FACULTY OF ENGINEERING

B.E. III / IV (Civil) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022

Subject: Structural Engineering Design and Detailing - I (RCC)

Time: 3 Hours   Max. Marks: 75

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1. Under what circumstances a combined footing is necessary.

2. Explain the principles of designing the staging for an overhead tank.

3. How the class -AA tracked AA loading differs from class A loading?

4. When is a 'key' needed in a retaining wall and what is the suitable location for it?

5. Sketch the various components of an Intze tank.

6. Give a detailed note on standard vehicular loadings for bridges.

7. Differentiate between a cantilever and counter fort retaining wall, in terms of their structural action.

8. Explain flange curtailment with the help of a sketch.

9. Write a note on Pigeaud's curves for bridges.

10. Draw the active earth pressure distribution in the Relating wall with sloped back fill.

PART – B (50 Marks)

Note: Answer any three questions. Selecting any one from each unit

UNIT- I (15 Marks)

11. Design the stem and counterfort of a counterfort retaining wall for a leveled back fill of 5 m above the ground level. Unit weight of the back fill is 18 kN/m^3. Angle of repose is 30° and safe bearing capacity of soil is 200 kN/m^2. Adopt M-20 and Fe-415. Sketch the reinforcement details.

OR

12. Design a combined footing connecting two columns of same size and load carrying capacity 1000 kN separated by 3m. If SBC of soil = 150 kw/m^2 use M20 and Fe 415 grade of material. Sketch the reinforcement details.

UNIT-II (15 Marks)

13. Design a rectangular tank 5m x 4m to retain water to a height of 3m (including FB 0.2m). The tank was placed on ground. Use M20, Fe415 grade of material. Sketch the reinforcement details.

OR

14. Compare the designs of a circular tank with flexible base and that with a rigid base for a capacity of one lakh litres. Adopt M-25 and Fe-415. Tank rests on ground.

..2

UNIT-III (20 Marks)

15. (a) Explain the calculation of design moment of bridge decks by using Pigeaud's curve.

 (b) A two-way slab panel of a T-beam bridge for the following data:
   Panel dimension = 4m x 3.5m,
   Live load = 1 RC class AA tracked,
   Average thickness of wearing coat = 70mm,
   thickness of slab = 200mm.

OR

16. Design an interior panel of a T-beam bridge with an effective size of 2.5 m x 4.0 m. Consider at least 3 possible cases of class-A (wheeled) loading. Adopt M-25 and Fe- 415. Thickness of slab may be taken as 250 mm and the average thickness of wearing coat as 75 mm. Sketch the reinforcement details in the slab. Use Pigeaud's Curves.

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FACULTY OF ENGINEERING

B.E. III / IV (EEE/EIE) II – Semester (NON-CBCS) (Backlog) Examination,

March / April 2022

Subject: Microprocessors and Microcontrollers

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1 Name the conditional flags of 8086 microprocessor.
2 Indicate the addressing modes of the following instruction:
   (a) MOV DL, AFh   (b) MOV CL, [BX].
3 What is meant by 'Procedure' in assembler programming?
4 What is the difference between assembly language and machine language?
5 What is an interrupt in 8086?
6 What are the steps in interfacing peripherals with the microprocessor?
7 What is the status of all registers on reset in 8051?
8 How much maximum external program memory can be interfaced with 8051?
9 Mention the addressing modes of 8051 microcontroller.
10 Discuss the difference between the instructions *MOV A, 05H* and *MOV A, #05H*.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 Explain the architecture of 8086 microprocessor with help of a neat schematic.

12 With an example, explain the following 8086 instructions:
   a) POP   b) CMP   c) JNZ   d) NOT   e) SHR.

13 a) Write 8086 Assembly Language Program to multiply two 16-bit numbers.
   b) Explain the following 8086 Directives
   i) ENDM   ii) SHORT.

14 Draw the internal architecture of 8255 and explain its different modes in detail.

15 Draw the pin diagram of 8051 microcontroller and explain each pin function in detail.

16 With examples, explain the typical instruction set of 8051 microcontroller.

17 With neat schematic, discuss the LED and Seven Segment Display interfacing of 8051 microcontroller.

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FACULTY OF ENGINEERING
B.E. III / IV (ECE) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Micro Processors and Micro Controllers

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1 What is the purpose of instruction Queue in 8086?
2 What is the need for addressing mode? Explain advantages of indirect addressing mode.
3 Differentiate between memory mapped I/O and I/O mapped I/O.
4 Explain Synchronous mode instruction format of 8251.
5 Explain the function of the following signals of 8051.
   (i) ALE   (ii) PSEN   (iii) EA.
6 List out the techniques used for passing parameters to procedures.
7 What is the significance of Interrupt Priority Register? Draw and explain it.
8 Write an ALP for 8051 to complement the upper nibble for the given byte 57H.
9 Describe the interrupt vector table of 8051 along with their priorities.
10 Write the differences between MOVX and MOVC instructions of 8051.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) Explain concept of segmented memory. What are its advantages?
   (b) Draw and discuss interrupt structure of 8086 in detail.

12 (a) Draw and explain internal architecture of 8251 USART.
   (b) Describe the interrupt structure of 8086 with necessary diagram.

13 (a) Design a memory interface with the 8086 for the following specification.
     (i) Two 16KB EPROMS ending at FFFFFH
     (ii) Two 16KB SRAM starting from C0000H.
   (b) Explain the operational modes of 8257 DMA controller.

14 Explain the architecture of 8051 with a neat diagram.

15 (a) Explain Special Functional Registers of 8051.
   (b) Draw DAC interface to 8051 and write a program to generate sine wave.

16 (a) Describe the 8051 interface to stepper motor and write a program to rotate it continuously.
   (b) Write a program to interface an LCD to 8051 and display "INDIA".

17 Write short notes on the following:
   (a) 8051 timer and counter.
   (b) Instruction formats of 8086.

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FACULTY OF ENGINEERING

**B.E. III / IV (CSE) II - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022**
Subject: Object Oriented System Development

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1 Explain the importance of modeling.
2 Write notes on Class Diagrams.
3 Describe the structures of state chart diagrams.
4 What are State Machines?
5 What is an artifact?
6 What so you mean by deferred events?
7 Define Unified process.
8 What is a Package?
9 What are work flows?
10 What are Use Cases?

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 Discuss in detail about the Advanced Structural Modeling.

12 (a) Explain about Use-Case diagrams with examples.
    (b) Discuss about Processes and Threads.

13 (a) Explain about Patterns and Frame works.
    (b) Write about Deployment diagrams.

14 (a) Distinguish between analysis and design model workflows in unified process.
    (b) What are the 4P's in the software development? Explain.

15 Describe about
    (a) Design
    (b) Requirements Capture.

16 What are Action States and Activity States? Explain Activity diagram with Swimlanes.

17 Write short notes on:
    (a) Events and Signals
    (b) Unit testing and Integration testing.

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FACULTY OF ENGINEERING
B.E. III / IV (ECE) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Computer Organization and Architecture

Time: 3 Hours   **Max. Marks: 75**
(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1. Differentiate between restoring and non-restoring division algorithm.

2. Show the hardware of signed 2's complement addition and subtraction

3. Distinguish between Direct and Indirect addressing modes with an example.

4. Write the sequence of micro operations for the following instructions
   i) STA   ii) ADD

5. Write the sequence of micro operation for subroutine call Instruction?

6. Determine the number of clock cycles that it takes to process 200 tasks in four segment pipeline?

7. Draw an asynchronous format for serial communication?

8. Specify three modes of DMA operation?

9. Compare between SRAM and an associative memory?

10. Define logical and physical address in a virtual memory?

PART - B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. a) Explain non-restoring division algorithm in detail with numerical example?
    b) Show the hardware required for division algorithm?

12. a) Design a 4-bit common bus using multiplexers and explain its operation?
    b) What is an interrupt? Draw and explain the flow chart of interrupt cycle of a general purpose computer?

13. a) Explain the various addressing modes of computer with examples?
    b) A non-pipeline system takes 50 ns to process a task. The same task processed in a six segment pipeline with a clock cycle of 10 ns. Determine the speedup ratio of the pipeline for 100 tasks. What is the maximum speed up that can be achieved?

14. a) Draw the typical block diagram of a asynchronous communication interface and explain its operation?
    b) Explain source initiated handshaking method for asynchronous data transfer?

15. a) Draw the block diagram of an associative memory and explain its operation in terms of match logic, read and write operations?
    b) Write the merits and demerits of direct, associative and set associative mapping techniques?

16. a) Draw the flow chart of Booth's multiplication algorithm and explain with numerical example?
    b) Explain four possible hardware schemes that can be used in an instruction pipeline in order to   minimize the performance degradation caused by instruction branching?

17. Write short notes on

    a) Programmed I/O

    b) Flynn's classification

    c) Page replacement algorithms

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FACULTY OF ENGINEERING

BE III / IV (MECH/AE) II - Semester (NON-CBCS) (Backlog) Examination,
March / April 2022
Subject: Heat Transfer

Time: 3 Hours   **Max. Marks: 75**
(Missing data, if any, may be suitably assumed)
PART – A
Note: Answer all questions.   **(25 Marks)**

1   Differentiate between three modes of heat transfer.
2   Define thermal conductivity.
3   What is the physical significance of Biots number? Is the Biot number more likely
    to be large for highly conducting solids or poorly conducting solids?
4   Define fin effectiveness. When is the use of fin not-justified?
5   Explain the following terms of forced convection: (a) Displacement thickness
    (b) Momentum thickness (c) Energy thickness.
6   Define local and mean heat transfer coefficients.
7   Explain the following (a) Irradiation, (b) Radiosity (c) Reradiation.
8   State and explain Kirchhoff's law of thermal radiation.
9   Explain the Fouling effects in heat exchanger.
  10 Write the expression for NTU of a heat exchanger.
PART - B
Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 A slab of aluminium 12 cm thick is originally in a temperature of 600°C. It is
   suddenly immersed in a liquid at 100°C resulting in a heat transfer coefficient of
   1250 W/m^{2}K. Determine the temperature at the centerline and the surface 1 minute
   after the immersion. Also calculate the total thermal energy removed per unit area
   of the slab during this period.

12 A copper sphere weighing 3 kg is heated in a furnace to a temperature of 300°C
   and is suddenly taken out and allowed to cool in ambient air at 25°C. It takes 60
   min for the copper sphere to cool down to 35°C, what is the average surface heat
   transfer coefficient?

13 Air at 20°C and 1bar pressure flows over a flat plate at 35 m/s, the plate is 75 cm
   long and is maintained at 60°C. Calculate the heat transfer from the plate per unit
   width of plate. Also calculate the turbulent boundary layer thickness at the end of
   the plate, assuming it to develop from the leading edge of the plate.

14 *A pipe carrying steam has an outer diameter 22 cm and run in a large room*. It is
   exposed to air at a temperature of 30°C. Calculate the loss of heat to surroundings
   per metre length of pipe due to thermal radiation. The emissivity of the pipe surface
   is 0.8. Find the reduction in heat loss if the pipe is enclosed in a 40 cm brick conduct
   of emmisivity 0.9.

                                                                                        ..2

15 A counterflow double pipe heat exchanger is used to heat water using oil as the heating fluid. The heat exchanger area is 16 sq.m and its is observed that water inlet and outlet temperatures are 35ºC and 75ºC while the corresponding oil temperatures are 110ºC and 75ºC. If water flows at the rate of 68 kg/min, calculate the overall heat transfer coefficient for the heat exchanger. Take specific heat of oil as 1.9 kJ/kg °C.

16 (a) Explain the Boiling Heat Transfer Phenomena with a neat sketch.
   (b) Two parallel black pates of 0.5X 1 m are separated by 0.5m distance one plate is at 1100ºC and other at 600ºC. What is the net radiant heat exchange between two plates?

17 Explain the following:-

   (a) Explain the significance of Biot and Fourier numbers.
   (b) Bring out the essential differences between forced convection and free convection in heat transfer.
   (c) Show the various regimes in Pool Boiling and discuss the heat transfer mechanisms in each region in brief.

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FACULTY OF ENGINEERING

BE III / IV (PROD) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: CAD / FEM

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1 Explain the importance of geometric model in CAD.
2 Write short notes on B-Spline Curve.
3 Differentiate between a Plane, Ruled and Tabulated surfaces.
4 Enlist different kinds of transformations which are used for 2D transformations
5 Write the shape functions for quadratic bar element.
6 Write the element stiffness matrix for Truss element.
7 Express the element load vector for uniformly distributed load on beam eleme
8 Write the Strain displacement matrix of constant strain triangular element.
9 Express the material property matrix for axisymmetric element.
10 Write a short note on any FEA software and its features.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11 (a) What do you understand by C_0, C_1 and C_2 continuity conditions in curves?
    (b) Differentiate between Bezier and B-Spline curves.

12 Write the key characteristics of following analytical surfaces.
    (a) Planar surface
    (b) Surface of revolution
    (c) Tabulated cylinder surface.

13 (a) What is rotation transformation? Write the rotation transformation matrix for different axis.
    (b) A line defined by two points A (1, 1), B (2, 4) is rotated by 30^0. Determine the coordinates of transformed line.

14 For the truss shown in fig 1 calculate the nodal displacements and element stresses.
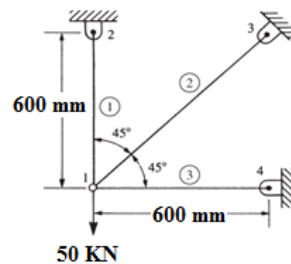(E= 70 GPa. A= 2 cm^2 for all truss members).

Figure1

15 Determine the deflection at the tip of the cantilever for the beam shown in fig2.
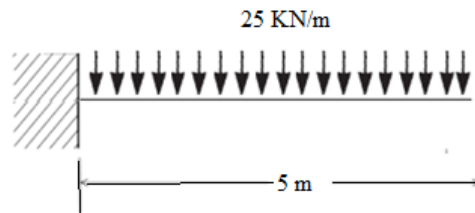   Take I=120 X 10 $^{-6}$m^4, E=200 GPa.

25 KN/m

5 m

Figure 2

16 For the isoparametric, quadrilateral element shown in figure3, determine the Jacobian
   matrix at $= \frac{1}{4}$ and $\eta = \frac{1}{4}$.

Y

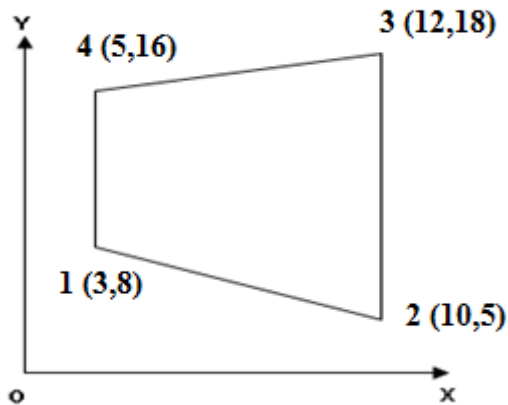4 (5,16)   3 (12,18)

1 (3,8)

2 (10,5)

O   x

Figure 3

17 Determine eigen values and eigen vectors for the following equation.

$$\begin{bmatrix} 3 & -3 \\ -3 & 3 \end{bmatrix} X = \lambda \begin{bmatrix} 2 & 1 \\ 1 & 2 \end{bmatrix} X .$$

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FACULTY OF ENGINEERING

BE III / IV (I.T) II - Semester (NON-CBCS) (Backlog) Examination, March / April 2022
Subject: Object Oriented System Development

Time: 3 Hours   **Max. Marks: 75**

(Missing data, if any, may be suitably assumed)

PART – A

Note: Answer all questions.   **(25 Marks)**

1. Define the term 'Multiplicity'.
2. What is 'Forward Engineering'?
3. What is meant by 'Use Cases' and 'Actors'?
4. Define two UML standard stereotypes (a) Process (b) Threads.
5. What is meant by the term 'Components and classes'?
6. Define the term 'Frameworks'.
7. What is meant by the term Design patterns?
8. Define the term 'Unified Process' is use case driven.
9. What is meant by the term 'Boundary Classes'?
10 Define the role of resting in software life cycle.

PART – B

Note: Answer any five questions.   **(5 x 10 = 50 Marks)**

11. (a) How to model webs of relationship?
    (b) What is well framed model? Explain the rules of UML.

12. (a) How to 'Model multiple flows of control?
    (b) What are the steps involved in 'Modeling Objects that migrate'?

13. (a) Draw the diagram for 'Modeling the realization of use case'.
    (b) What are the steps involved in 'Modeling Architectural Patterns'?

14. (a) Draw the diagram 'Unified Process' as series of work flow ranging from requirements to test.
    (b) Distinguish between 'Iterative and Incremental Models'.

15. (a) Draw the diagram of 'The workers and Artifacts involved when capturing requirements as the use cases'.
    (b) Summarize the workflow of the requirements.

16. (a) What is the importance of model? Explain the principles of models?
    (b) Draw the artifacts of a software intensive system and an overview of UML.

17. (a) Draw the diagrams discussing the 'Transitions'.
    (b) Draw the diagram identifying 'Messeges, Links, Sequencing'.

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