ವಿಶ್ವೇಶ್ವರಯ್ಯ ತಾಂತ್ರಿಕ ವಿಶ್ವವಿದ್ಯಾಲಯ
("ವಿ ತ ಯು ಅಧಿನಿಯಮ 1994"ರ ಅಡಿಯಲ್ಲಿ ಕರ್ನಾಟಕ ಸರ್ಕಾರದಿಂದ ಸ್ಥಾಪಿತವಾದ ರಾಜ್ಯ ವಿಶ್ವವಿದ್ಯಾಲಯ)
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REF: VTU/BGM/BOS/Syllabus/2024-25/532 DATE: - 3 MAY 2024

CIRCULAR

Subject: 21ME642 - Mechatronics System Design SEE errorregarding...

Reference: The Chairperson opinion dated 02.05.2024

This relates to the subject mentioned above; the Semester End Examinations (SEE) are incorrectly listed in the syllabus for the course/subject "**Mechatronics System Design (21ME642)**" in the 2021 scheme. The following change has to be made:

Course/Subject	SEE (Existing)	SEE (TO BE READ AS)
Mechatronics System Design (21ME642)	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 has to secure a minimum of 35% of the maximum marks meant for SEE.	Theory SEE will be conducted by the University as per the scheduled timetable, with common question papers for the subject (**duration 03 hours)** 1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 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

All the Principals of Engineering Colleges are hereby informed to bring the content of this circular to the notice of all concerned.

Encl: As mentioned above.

03/05/24
REGISTRAR

To,

- **The Principals of all Engineering Colleges under the ambit of the university**

Copy to;

1. The Hon'ble Vice-Chancellor through the secretary to the VC for information
2. The Registrar (Evaluation) VTU Belagavi for information and needful
3. The Director, ITI SMU VTU Belagavi for information and to make provision for uploading of the circular
4. The Special Officer QPDS Examination section for information and needful
5. The Special Officer, academic section for information
6. Office copy

VI SEMESTER

MECHATRONICS SYSTEM DESIGN			
Course Code	21ME642	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

Course objectives:

1. Gain knowledge of basics of Mechatronics system design and sensors.
2. Understanding various techniques of Mechatronics system design for solving engineering problems.
3. Understanding Dynamic responses of systems and Fault detection techniques
4. Determination of optimization solutions, effective decision making, Convert the data in real time interfacing.
5. Understand real time mechatronic system design through case study

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 analysing information.

Module-1 (8 HOURS)

Introduction to mechatronics System Design: Mechatronics Definition, integrated design issues in Mechatronics, the Mechatronics design process, the key elements, Application of Mechatronics.
Sensors in Mechatronics: sensors for motion and position measurement. Force and pressure sensors. Sensors for temperature measurements.

Teaching-Learning Process	1. PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general).

Module-2 (8 HOURS)

Modeling and Simulation of Physical Elements: Operator notation and transfer functions, Block diagrams, manipulations and simulation, block diagram modeling- Direct method and analogy approach, Electrical systems, Mechanical systems **(Rotational and Translational),** electrical Mechanical Coupling, Fluid systems

Teaching-Learning Process	1. . PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general).

Module-3 (8 HOURS)

Dynamic responses of systems and Fault Finding. Modelling of dynamic systems, Terminology, first order systems and second order systems. Fault detection techniques, Parity and error coding checks, Common hardware faults. Microprocessor systems. Emulation and simulation.

Teaching-Learning Process	1. PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general).

Module-4 (8 HOURS)

Signal Conditioning and Real time Interfacing: Introduction, elements of Data Acquisition and Control System, Transducers and Signal Conditioning, Devices for data conversion, Data conversion process, Application software.	
Teaching-Learning Process	1. PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general).
Module-5 (8 HOURS)	
Case Studies: Comprehensive and Data acquisition case studies, data acquisition and control case studies.	
Teaching-Learning Process	1. PowerPoint Presentation, 2. Video demonstration or Simulations, 3. Chalk and Talk are used for Problem Solving (In-general).

Course outcome (Course Skill Set)

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

CO1. Discuss about Mechatronics design process and select the sensor and Actuator for a Mechatronics application

CO2. Explain the Modelling and Simulation of mechanical Elements, electrical Elements, and fluid systems the sensors in mechatronics systems, and Fault detection techniques in Mechatronics.

CO3. Understand the elements of Data Acquisition and Control System, Convert the data in real-time interfacing

CO4. Model the dynamic response of first-order and second-order 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). A student shall be deemed to have satisfied the academic requirements and earned the credits allotted to each subject/ course if the student secures not less than 35% (18 Marks out of 50)in the semester-end examination(SEE), and 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)

Three Tests (preferably in MCQ pattern with 20 questions) each of **20 Marks (duration 01 hour)**

- First test at the end of 5th week of the semester
- Second test at the end of the 10th week of the semester
- Third test at the end of the 15th week of the semester

Two assignments each of **10 Marks**

- First assignment at the end of 4th week of the semester
- Second assignment at the end of 9th week of the semester

Quiz/Group discussion/Seminar, any two of three suitably planned to attain the COs and POs for **20 Marks (duration 01 hours)**

The sum of total marks of three tests, two assignments, and quiz /seminar/ group discussion will be out of 100 marks and shall be **scaled down to 50 marks**

Semester End Examinations (SEE)

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

1. The question paper will have ten questions. Each question is set for 20 marks. Marks scored shall be proportionally reduced to 50 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

Suggested Learning Resources:

Books

1. Mechatronics System Design by Devdas Shetty and Richard A Kolk, Second edition, Thomson Learning Publishing Company, Vikas publishing house, 2001.
2. W. Bolton, "Mechatronics" - Addison Wesley Longman Publication, 1999.
3. Shetty and Kolk "Mechatronics System Design"- Cengage Learning, 2010

Web links and Video Lectures (e-Resources):

- https://nptel.ac.in/

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

- Quiz
- Presentations
- Group Activity