	Entrepreneurship		Semester	6
	Course Code	**BVM601**	CIE Marks	100
	Teaching Hours/Week (L: T:P:S)	1:0:0:2	SEE Marks	0
	Total Hours of Pedagogy	25 (each module 05 hours)	Total Marks	100
	Credits	02	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Develop an entrepreneurial mindset: Cultivate a growth mindset, risk-taking ability, and a passion for innovation.

CLO2: Identify and evaluate business opportunities: Learn to recognize market gaps, assess potential, and conduct feasibility studies.

CLO3: Create and validate business models: Develop sound business models that align with market needs and generate revenue.

CLO4: Master business planning: Construct comprehensive business plans outlining goals, strategies, financial projections, and marketing plans.

CLO5: Secure funding: Understand various funding sources and develop effective pitch presentations.

CLO6: Build and lead a team: Develop leadership skills, effective team building, and talent management strategies.

CLO7: Manage business operations: Gain knowledge of essential business functions such as finance, marketing, sales, and operations.

CLO8: Understand the legal and regulatory environment: Navigate legal and compliance issues relevant to entrepreneurship.

CLO9: Cultivate financial acumen: Develop financial literacy, budgeting, and financial forecasting skills.

CL10: Embrace ethical and social responsibility: Understand the importance of ethical business practices and corporate social responsibility.

CL11: Understand the startup ecosystem: Learn about accelerators, incubators, and angel investors.

Module-1

Foundational Concepts

- Definition and history of entrepreneurship
- Entrepreneurial mindset and characteristics
- The entrepreneurial process
- Types of entrepreneurs (serial, social, etc.)

Module-2

Idea Generation and Validation

- Identifying opportunities
- Market research and analysis
- Customer development
- Business model canvas
- Value proposition development

Module-3

Business Planning and Strategy

- Business plan components
- Financial projections
- Marketing and sales strategy
- Operations management
- Legal and ethical considerations

Module-4

Entrepreneurial Finance

- Sources of funding (bootstrapping, angel investors, venture capital, crowdfunding, etc.)
- Financial management
- Valuation
- Investment analysis

Innovation and Creativity

- Design thinking
- Creativity techniques
- Intellectual property
- Innovation management

Module-5

Entrepreneurial Ecosystem

- The startup ecosystem
- Incubators and accelerators
- Mentorship and networking
- Government support

Challenges and Risks

- Failure and resilience
- Risk management
- Ethical dilemmas
- Exit strategies

Course outcome (Course Skill Set)

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

- **CO1:**Understanding of Entrepreneurship: Students will develop a comprehensive understanding of entrepreneurial concepts, theories, and practices.
- **CO 2:**Idea Generation and Evaluation: Students will learn to identify business opportunities, conduct market research, and assess the feasibility of new ventures.
- **CO 3:**Business Planning: Students will be able to create a comprehensive business plan outlining the venture's goals, strategies, financial projections, and marketing plans.
- **CO 4:**Financial Management: Students will gain knowledge of financial analysis, budgeting, and fundraising for startups.
- **CO 5:**Marketing and Sales: Students will develop skills in market segmentation, product positioning, pricing, and sales strategies.
- **CO 6:**Team Building and Leadership: Students will learn to build and lead effective teams, manage conflict, and foster a collaborative work environment.
- **CO 7:**Risk Management and Decision Making: Students will develop the ability to assess risks, make informed decisions, and adapt to changing circumstances.
- **CO 7:**Ethical and Social Responsibility: Students will understand the ethical implications of entrepreneurship and the importance of social responsibility.
- **CO 8:**Venture Creation: Some courses may include a practical component where students develop and launch their own business ventures.
- **CO 9:**Innovation and Creativity: Students will enhance their creative problem-solving abilities and foster a culture of innovation.
- **CO 10:**Networking and Relationship Building: Students will develop strong professional networks and build relationships with mentors and industry experts.
- **CO 11:**Global Perspective: Students will gain an understanding of global markets and the challenges and opportunities of international entrepreneurship.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for the 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). The student is declared as a pass in the course if he/she 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: 100 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks
4. The test after completion of 100% syllabus is conducted for 100 marks.
   Two questions are to be set for each module, there are 10 questions with 20 marks each. Each question may or may not have a sub-question. The students have to answer for 100 marks(05 full questions).
5. The sum of the two assignments is scaled down to 50.
6. The marks scored in the test shall be scaled down to 50.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks
   (Teacher may conduct the quiz or presentation or other suitable method of assignment in place of two or one assignment mentioned)

Semester-End Examination:

SEE is Not Applicable

Web links and Video Lectures (e-Resources):

https://onlinecourses.nptel.ac.in/noc21_mg70/preview

https://onlinecourses.nptel.ac.in/noc24_ge15/preview

Suggested Learning Resources:
Books

1. "The Lean Startup" by Eric Ries
2. "Zero to One" by Peter Thiel
3. "The Startup Owner's Manual" by Steve Blank
4. "Business Model Generation" by Alexander Osterwalder and Yves Pigneur

Activity-Based Learning (Suggested Activities in Class)/Practical-Based Learning • Simulation Games • Case Studies • Guest Lectures and Panel Discussions • Business Plan Competitions • Startup Weekend or Hackathons • Field Trips and Industry Visits • Mentorship and Coaching • Idea Generation: Brainstorming sessions, mind mapping, design thinking workshops. • Market Research: Conducting surveys, analysing market data, customer interviews.

	Employment Readiness		Semester	6
	Course Code	**BVM602**	CIE Marks	100
	Teaching Hours/Week (L: T:P:S)	1:0:0:2	SEE Marks	0
	Total Hours of Pedagogy	25 (each module 05 hours)	Total Marks	100
	Credits	02	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Identify personal values, interests, and skills to align with potential career paths.
CLO2: Conduct in-depth career research, including industry analysis and job market trends.
CLO3: Develop effective time management and organizational skills.
CLO4: Demonstrate adaptability and resilience in a changing work environment.
CLO5: Develop effective job search strategies and utilize online job platforms.
CLO6: Create and manage a professional online presence (LinkedIn, personal website).
CLO7: Develop a compelling resume and cover letter tailored to specific job opportunities.

Module-1

Self-Assessment and Career Exploration

- Identifying personal values, interests, and skills
- Exploring career options and conducting job market research
- Setting career goals and developing a career action plan

Module-2

Job Search Strategies

- Resume and cover letter writing
- Effective job search techniques (online platforms, networking, job boards)
- Utilizing career centres and other resources

Module-3

Interview Preparation and Techniques

- Understanding different types of interviews (behavioural, case, group)
- Developing effective interview skills (questioning, listening, body language)
- Following up after interviews

Module-4

Professional Development

- Building strong professional networks
- Developing effective communication skills (verbal, written, nonverbal)
- Enhancing teamwork and collaboration skills
- Time management and organizational skills
- Workplace ethics and professionalism

Module-5

Career Planning and Development

- Creating a career development plan
- Understanding the importance of lifelong learning
- Exploring graduate school and advanced degree options

Course outcome (Course Skill Set)

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

CO 1: Successful transition from academia to the workforce
CO 2: Acquisition of essential job search and interview skills
CO 3: Development of a strong professional network
CO 4: Enhanced employability skills
CO 5: Improved job search strategies
CO 6: Increased self-awareness

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). The student is declared as a pass in the course if he/she 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: 100 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks
4. The test after completion of 100% syllabus is conducted for 100 marks.
   Two questions are to be set for each module, there are 10 questions with 20 marks each. Each question may or may not have a sub-question. The students have to answer for 100 marks(05 full questions).
5. The sum of the two assignments is scaled down to 50.
6. The marks scored in the test shall be scaled down to 50.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(Teacher may conduct the quiz or presentation or other suitable method of assignment in place of two or one assignment mentioned)

Semester-End Examination:

SEE is Not Applicable

Web links and Video Lectures (e-Resources):

Suggested Learning Resources:

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

- **Role-playing:** Simulate various workplace scenarios (meetings, presentations, conflict resolution) to practice communication and interpersonal skills.
- **Mock interviews:** Conduct practice interviews to build confidence and improve interview skills.
- **Time management exercises:** Implement daily or weekly schedules to develop punctuality and time management habits.

	Robotics Engineering		Semester	6
	Course Code	**BVM603**	CIE Marks	50
	Teaching Hours/Week (L: T:P:S)	2:0:0:2	SEE Marks	50
	Total Hours of Pedagogy	40(Each Module 08 hours)	Total Marks	100
	Credits	03	Exam Hours	03 Hours
	Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO 1. To introduce the functional elements of Robots
CLO 2. To educate on carious concepts in robot anatomy and control
CLO 3. To impart knowledge on end effectors and drive systems in robots
CLO 4. To know about different types and functions of sensors in robotics
CLO 5. To describe different applications of robots.

Module-1

Robotics Definition, Robot-Basic concepts, Need, Laws of Robotics, History, Types of Robots, Classification,specifications of Robotics.

Module-2

Anatomy of Robots, Types of Joints, Robot configurations- cartesian, cylinder, polar and articulate.

Basics of control: open loop- closed loop, Transfer functions, Control laws: P, PD, PID

Module-3

End effectors-Classification, Types of Mechanical actuation, Gripper design, Robot drive system- Hydraulic,Pneumatic and Electrical Drive systems.

Module-4

Sensors in robotics- Touch Sensors, Tactile sensor, Proximity and range sensors, Force sensor, Pressure sensors,

Module-5

Applications: Industrial applications of robots, Medical, Household, Entertainment, Space, Underwater, Defence,Disaster management

Course outcome (Course Skill Set)

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

CO 1: Understand the functions of different elements of robots.
CO 2. Apply the knowledge of sensors and end effectors in robotics
CO 3. Analyze the use of different types of robots for different applications.

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). The student is declared as a pass in the course if he/she 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: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

   (The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)

Semester-End Examination: 50 Marks

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

Web links and Video Lectures (e-Resources):

Suggested Learning Resources:

Books

1. Robotics and Industrial automation by RK Rajput

2. R.K.Mittal and I.J.Nagrath, Robotics and Control, Tata McGraw Hill, New Delhi,4th Reprint, 2005.

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

- Quiz, demonstration

Universal Human Value Course		Semester	6
Course Code	**BVM604**	CIE Marks	100
Teaching Hours/Week (L: T:P:S)	1:0:0:0	SEE Marks	00
Total Hours of Pedagogy	12 hours (2.5 hours per module)	Total Marks	100
Credits	01	Exam Hours	01 Hours
Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Understand the interplay between individual, societal, and global values.
CLO2: Recognize the significance of values in personal and professional life.
CLO3: Students will be differentiated between moral, ethical, and legal values.
CLO4: Students will be able to explain the relationship between values and character development.
CLO5: Students will demonstrate increased empathy and compassion towards others.
CLO6: Students will exhibit a stronger sense of responsibility for their actions and their impact on society.

Module-1

Understanding Human Values

- Definition and nature of values
- Classification of values (personal, social, spiritual)
- Importance of values in individual and societal life
- Value conflicts and dilemmas

Core Human Values

- Truthfulness
- Peace
- Love
- Non-violence
- Compassion
- Respect
- Equality
- Justice
- Tolerance
- Gratitude

Module-2

Value-Based Living

- Integrating values into daily life
- Developing value-based character
- Building strong relationships
- Ethical decision-making
- Social responsibility

- Environmental consciousness

Contemporary Issues and Values

- Global challenges and their impact on human values
- Role of technology in shaping values
- Ethical considerations in business, politics, and media
- Human rights and social justice

Module-3

Understanding Harmony in the Human Being - Harmony in Myself!

- Understanding human beings as a co-existence of the sentient 'I' and the material 'Body'
- Understanding the needs of Self ('I') and 'Body' - happiness and physical facility
- Understanding the Body as an instrument of 'I' (I being the doer, seer and enjoyer)
- Understanding the characteristics and activities of 'I' and harmony in 'I'
- Understanding the harmony of I with the Body: Sanyam and Health; correct appraisal of Physical needs, meaning of Prosperity in detail
- Programs to ensure Sanyam and Health.

Include practice sessions to discuss the role others have played in making material goods available to me.
Identifying from one's own life. Differentiate between prosperity and accumulation. Discuss program for ensuring health vs dealing with the disease

Module-4

Understanding Harmony in the Family and Society- Harmony in Human-Human Relationship

- Understanding values in human-human relationships; the meaning of Justice (nine universal values in relationships) and the program for its fulfilment to ensure mutual happiness; Trust and Respect as the foundational values of relationship
- Understanding the meaning of Trust; Difference between intention and competence
- Understanding the meaning of Respect, Difference between respect and differentiation; the other salient values in relationship
- Understanding the harmony in the society (society being an extension of family): Resolution, Prosperity, fearlessness (trust) and co-existence as comprehensive Human Goals
- Visualizing a universal harmonious order in society- Undivided Society, Universal Order- from family to world family.

Include practice sessions to reflect on relationships in family, hostel and institute as extended family, real-life examples, teacher-student relationship, goal of education etc. Gratitude is a universal value in relationships. Discuss with scenarios. Elicit examples from students' lives

Module-5

Understanding Harmony in Nature and Existence - Whole existence as Coexistence

- Understanding the harmony in Nature
- Interconnectedness and mutual fulfilment among the four orders of nature-

recyclability and self-regulation in nature

- Understanding Existence as Co-existence of mutually interacting units in all-pervasive space
- Holistic perception of harmony at all levels of existence.

Include practice sessions to discuss human beings as the cause of imbalance in nature (the film "Home" can be used), pollution, depletion of resources and the role of technology etc.

Course outcome (Course Skill Set)

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

CO 1: Understanding of core human values: Students grasp the significance of values like honesty, integrity, compassion, and respect.
CO 2: Application of values: Ability to integrate learned values into daily life and professional practices.
CO 3: Critical thinking: Development of analytical skills to evaluate ethical dilemmas and complex situations.
CO 4: Leadership skills: Enhanced potential to inspire and guide others towards positive change.
CO 5: Global citizenship: Fostered awareness of global challenges and a commitment to contribute to a better world.
CO 6: Self-awareness and self-reflection: Students develop a deeper understanding of their values, beliefs, and behaviours.

Assessment Details (both CIE and SEE)

The weightage of Continuous Internal Evaluation (CIE) is 50% and for the 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, the minimum passing mark is 35% of the maximum marks (18 out of 50 marks). The student is declared as a pass in the course if he/she 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: 100 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks
4. The test after completion of 100% syllabus is conducted for 100 marks.
   Two questions are to be set for each module, there are 10 questions with 20 marks each. Each question may or may not have a sub-question. The students have to answer for 100 marks(05 full questions).
5. The sum of the two assignments is scaled down to 50.
6. The marks scored in the test shall be scaled down to 50.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(Teacher may conduct the quiz or presentation or other suitable method of assignment in place of two or one assignment mentioned)

Semester-End Examination:

SEE is Not Applicable

Web links and Video Lectures (e-Resources):

https://onlinecourses.nptel.ac.in/noc23_hs89/preview

https://www.youtube.com/c/UniversalHumanValues

Suggested Learning Resources:
Books

1. Man's Search for Meaning by Viktor Frankl
2. The Power of Now by Eckhart Tolle
3. Ethics and Human Action by Immanuel Kant

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

- Contents-related activities (Activity-based discussions)
- Case studies: Analysing real-world ethical dilemmas to develop critical thinking and problem-solving skills.
- Ethical debates: Engaging in structured debates on controversial topics to explore different viewpoints.
- Ethical dilemmas games: Creating interactive scenarios to practice ethical decision-making in a fun and engaging way.
- Guest lectures: Inviting experts to share their experiences with ethical challenges in their field.
- Organising group-wise discussions on topics.
- Quizzes and Discussions, Seminars and assignments.

MICROCONTROLLER		Semester	6
Course Code	**BVM605**	CIE Marks	100
Teaching Hours/Week (L: T:P:S)	2:0:2:2	SEE Marks	00
Total Hours of Pedagogy	50 (Each Module 10 hours)	Total Marks	100
Credits	04	Exam Hours	03 Hours
Examination type (SEE)	**Theory**		

Course Learning Objectives:

CLO1: Gain knowledge of microcontrollers, microprocessors, Different memory Architecture, interfacing techniques, Assembly and C programming .

CLO2: Understand to generate delays for different time period, exchanging of information between two devices using serial communication.

CLO3: Interfacing the controller to build the real-time applications such as switches, display devices, motors, converters etc.

CLO4: Differentiate between different microprocessor, microcontrollers, memory architecture and different Instruction sets.

Module-1

Introduction to Microcontrollers:

- What is a microcontroller?
- Difference between microprocessors and microcontrollers.
- Basic microcontroller architecture.
- Applications of microcontrollers.

Module-2

Microcontroller Architecture:

- CPU (Central Processing Unit)
- Memory (ROM, RAM)
- Input/Output (I/O) ports
- Timers/Counters
- Serial communication interfaces (UART, etc.)
- Interrupts

Module-3

Programming Fundamentals:

- Introduction to assembly language or C programming.
- Basic programming concepts (variables, loops, conditional statements).
- Microcontroller instruction sets.
- Writing and debugging simple microcontroller programs.

Module-4

I/O Interfacing:

- Digital I/O: controlling LEDs, switches.
- Analog I/O: reading analog sensors.
- Interfacing with external devices.

Module-5

Timers and Counters:

- Understanding timer/counter operation.
- Generating time delays.
- Implementing event counting.

Serial Communication:

- Basics of serial communication.
- UART (Universal Asynchronous Receiver/Transmitter) communication.
- Data transmission and reception.

8051 microcontrollers (a classic, often used for educational purposes)

Course outcome (Course Skill Set)

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

CO 1: Have knowledge of Microcontrollers, Microprocessors, architecture , instruction set, memory concepts , delay generation, interfacing of external hardware peripherals.
CO 2: Describe the concepts of Assembly and C instruction set, memory management, serial communication, interrupt handling and time delay generation using Timer.
CO 3: Compute time delays, baudrates and write program using assembly and C language for different applications like display data on LCD, generate waveforms, temperature controller, keyboard interface and Motors etc
CO 4: Compare between microprocessor, microcontrollers, memory architecture, different Instruction sets and calculate the delay for different time periods

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). The student is declared as a pass in the course if he/she 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: 100 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks
4. The test after completion of 100% syllabus is conducted for 100 marks.
   Two questions are to be set for each module, there are 10 questions with 20 marks each. Each question may or may not have a sub-question. The students have to answer for 100 marks(05 full questions).
5. The sum of the two assignments is scaled down to 50.
6. The marks scored in the test shall be scaled down to 50.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks

(Teacher may conduct the quiz or presentation or other suitable method of assignment in place of two or one assignment mentioned)

Semester-End Examination:

SEE is Not Applicable

Web links and Video Lectures (e-Resources):

https://archive.nptel.ac.in/courses/108/105/108105102/

Suggested Learning Resources:

Books

1. Microcontrollers by V Udeshshankara

2. "The 8051 Microcontroller", Dr. K Uma Rao, Dr. Andhe Pallavi, Sanguine Technical publishers, Bangalore-2009

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

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Hydraulics & Pneumatics			Semester	6
Course Code		**BVM606**	CIE Marks	50
Teaching Hours/Week (L: T:P:S)		1:0:2:2	SEE Marks	50
Total Hours of Pedagogy		40(Each Module 08 hours)	Total Marks	100
Credits		03	Exam Hours	03 Hours
Examination type (SEE)		**Theory**		

Course Learning Objectives:

CLO1: Explain Pascal's Law and its application in hydraulic systems.
CLO2: Describe the properties of hydraulic fluids and their importance.
CLO3: Identify and explain the function of various hydraulic components (pumps, valves, cylinders, accumulators, etc.).
CLO4: Understand the concept of hydraulic servo systems.
CLO5: Explain the properties of compressed air and its behavior.
CLO6: Identify and explain the function of various pneumatic components (compressors, valves, cylinders, actuators, etc.).

Module-1

Introduction

Need and importance of hydraulic and pneumatic, Hydrostatic and hydrodynamic definitions, properties of fluid, Pascal's law, Continuity equation and Bernoulli's equation.

Advantages and limitations of hydraulic and pneumatic systems

Module-2

Hydraulic Pump

Type, construction, working applications and selection criteria. Other Elements such as filters, manifold, receivers, coolers and connecters.

Hydraulic Actuators- Type, working and applications.

Control Valves- Type, designation, symbols, working and applications.

Hydraulic Pipes- Type, materials, designations, pressure ratings and selection criteria. Piping Layout, Concept, rules/norms.

Module-3

Fundamentals of Pneumatics

Compressible fluid flow, mass flow rate.

compressible fluid- Type, properties and applications

Module-4

Pneumatic Element

Pipes- Type, applications and properties.

Air Compressor- Type (Reciprocating and rotary), working and selection.

Pneumatic Cylinders- Type, symbol, cushion, assemblies, mounting and, Pneumatic Valves- Type, symbols, working, applications and selection.

Air Motors- Type, working and applications.

Other Elements - Air receivers, filters, pressure regulator, lubricator.

Introduction to Solenoid valves- their working and types

Module-5

Hydraulic and Pneumatic Circuits

Concept, Meaning and ISO symbols.
Brief on designing of hydraulic and pneumatic circuits.
Applications

Course outcome (Course Skill Set)

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

CO 1: Working principle of various components used in hydraulic & pneumatic systems.
CO 2:learn about various components such as hydraulic Pumps systems, Hydraulic Actuators and Valve
CO 3: To learn about basic principles of Pneumatics
CO 4: To understand pneumatic elements, their working, uses
CO 5: To learn about the hydraulic & pneumatic circuits

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). The student is declared as a pass in the course if he/she 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: 50 Marks

1. Two assignments tests;
2. First assignment after 30% completion of the syllabus for 50 marks
3. Second assignment after completion of 70% of the syllabus for 50 marks(May be quiz or other method of assignments)
4. The test after completion of 90 % syllabus is conducted for 100 marks.
5. The sum of the two assignments is scaled down to 25.
6. The marks scored in the test shall be scaled down to 25.
7. The final marks of the course/subject is the sum of the Assignment marks and test marks **(The class teacher may conduct the quiz/presentations/other suitable methods of assignment in place of two or one test)**

Semester-End Examination: 50 Marks

Question paper pattern:

• The question paper will have ten full questions carrying equal marks.
• Each full question will be for 20 marks.
• There will be two full questions (with a maximum of four sub-questions) from each module.
• Each full question will have sub- question covering all the topics under a module.
• The students will have to answer five full questions, selecting one full question from each module.

Marks scored will be scaled down to 50 marks

Web links and Video Lectures (e-Resources):

https://nptel.ac.in/courses/112105046

Suggested Learning Resources:

Books

1. Fluid Machinery and Pneumatics by RK Hegde

2. Hydraulics by HS Vishwanath

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

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