Seat No. _____   Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
M. Sc. INSTRUMENTATION AND CONTROL – SEMESTER 2
SUMMER 2023 EXAMINATION

Course Title: ANALYTICAL INSTRUMENTATION

Course Code: 201390201

Total Printed Pages : 2

Date: 17/04/2023   **Time: 2:00 pm to 4:00 pm**   **Maximum Marks: 50**

Instructions:
- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1   **Answer the following multiple choice questions.**   **(04)**

(1)   Michelson interferometer is used in ....
   (a) FID   (b) NMR   (c) FTIR   (d) ESR

(2)   Called as mirage effect which measures the bending of light due to optical absorption observed by:
   (a) Photothermal lens   (c) Photothermal diffraction
   (b) Photothermal deflection   (d) Photothermal emission

(3)   The study of magnetic dipoles of electronic origin by applying fixed microwave frequencies to sample residing in varying magnetic field.
   (a) Auger spectroscopy   (c) ESR spectroscopy
   (b) NMR spectroscopy   (d) X-ray Spectroscopy

(4)   Nephelometry is the method based on ....process.
   (a) magnetic   (b) optical   (c) electrical   (d) none

Q.2   **Answer in brief and to the Point (2 marks each)**   **(06)**

(1)   Draw the block diagram of Flame Photometer with neat labels.

(2)   Show the basic processes in Photo thermal spectroscopy.

(3)   What information we get from Electron Spin Resonance Spectrometer?

Q.3   (a)   Explain radiation sources used for UV-VIS and IR range.   **(05)**

(b)   Define the term Atomizer. Discuss types of Atomizer.   **(05)**
OR
(b)   Explain Pyroelectirc Detector and list its characteristics.   **(05)**

Q.4 (a) Explain concept of Resonance in Atomic Absorption Spectroscopy (AAS) **(05)** and discuss its components.

(b) What is Raman scattering? Explain Raman Spectrometer. **(05)**

OR

(b) Describe working of Photo-acoustic spectrometer with neat diagram. **(05)**

Q.5 (a) What information is obtained from NMR? With neat diagram explain NMR **(05)** spectrometer.

(b) Describe Quadrupole Mass Spectrometer. **(05)**

OR

(b) Explain the working of FET based pH meter. **(05)**

Q.6 (a) Draw block diagram of High Pressure Liquid Chromatography (HPLC) **(05)** system. Explain function of each block.

(b) Explain Paramagnetic Oxygen Analyzer. **(05)**

OR

(b) List different methods of Thermal Analysis and explain Thermogravimetric **(05)** analysis (TGA).

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Seat No. _____   Enrolment No. _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
M. Sc. INSTRUMENTATION AND CONTROL – SEMESTER 2
SUMMER 2023 EXAMINATION

Course Title: ADVANCED MICROPROCESSOR AND MICROCONTROLLERS

Course Code: 201390202

Total Printed Pages : 2

Date: 19 / 04 / 2023   **Time: 2:00 PM to 4:00 PM**   **Maximum Marks: 50**

Instructions:
- Attempt all questions.
- Numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Q. 1   **Answer the following multiple choice questions.**   **(04)**

(1)   Which flag setting makes the 8086 to work into single step mode?
    (a) Direction Flag   (b) Trap Flag   (c) Auxiliary Flag   (d) None

(2)   If MN/MX pin is at low the 8086 operates in _____ mode.
    (a) Minimum   (b) Maximum   (c) Both A & B   (d) Intermediate

(3)   8086 can employ _____ I/O operations.
    (a) Isolated I/O   (c) Both A & B
    (b) Memory mapped I/O   (d) None of above

(4)   Which Arduino Boards uses the Atmega2560?
    (a) Arduino Micro and Dueb   (c) Arduino Nano and Fio
    (b) Arduino Mega and Mega ADK   (d) Arduino Uno and Robot

Q.2   **Answer in brief and to the Point (2 marks each)**   **(06)**

(1)   What is the role of flag? Enlist different flags used in 8086 microprocessor with its function.

(2)   Write benefits of DRAM over SRAM.

(3)   What is the purpose of PWM Duty Cycle?

Q.3   (a)   Describe the architecture of 8086 microprocessor.   **(05)**

(b)   Explain in detail the memory address generation in 8086.   **(05)**
OR
(b)   Enlist segment registers and its size.   **(05)**
Write a program for 8086 using ADD instruction to multiply two numbers $000A_H$ and 0005_H. Show the verified answer by dry run.

Q.4 (a) Differentiate between minimum and maximum mode of 8086 **(05)** microprocessor and explain maximum mode interface signal.

(b) Describe Hardware organization of the memory address space. **(05)**

OR

(b) Draw a typical memory interface circuit and explain its working in detail. **(05)**

Q.5 (a) With the help of neat diagram explain the interfacing of eight byte-wide **(05)** isolated Output ports of 8086.

(b) Draw the architecture of 8259 programmable interrupt controller and **(05)** explain each block.

OR

(b) Explain type 0, 1, 2, 3 and 4 interrupts in 8086. **(05)**

Q.6 (a) Draw Block Diagram of ATmega328 microcontroller and explain it. **(05)**

(b) Give Comparative account of Arduino Mega, Leonardo & Lilypad. **(05)**

OR

(b) Draw pin diagram of ATmega 328p and explain function of each pin. **(05)**

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Seat No.: _____   Enrolment No.: _____

THE CHARUTAR VIDYA MANDAL UNIVERSITY
M. Sc. INSRUMENTATION AND CONTROL-SEMESTER 2
APRIL 2023 (REGULAR) EXAMINATION

Course Title: Computer Aided Process Control
Course Code: 201390203
Total Printed Pages: 01
Date: 21/04/2023, Friday   Time: 02.00 pm to 04.00 pm   **Maximum Marks: 50**

Instructions:
- Attempt all questions.
- The numbers to the right indicate full marks for each question.
- Make suitable assumptions wherever necessary.

Que 1   **Answer the following multiple-choice questions.**   **(04)**

(1)   _____ : Any variable that causes variation in the controlled variable.
   a) Disturbance   b) Manipulated variable
   c) Error   d) Process variable

(2)   _____ describes the processing actions required to convert raw materials into finished products.
   a) Process model   b) Physical model
   c) Control model   d) Narrative statements

(3)   The operating system kernel is supported by_____ to serve internal and external interrupt demands.
   a) I/O device module   b) Interrupt handling module
   c) Process interface module   d) Language support module

(4)   _____ phase of a software life cycle: The concept is explored and refined, and the client's requirements are ascertained and analyzed.
   a) Specification   b) Requirement
   c) Planning   d) Design

Que 2   **Answer in brief and to the point.**   **(06)**
(1)   With the necessary block diagram, explain the open-loop control system.
(2)   Explain the role of computers in process control.
(3)   Explain computer (PC) based data acquisition system.

Que 3   (a)   Discuss the feedforward control system (FFCS). Give advantages and disadvantages of FFCS.   **(05)**

(b)   Write on the cascade control system. Enlist its features.   **(05)**

OR

(b)   Give an account of a ratio control system.   **(05)**

Que 4   (a)   Give classification of computer-aided process control. Discuss sequential control processes in detail.   **(05)**

(b)   Explain physical and control models.   **(05)**

OR

(b)   Give an account of types of computer control process software.   **(05)**

Que 5   (a)   Explain the single-task operating system.   **(05)**

(b)   Write on control system design using heuristics.   **(05)**

OR

(b)   Write a note on the multi-tasking operating system.   **(05)**

Que 6   (a)   Give an account of the software life cycle.   **(05)**

(b)   Give characteristics of real-time software. Also, discuss design strategies.   **(05)**

OR

(b)   Explain software process models.   **(05)**

THE CHARUTAR VIDYA MANDAL UNIVERSITY
M.Sc. Instrumentation & Control, SEM – II,
April 2023 Examination (Regular)
Power Electronics (201390207)

Date: 25th April 2023   TIME: 02:00 PM TO 4:00 PM   TOTAL MARKS: 50

Q. 1   Choose the correct answer.   **[04]**
(1) Static induction transistor (thyristor family) has _____ on state voltage drop.
    (A) Low   **(C)** Medium
    (B) High   **(D)** Very high
(2) Excitation angle (B) – firing angle (a) = _____
    (A) Reverse angle   **(C)** Overlap angle
    (B) Conduction angle   **(D)** None of above
(3) Constant frequency controlling chopper strategi is known as ____ .
    (A) Time ratio control (TRC)   **(C)** Both (A) & (B)
    (B) Time frequency control (TFC)   **(D)** None of above
(4) The torque and speed of induction motors can be controlled by changing the supply____.
    (A) frequency   **(C)** Both (A) & (B)
    (B) Amplitude   **(D)** None of above

Q.2   Answer the following. (Any three, each two marks)   **[06]**
(1) Write a short note on LASCR.
(2) Write note on DIAC.
(3) Draw circuit diagram for three phase converter system Using Diode
(4) What is the base speed of a motor? How base speed is important for power controlling?

Q.3   (A) Enlist any four thyristors turn on methods in detail.   **[05]**
    (B) Explain thyristor construction & equivalent circuit diagram with characteristics   **[05]**
    graph.
<div align="center">OR</div>
    (B) Write a note on TRIAC.   **[05]**

Q.4   (A) Explain class A: self-commutation by resonating load technique.   **[05]**
    (B) Draw neat circuit diagram and explain phase control method for single phase   **[05]**
    half wave circuit with RL load.
<div align="center">OR</div>
    (B) Elaborate effect of Source impedance on the performance of single-phase   **[05]**
    converters

Q.5   (A) Explain working principle of step-up chopper.   **[05]**
    (B) Explain second quadrant – class B chopper   **[05]**
<div align="center">OR</div>
    (B) With necessary diagram elaborate step up cyclo converter.   **[05]**

Q. 6 (A) Write a note on basic characteristics of DC motor.   **[05]**
    (B) Explain regenerative and dynamic breaking of motor.   **[05]**
<div align="center">OR</div>
    (B) Discussion squirrel cage motor.   **[05]**