain & Sunil S Rao- Industrial Safety, Health and Environment Management System, Khannan Publisheres. New Delhi (2006).

Web links and Video Lectures (e-Resources):

- https://www.osha.gov/sites/default/files/training-library_industrial_hygiene.pdf
- https://kuliahdianmardi.files.wordpress.com/2016/03/human-factors-and-ergonomics-national-safety-council-handbook-of-occupational-safety-and-health-national-safety-council-crc-press-2010.pdf
- https://www.healthsafety.co/assets/docs/Industrial_Safety_syllabus.pdf
- https://www.ilo.org/safework/events/safeday/lang--en/index.htm
- https://www.unglobalcompact.org/take-action/safety-andhealth
- https://www.ehs.ufl.edu/departments/occupational-safety-risk/industrial-hygiene-occupational-safety/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Project Phase - I		Semester	**VI**
Course Code	**BIP685**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:4:0	SEE Marks	50
Total Hours of Pedagogy	--	Total Marks	100
Credits	02	Exam Hours	03
Examination type (SEE)	**Practical**		

Software Applications Lab		Semester	**VI**
Course Code	**BIPL606**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	**0:0:2:0**	SEE Marks	50
Credits	01	Exam Hours	03
Examination type (SEE)	**Practical**		

Course objectives:

- The course aims at building capabilities in the students for analyzing different situations in the industrial/business scenario involving limited resources and finding the optimal solution within constraints.

Sl.NO	**Experiments**
1	Regression analysis using any of the statistical packages.
2	Correlation analysis using any of the statistical packages.
3	Use of software package to solve LPP problems.
4	Use of software package to solve assignment and transportation problems.
5	Use of software package to solve PERT problems.
6	Use of software package to solve CPM problems.
7	Plotting Quality Control chart for attributes using Software Packages. Plotting appropriate charts and diagrams relevant to various industrial Applications
8	Plotting Quality Control chart for variables using Software Packages. Plotting appropriate charts anddiagrams relevant to various industrial Applications
	Demonstration Experiments (For CIE)
9	Development of simple MIS application programs for use in Library.
10	Development of simple MIS application programs for use in Bank.
11	Development of simple MIS application programs for use in Business shop.
12	Development of simple MIS application programs for use in Hospital.

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

1. Analyse any real life system with limited constraints and depict it in a model form.
2. Convert the problem into a mathematical model.
3. Solve mathematical model manually as well as using software such as TORA, etc.
4. Understand variety of problems such as assignment, transportation, travelling salesman, etc.
5. Solve the problems using linear programming approach using software.
6. Solve the problems on PERT and CPM using software.
7. Solve Quality Control chart for attributes and variables using Software Packages

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are**50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.

- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.
- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

- Oracle / MS SQL Server (back-end) VB6.0 / Developer2000 (frontend tools)
- Statistical Package like: SPSS, or Minitab, or SAS, or Systat, or MATLAB, or Statistica, etc.
- OR Packages: TORA, or LINDO, or KETRON, or ABACUS, etc.

Ability Enhancement Course / Skill Enhancement Course – V

Elements of Developing Management Skills		Semester	**VI**
Course Code	**BIP657A**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01
Examination type (SEE)	**Theory**		

Course objectives:

- To help the students gain understanding of the functions and responsibilities of managers.
- To provide them tools and techniques to be used in the performance of the managerial job.
- To enable them to analyse and understand the environment of the organization.
- To help the students to develop cognizance of the importance of management principle

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching methodmay be adopted to develop the outcomes.
2. Show Video/animation films to explain concepts
3. Encourage collaborative (Group Learning) Learning in the class
4. Ask at least three HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking
5. Adopt Problem Based Learning (PBL), which fosters student's Analytical skills, develops thinking skills such asthe ability to evaluate, generalize, and analyze information rather than simply recall it.
6. Topics will be introduced in multiple representations.
7. Show the different ways to solve the same problem and encourage the students to come up with their owncreative ways to solve them.
8. Discuss how every concept can be applied to the real world - and when that's possible, it helps improve the students' understanding.

Module-1

INTRODUCTION

THE CRITICAL ROLE OF MANAGEMENT SKILLS

The Importance of Competent Managers, The Skills of Effective Managers, Essential Management Skills, What Are Management Skills?, Improving Management Skills, An Approach to Skill Development, Leadership and Management.

PERSONAL SKILLS DEVELOPING SELF-AWARENESS

SKILL LEARNING : Key Dimensions of Self Awareness, The Enigma of Self Awareness, The Sensitive Line, Understanding and Appreciating Individual.

SKILL PRACTICE:Exercises for Improving Self Awareness Through Self-Disclosure-Through the Looking Glass.

Module-2

MANAGING PERSONAL STRESS

SKILL LEARNING Improving the management of stress and time, Major elements of stress, Managing stress, Eliminating stressors.

SKILL PRACTICE Exercises for long-term and short- run stress management,

SOLVING PROBLEMS ANALYTICALLY AND CREATIVELY

SKILL LEARNING: Problem-solving, creativity and innovation, Steps in analytical problem-solving, Limitations of the analytical problem-solving model.

SKILL PRACTICE: Individual assignment Analytical problem-solving, Team assignment creative problem-solving, Moving up in the rankings, Creative problem-solving practice

Module-3

INTERPERSONAL SKILLS

BUILDING RELATIONSHIPS BY COMMUNICATING SUPPORTIVELY

SKILL LEARNING: Building positive interpersonal relationships, The importance of effective communication, The focus on accuracy

SKILL PRACTICE: Exercises for diagnosing communication problems and fostering understanding

GAINING POWER AND INFLUENCE

SKILL LEARNING: Building a strong power base and using influence wisely.

SKILL PRACTICE: Exercise for gaining power, Repairing power failures in management Circuits.

MOTIVATING OTHERS

SKILL LEARNING**:** Increasing motivation and performance, Diagnosing work performance problems. Skill practice: Exercises for diagnosing work performance problems.

Module-4

GROUP SKILLS

EMPOWERING AND DELEGATING

SKILL LEARNING: Empowering and delegating, A management dilemma involving empowerment.
Exercises for empowerment, Executive development associates.

BUILDING EFFECTIVE TEAMS AND TEAMWORK

SKILL LEARNING: Developing teams and teamwork, the advantages of teams.

SKILLS PRACTICE

Exercises in building effective teams, Team diagnosis and team development exercise.

LEADING POSITIVE CHANGE

SKILL LEARNING: Leading positive change, Ubiquitous and escalating change. SKILL PRACTICE: Exercises in leading positive change, Reflected Best self-portrait

Module-5

SPECIFIC COMMUNICATION SKILLS

MAKING ORAL AND WRITTEN PRESENTATIONS

SKILL LEARNING: Making oral and written presentations, Essential elements of effective presentation

SKILL PRACTICE: Exercises for making effective oral and written presentations, Speaking as a leader

CONDUCTING INTERVIEWS

SKILL LEARNING: Planning and conducting interviews, Specific types of organizational interviews

SKILL PRACTICE: Evaluating a new employee orientation programme

CONDUCTING MEETINGS

SKILL LEARNING: Conducting effective meetings: a short guide, For meeting managers and meeting participants, The five Ps of effective meetings, suggestions for group members

SKILL PRACTICE: Exercises for conducting meeting.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Understand the concepts related to Business.
2. Demonstrate the roles, skills and functions of management.
3. Analyse effective application of PPM knowledge to diagnose and solve organizational problems and develop optimalmanagerial decisions.
4. Understand the complexities associated with management of human resources in the organizations and integrate thelearning in handling these complexities.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

5. The question paper will have ten questions. Each question is set for 10 marks.
6. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
7. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. David A. Whetten, Kim S. Cameron, "Developing management skills",(eastern economy edition)Eighth edition,2013.
2. Baker, W. Achiving success through social capital. San Rrancisco:Jossy-Bass.(2000)

Web links and Video Lectures (e-Resources):

- https://www.youtube.com/watch?v=nFSeS1MeSeY
- https://www.youtube.com/watch?v=cx_RXvE1qic
- https://www.youtube.com/watch?v=NNeNNpiD-rQ
- https://www.youtube.com/watch?v=zJxVBovpKls
- https://www.youtube.com/watch?v=uSSHDCgq-4k
- https://www.youtube.com/watch?v=kOs8-8UUlls
- https://www.youtube.com/watch?v=j-i6JOgFk1E
- https://www.youtube.com/watch?v=1jsBVAFnc1c
- https://www.youtube.com/watch?v=akUdyh8ERvQ
- https://www.youtube.com/watch?v=BJiDr-wrdzk
- https://www.youtube.com/watch?v=jvc_ETgS6xk
- https://www.youtube.com/watch?v=lZ41JRjDu5Q
- https://www.youtube.com/watch?v=2xlumuCc8gE
- https://www.youtube.com/watch?v=iAzPjqGo4d8

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- Group discussions on management skills.

Basics of Rapid Prototyping		Semester	**VI**
Course Code	**BIP657B**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01
Examination type (SEE)	**Theory**		

Course objectives:

- To provide knowledge on different types of Rapid Prototyping systems. and its applications in various fields.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

- Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
- Encourage collaborative Learning (Group Learning) in the class.
- Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
- Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1

Introduction:

Need for the compression in product development, history of RP systems, Survey of applications, Growth of RP industry, and classification of RP systems.

Module-2

Stereo Lithography Systems:

Principle, Process parameter, Process details, Data preparation, data files and machine details, Application.

Module-3

Selective Laser Sintering:

Type of machine, Principle of operation, process parameters, Data preparation for SLS, Applications.

Module-4

Fusion Deposition Modelling:
Principle, Process parameter, Path generation, Applications.

Module-5

Solid Ground Curing: Principle of operation, Machine details, Applications.
Laminated Object Manufacturing: Principle of operation, LOM materials. Process details, application.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Understand and use techniques for processing of CAD models for rapid prototyping.
2. Understand and apply fundamentals of rapid prototyping techniques.
3. Use appropriate tooling for rapid prototyping process.
4. Use rapid prototyping techniques for reverse engineering.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

8. The question paper will have ten questions. Each question is set for 10 marks.
9. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
10. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

1. Stereo lithography and other RP & M Technologies -Paul F. Jacobs - SME, NY1996.
2. Rapid Manufacturing - Flham D.T &Dinjoy S.S - Verlog London2001.

3. Rapid automated - Lament wood - Indus press NewYork

Web links and Video Lectures (e-Resources):

- https://www.midaspattern.co.uk/news/the-history-of-rapid-prototyping#:~:text=Who%20Invented%20Rapid%20Prototyping%3F,include%20various%20forms%20of%20manufacture.
- https://www.youtube.com/watch?v=yW4EbCWaJHE
- https://www.youtube.com/watch?v=yiUUZxp7bLQ
- https://www.youtube.com/watch?v=7px1fl41cA4
- https://www.youtube.com/watch?v=ZZzDLQ-KoQ4
- https://www.youtube.com/watch?v=m0b3WIS2nqw

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Introduction to Maintenance Engineering		Semester	**VI**
Course Code	**BIP657C**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	1:0:0:0	SEE Marks	50
Total Hours of Pedagogy	15	Total Marks	100
Credits	01	Exam Hours	01
Examination type (SEE)	**Theory**		

Course objectives:

- To understand the fundamentals Maintenance and Safety Engineering.
- To learn the concepts of Accident Preventions and safety acts.
- To analyze the Principles and Practices of Maintenance Planning and Maintenance Policies.

Teaching-Learning Process (General Instructions)

These are sample Strategies, which teachers can use to accelerate the attainment of the various course outcomes.

1. Lecturer method (L) does not mean only the traditional lecture method, but a different type of teaching method may be adopted to develop the outcomes.
2. Encourage collaborative Learning (Group Learning) in the class.
3. Ask HOTS (Higher-order Thinking) questions in the class, which promotes critical thinking.
4. Individual teachers can device innovative pedagogy to improve teaching-learning.

Module-1

Introduction to the Development of Industrial Safety and Management:

History and development of Industrial safety: Implementation of factories act, Safety and productivity, Safety organizations. Safety committees and structure.

Module-2

Accident Preventions and Protective Equipments: Personal protective equipment, Survey the plant for locations, Part of body to be protected, Education and training in safety, Prevention causes and cost of accident, Housekeeping, First aid, Firefighting equipment, Accident reporting.

Module-3

Safety Acts: Features of Factory Act, Introduction of Explosive Act, Boiler Act, ESI Act, Industrial hygiene, Occupational safety, Diseases prevention, Ergonomics, Occupational diseases, stress, fatigue, safety and the physical environment, Engineering methods of controlling chemical hazards.

Module-4

Principles and Practices of Maintenance Planning: Basic Principles of maintenance planning – Objectives and principles of planned maintenance activity, Sound Maintenance systems – Reliability and machine availability, Equipment Life cycle.

Module-5

Maintenance Policies and Preventive Maintenance: Maintenance categories – Merits of each category – Preventive maintenance, Maintenance schedules: Repair cycle, Principles and methods of lubrication, Fault Tree Analysis, Total Productive Maintenance: Methodology and Implementation.

Course outcome (Course Skill Set)

At the end of the course the student will be able to:

1. Explain comprehensively the Maintenance and Safety Engineering.
2. Apply the techniques required to Accident Preventions
3. Perform Maintenance Policies and Preventive Maintenance

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together.

Continuous internal Examination (CIE)

- For the Assignment component of the CIE, there are 25 marks and for the Internal Assessment Test component, there are 25 marks.
- The first test will be administered after 40-50% of the syllabus has been covered, and the second test will be administered after 85-90% of the syllabus has been covered
- Any two assignment methods mentioned in the 22OB2.4, if an assignment is project-based then only one assignment for the course shall be planned. The teacher should not conduct two assignments at the end of the semester if two assignments are planned.
- For the course, CIE marks will be based on a scaled-down sum of two tests and other methods of assessment.

Internal Assessment Test question paper is designed to attain the different levels of Bloom's taxonomy as per the outcome defined for the course.

Semester End Examinations (SEE)

SEE paper shall be set for 50 questions, each of the 01 marks. The pattern of the question paper is MCQ (multiple choice questions). The time allotted for SEE is **01 hour.** The student has to secure a minimum of 35% of the maximum marks meant for SEE.

OR

MCQ (Multiple Choice Questions) are preferred for 01 credit courses, however, if course content demands the general question paper pattern that followed for 03 credit course, then

11. The question paper will have ten questions. Each question is set for 10 marks.
12. There will be 2 questions from each module. Each of the two questions under a module may or may not have the sub-questions (with maximum sub-questions of 02, with marks distributions 5+5, 4+6, 3+7).
13. The students have to answer 5 full questions, selecting one full question from each module.

Suggested Learning Resources:

Books

- Industrial Maintenance Management Srivastava, S.K. - S. Chand andCo.
- Occupational Safety Management and Engineering Willie Hammer - PrenticeHall
- Installation, Servicing and Maintenance Bhattacharya, S.N. - S. Chand andCo.

Web links and Video Lectures (e-Resources):

- https://study.com/academy/lesson/workplace-accident-definition-types-effects.html
- https://www.ehs.washington.edu/workplace/accident-prevention-plan
- https://www.youtube.com/watch?v=ssLQ7sLnIJ8
- https://www.prometheusgroup.com/posts/6-maintenance-planning-principles-for-success-in-planning-scheduling
- https://www.fiixsoftware.com/blog/putting-your-tpm-plan-into-action-a-step-by-step-guide/

Activity Based Learning (Suggested Activities in Class)/ Practical Based learning

- At the end of the lecture/presentation, numerical exercises are to be taken up to solve problems related to the topics covered. Additional problems are to be given for practice and also as assignments under each of the topics covered.

Basics of IIOT		Semester	**IV**
Course Code	**BIPL657D**	CIE Marks	50
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	50
Credits	01	Exam Hours	01
Examination type (SEE)	**Practical**		

Course objectives:

5. Demonstrate to install IDE to create IoT application
2. Illustrate diverse methods of deploying smart objects and connect them to network.
3. Develop Python programming language to develop programs for solving real-world problems
4. Analyse sensor technologies for sensing real world entities

Sl.NO	**Experiments**
1	Design a smart bin using IoT with Arduino / Raspberry Pi
2	Design water level monitoring system using IoT with Arduino / Raspberry Pi
3	Design temperature monitoring system using IoT with Arduino / Raspberry Pi
4	Design car parking management system using IoT with Arduino / Raspberry Pi
5	Design automated pet feeder using IoT with Arduino / Raspberry Pi
6	Design smart agriculture system using IoT with Arduino / Raspberry Pi
7	Design smart street light monitoring system using IoT with Arduino / Raspberry Pi
8	Design smart anti-theft system using IoT with Arduino / Raspberry Pi
	Demonstration Experiments (For CIE)
9	Demonstrate Alexa based smart home monitoring system using IoT
10	Demonstration home automation system using IoT
11	Demonstration of face recognition bot using IoT
12	Demonstration ECG monitoring using IoT

Course outcomes (Course Skill Set):

At the end of the course the student will be able to:

- Understand basic concepts of IoT, Arduino / Raspberry Pi
- Build application-oriented projects using IoT
- Develop algorithm to solve real time problems by interface sensors and controller

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for Semester End Exam (SEE) is 50%. The minimum passing mark for the CIE is 40% of the maximum marks (20 marks out of 50) and for the SEE minimum passing mark is 35% of the maximum marks (18 out of 50 marks). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures a minimum of 40% (40 marks out of 100) in the sum total of the CIE (Continuous Internal Evaluation) and SEE (Semester End Examination) taken together

Continuous Internal Evaluation (CIE):

CIE marks for the practical course are**50 Marks**.

The split-up of CIE marks for record/ journal and test are in the ratio **60:40**.

- Each experiment is to be evaluated for conduction with an observation sheet and record write-up. Rubrics for the evaluation of the journal/write-up for hardware/software experiments are designed by the faculty who is handling the laboratory session and are made known to students at the beginning of the practical session.
- Record should contain all the specified experiments in the syllabus and each experiment write-up will be evaluated for 10 marks.
- Total marks scored by the students are scaled down to **30 marks** (60% of maximum marks).
- Weightage to be given for neatness and submission of record/write-up on time.
- Department shall conduct a test of 100 marks after the completion of all the experiments listed in the syllabus.
- In a test, test write-up, conduction of experiment, acceptable result, and procedural knowledge will carry a weightage of 60% and the rest 40% for viva-voce.
- The suitable rubrics can be designed to evaluate each student's performance and learning ability.
- The marks scored shall be scaled down to **20 marks** (40% of the maximum marks).

The Sum of scaled-down marks scored in the report write-up/journal and marks of a test is the total CIE marks scored by the student.

Semester End Evaluation (SEE):

- SEE marks for the practical course are 50 Marks.
- SEE shall be conducted jointly by the two examiners of the same institute, examiners are appointed by the Head of the Institute.
- The examination schedule and names of examiners are informed to the university before the conduction of the examination. These practical examinations are to be conducted between the schedule mentioned in the academic calendar of the University.
- All laboratory experiments are to be included for practical examination.
- (Rubrics) Breakup of marks and the instructions printed on the cover page of the answer

script to be strictly adhered to by the examiners. **OR** based on the course requirement evaluation rubrics shall be decided jointly by examiners.

- Students can pick one question (experiment) from the questions lot prepared by the examiners jointly.
- Evaluation of test write-up/ conduction procedure and result/viva will be conducted jointly by examiners.

General rubrics suggested for SEE are mentioned here, writeup-20%, Conduction procedure and result in -60%, Viva-voce 20% of maximum marks. SEE for practical shall be evaluated for 100 marks and scored marks shall be scaled down to 50 marks (however, based on course type, rubrics shall be decided by the examiners)

Change of experiment is allowed only once and 15% of Marks allotted to the procedure part are to be made zero.

The minimum duration of SEE is 02 hours

Suggested Learning Resources:

1. David Hanes, Gonzalo Salgueiro, Patrick Grossetete, Robert Barton, Jerome Henry,"IoT Fundamentals: Networking Technologies, Protocols, and Use Cases for the Internet of Things", 1 stEdition, Pearson Education (Cisco Press Indian Reprint). (ISBN: 978-9386873743)
2. Srinivasa K G, "Internet of Things",CENGAGE Leaning India, 2017
3. Raj Kamal, "Internet of Things: Architecture and Design Principles", 1 st Edition, McGraw Hill Education, 2017. (ISBN: 978-9352605224)
4. Vijay Madisetti and ArshdeepBahga, "Internet of Things (A Hands-on-Approach)", 1 stEdition, VPT, 2014. (ISBN: 978-8173719547)

National Service Scheme (NSS)		Semester	**VI**
Course Code	**BNSK658**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		

Physical Education (PE)		Semester	**VI**
Course Code	**BPEK658**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		

Yoga		Semester	**VI**
Course Code	**BYOK658**	CIE Marks	100
Teaching Hours/Week (L:T:P: S)	0:0:2:0	SEE Marks	0
Total Hours of Pedagogy	00	Total Marks	100
Credits	00	Exam Hours	--
Examination type (SEE)	**Practical**		