

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester****RCC STRUCTURAL DESIGN - II**

(Civil Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

- 1 Two reinforced concrete columns 800mm X 800mm and 600mm X 600mm in size carry axial loads of 1500kN and 1000kN. The columns are placed at 4m centre to centre. The SBC of the soil is 200kN/m<sup>2</sup>. Design the combined slab type rectangular footing. The cantilever projection available from the centre line of 800mm x 800mm column to property line is 1.5m. Adopt M<sub>20</sub> grade concrete and Fe<sub>415</sub> grade steel.
- 2 Design a combined trapezoidal footing for two columns A and B, spaced 5 metres centre to centre. Column A is 300 x 300 mm in size and transmits a load of 670 kN. Column B is 400mm x 400mm in size and carries a load of 940kN. The maximum length of footing is restricted to 7 metres only. The safe bearing capacity of soil may be taken as 160 kN/m<sup>2</sup>. Use M<sub>20</sub> mix for concrete and Fe<sub>415</sub> steel.

**SECTION - II**

- 3 Design a cantilever retaining wall to retain an earth embankment with a horizontal top 3.2m above ground level. Density of earth is 17 kN/m<sup>3</sup>, angle of internal friction  $\phi=30^\circ$ , SBC of soil is 190 kN/m<sup>2</sup>. Take coefficient of friction between soil and concrete is 0.5. Adopt M<sub>20</sub> grade concrete and Fe<sub>415</sub> steel.
4. Design a counter fort type retaining wall to support an earth fill of 6.0m height above the ground. The safe bearing capacity of the soil at site is 160kN/m<sup>2</sup>. The unit weight of soil may be taken as 16kN/m<sup>3</sup> and an angle of shearing resistance of 33°. Assume the value of coefficient of friction as 0.55. Spacing of counter forts is 3.0m centre to centre. Adopt M<sub>20</sub> grade concrete and Fe<sub>415</sub> grade steel.

**SECTION - III**

- 5 Design a circular water tank with flexible base resting on the ground to store 1,60,000 litres of water. The depth of the tank may be kept 3.2m. Use M<sub>25</sub> concrete and Fe<sub>415</sub> steel.
6. Design an Intze water tank for a capacity of 1.4 million litres, supported on an elevated tower comprising 10 columns. The base of the tank is 18m above ground level and the depth of the foundation is 1.2 m below ground level. Adopt M<sub>20</sub> and Fe<sub>415</sub> grade concrete and steel.

#### SECTION – IV

7. (a) Explain behavior of slab upto failure and yield line pattern for
    - i. One – way slab
    - ii. Two – way slab
  - (b) State the assumptions and guidelines for predicting yield line patterns.
8. (a) Explain yield line theory for the analysis of slab.
  - (b) List the characteristic features of yield lines.

#### SECTION - V

9. (a) Define a prestressed concrete member. Explain the advantages and applications of prestressed concrete.
  - (b) Explain in detail the Gifford Udal system of prestressing with the help of neat sketch.
10. A Simply supported prestressed concrete beam of span 11m is rectangular in section 500mm X 750mm. The beam is prestressed by a parabolic cable having an eccentricity of 200mm at the centre and zero at the end supports. The effective force in cables is 1600kN. If the beam supports a total UDL of 40kN/m which includes the self-weight,
    - (a) Evaluate the extreme fiber stresses at the mid span.
    - (b) Calculate the force required in the cable having the same eccentricity to balance a total load of 50kN/m on the beam.

**III B.Tech. II Semester**  
**CONCRETE TECHNOLOGY**  
 (Civil Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Write the chemical composition of cement and the functions of each composition.
- (b) Explain the general manufacturing procedure of cement.
- 2 (a) Write down the physical properties of
  - (i) Low heat portland cement
  - (ii) Coloured portland cement.
- (b) What are the functions and applications of Water proofers ?

**SECTION - II**

- 3 What is an Alkali-Aggregate reaction ? Explain the various factors promoting the Alkali-Aggregate reaction.
- 4 (a) Explain briefly about pre packed concrete.
- (b) Write short notes on effect of time and temperature on workability of concrete.

**SECTION - III**

- 5 (a) What is Maturity concept of concrete ?
- (b) The strength of a sample of fully matured concrete is found to be 30 MPa. Find the strength of identical concrete at the age of 7 days when cured at an average temperature during day time at 25<sup>0</sup> c, and night time at 10<sup>0</sup> c.
- 6 Explain in detail, how do you conduct the non-destructive testing of concrete using Ultrasonic Pulse Velocity with neat sketches. What are its limitations ?

**SECTION - IV**

- 7 Explain the factors affecting modulus of elasticity of concrete.
- 8 What is Air entrained concrete ? How do you determine the Thermal properties of concrete ?

**SECTION - V**

- 9 Design a concrete mix for construction of an elevated water tank using ACI method for the following data.  
 The specified design strength of concrete is 25 MPa at 28 days measured on standard cylinders. Standard deviation can be taken as 4 MPa. The specific gravity of FA and CA are 2.65 and 2.70 respectively. The dry rodded bulk density of CA is 1600 kg/m<sup>3</sup> and fineness modulus of FA is 2.80. Ordinary Portland Cement (Type I) will be used. A slump of 50 mm is necessary. CA is found to be absorptive to the extent of 1 % and free surface moisture in sand is found to be 2 %. Assume any other essential data suitably.
- 10 (a) What are the factors to be considered in the preparation of design mix?
- (b) Differentiate ACI method and IS method of design mix.



**III B.Tech. II Semester****ENVIRONMENTAL ENGINEERING - I**

(Civil Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Write about various sources of water and their suitability in terms of Quality and Quantity.
- (b) Explain the various factors affecting Per capita Demand.
- 2 Discuss various methods of Population forecasting with model calculations and their suitability.

**SECTION - II**

- 3 (a) Compare the quality of Ground and Surface water.
- (b) Discuss the effects of the following parameters, indicating their permissible limits. Fluorides, Iron, Nitrates, Alkalinity, Hardness and Sulphates
- 4 (a) Explain the theory of sedimentation.
- (b) A Rectangular Sedimentation Basin is to handle 10Ml/day of raw water. A detention basin of width to length ratio of 1/3 is proposed to trap all particles larger than 0.04mm in size. Assuming a relative density of 2.65 for the particles and 20<sup>o</sup>c as the average temperature, compute the Basin dimensions. If the depth of the tank is 3.5m, Calculate the detention time.

**SECTION - III**

- 5 (a) Discuss various mechanisms involved in filtration.
- (b) What are various forms chlorination? Explain Break Point Chlorination.
- 6 Write a note on the following
  - (a) Chlorine demand and Residual Chlorine
  - (b) Chloramines
  - (c) Break point Chlorination

**SECTION - IV**

- 7 Explain How do you remove
  - (i) Fluorides (ii) Hardness (iii) Arsenic (iv) Salinity
- 8 (a) Explain process of removal of Fluorides from water.
- (b) When do you prefer Ion Exchange Process? Explain it.

**SECTION - V**

- 9 (a) Discuss the merits and de-merits of layouts of distribution network with neat sketches.
- (b) Explain the method of estimating the capacity of reservoir using Mass curve technique.
- 10 Explain in detail about methods of Distribution of water with the help of neat sketches.



**III B.Tech. II Semester****MODERN CONTROL THEORY**  
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

Answer **FIVE** Questions, Choosing **ONE** Question from each section  
All Questions carry equal marks

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**SECTION - I**

- 1 Design Lag Compensator for a unity feedback system with open loop transfer function  $G(s)=k/s(1+2s)$  so that phase margin is 40 and steady state error for ramp input is  $\leq 2.0$ .
- 2 Compare the merits and demerits of PI and PID controllers design using Bode plot and Root locus techniques.

**SECTION - II**

- 3 (a) Define controllability and observability. Give the Kalman test for both of them.
- (b) Construct the state model characterized by the differential equation.

$$\frac{d^3 y}{dt^3} + \frac{6 d^2 y}{dt^2} + \frac{11 dy}{dt} + 6y + u = 0$$

- 4 (a) Derive state transition matrix and write its properties.
- (b) Consider the state model for a system characterized by the differential model.

$$\frac{d^3 y}{dt^3} + \frac{6 d^2 y}{dt^2} + \frac{11 dy}{dt} + 6y = u(t)$$

Give the block diagram representation of the state model.

**SECTION - III**

- 5 (a) Explain the linear system with full order state observer with neat block diagram.
- (b) Explain the method of control system design by pole placement.
- 6 Consider the system defined by

$$\dot{x} = Ax, \quad Y = CX$$

$$\text{where } A = \begin{bmatrix} -1 & 1 \\ 1 & -2 \end{bmatrix} \quad C = [1 \quad 0]$$

Design a full order state observer. The desired Eigen values for the observer matrix are  $\mu_1 = -5, \mu_2 = -5$ .

#### SECTION - IV

- 7 (a) What is a singular point? Explain different types of singular points in a non-linear control system based on the location of Eigen values of the system .
- (b) Explain the stability analysis of a non-linear system using phase trajectories.
- 8 Consider a non-linear system described by the equations:
- $$\dot{x}_1 = -x_1 + 2x_1^2 x_2$$
- $$\dot{x}_2 = -x_2$$
- Check the stability of the system by use of variable gradient method.

#### SECTION - V

- 9 (a) State and explain the Liapunov stability problem.
- (b) Consider a nonlinear system described by the equation Investigate the stability of equilibrium state.
- $$\dot{x}_1 = -3x_1 + x_2 \quad \dot{x}_2 = x_1 - x_2 - x_2^2$$
- 10 (a) Derive the necessary and sufficient conditions for the direct method of Lyapunov for the stability of linear continuous autonomous systems.
- (b) Consider a non-linear system described by the equations :  
By using the Krasoviskii method, investigate the stability of the system.

$$\dot{x}_1 = -x_1, \dot{x}_2 = x_1 - x_2 - x_2^3$$



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022  
**III B.Tech II Semester**

**POWER SYSTEMS – II**  
(Electrical & Electronics Engineering)

Time : 3 hours

Max Marks: 60

*Answer FIVE Questions, Choosing ONE Question from each section  
All questions carry equal marks*

**SECTION – I**

1. (a) Draw the phasor diagram of a medium transmission line using nominal T- representation and derive the necessary equations.  
(b) Explain Ferranti effect in a transmission line with a phasor diagram.
2. (a) Explain different methods of voltage control and line compensation.  
(b) Using the nominal  $\pi$  – method ,find the sending end voltage and voltage regulation of 250km 3 –phase ,50 Hz transmission line delivering 25 MVA at 0.8 power factor lagging to a balanced load at 132KV. The line has a series impedance of  $27.5+j97.4$  ohms and shunt admittance  $7.38 \times 10^{-4}$  mho .neglect leakage?

**SECTION – II**

3. (a) Explain with the help of neat diagram the specifications of travelling waves?  
(b) Explain the behavior of travelling wave when it reaches the end of
  - (i) A line connected to cable
  - (ii) Terminated by an impedance equal to its surge impedance
4. (a) Draw the Beweley's lattice diagram and discuss its uses.  
(b) Write short notes on attenuation and distortion.

**SECTION - III**

5. (a) Explain different methods of neutral grounding.  
(b) A 132 kv ,3 phase ,50hz transmission line 192km long consists of three conductors of effective diameter 20mm arranged in a vertical plane with 4m spacing and regularly transposed. Find the inductance and KVA rating of arc suppressor coil in the system.
6. (a) Derive the expression for earth resistance of hemispherical electrode.  
(b) Write short notes on the following
  - i) Soil resistivity
  - b) tolerable step and touch voltage

#### **SECTION - IV**

7. (a) What are the different ways of classifying substations and explain?  
(b) What are the factors to be considered for location and installation of substation?
8. (a) Explain the technical and economical advantages of HVDC system over AC system.  
(b) Explain the types of DC links of HVDC transmission systems.

#### **SECTION - V**

9. (a) What is per unit system? Explain the advantages of per unit system?  
(b) Two generators rated at 10MVA, 13.2 Kv & 15MVA, 13.2KV are connected in parallel to a bus bar. They feed supply to two motors of inputs 8MVA & 12MVA respectively. The rated voltage of motors is 12.5KV. Assuming base quantities as 50MVA, 13.8 KV. Draw the reactance diagram. The percentage of reactance of generator is 15% and that for motor is 20%.
10. (a) Explain the circuit model representation of two winding & three winding transformers.  
(b) Explain the circuit model representation of round rotor synchronous machine.

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B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**  
**POWER ELECTRONICS**  
(Electrical & Electronics Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

- 1 Explain Dynamic characteristics of SCR.
- 2 Write short notes on (i) snubber circuit (ii) turn on methods of SCR.

**SECTION - II**

- 3 Explain 3- $\phi$  fully controlled bridge converter with R-load for  $\alpha=0^{\circ}, 30^{\circ}, 60^{\circ}, 90^{\circ}$
- 4 Draw the circuit diagram of a 3- $\phi$  full converter; explain how the output voltage wave for a firing angle of  $30^{\circ}$  is obtained by using phase voltage and line voltages.

**SECTION - III**

- 5 (a) Derive an expression for output voltage in terms of duty cycle for a chopper in which the output voltage is lesser than the supply voltage.  
(b) Discuss the time ratio control in a dc chopper.
- 6 Explain load commutated chopper and Jones chopper.

**SECTION - IV**

- 7 Explain about current commutation and voltage commutation techniques used for single phase bridge inverter with neat circuits and wave forms.
- 8 (a) Explain different PWM techniques.  
(b) Explain the principle of operation of a 1- $\phi$  half bridge inverter with neat sketch.

**SECTION - V**

- 9 Explain working of 1- $\phi$  step up cycloconverter using bridge type connection for  $f_0=6f_s$ .
- 10 Discuss the operating principle of a mid-point type, 1- $\phi$  to 1- $\phi$  step – down cyclo-converter using wave forms. Indicate the conduction of various thyristors in the waveforms.



**III B.Tech. II Semester****NEURAL NETWORKS & FUZZY LOGIC**  
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Explain about biological Neuron operation.
- (b) Explain about different Activation functions used in Artificial Neuron.
- 2 (a) Mention various activation functions used in artificial neuron model with its response diagram
- (b) Using Delta Learning Rule find the weight vectors to train the following input vectors, initial weight vectors are  $X_1 = [1 \ -2 \ 0 \ -1]^T$ ,  $X_2 = [0 \ 1.5 \ -0.5 \ -1]^T$ ,  $X_3 = [-1 \ 1 \ 0.5 \ -1]^T$  and  $W^1 = [1 \ -1 \ 0 \ 0.5]^T$  and its desired outputs are  $d_1 = -1$ ,  $d_2 = -1$  and  $d_3 = 1$  respectively. Assume the activation function to be bipolar sigmoid function and learning rate coefficient is 0.1

**SECTION - II**

- 3 (a) What are the limitations of single layer perceptron network?
- (b) Explain how a multilayer perceptrons can function as a classifier. Give Examples.
- 4 (a) Explain about Error Back Propagation Algorithm.
- (b) Explain about Radial Basis Function networks.

**SECTION - III**

- 5 (a) Explain about the self-organizing feature maps.
- (b) Explain about the Hamming network and Max network.
- 6 (a) Explain the Winner Take All learning rule and mention its algorithm for training of a neural network.
- (b) Explain about the counter propagation network.

### SECTION - IV

- 7 (a) Differentiate between crisp sets and fuzzy sets and explain the following terms with respect to Fuzzy set.
- (i) Cardinality                      (ii) Convex Fuzzy set                      (iii) Support
- (b) Fuzzy Sets  $\tilde{A}$ ,  $\tilde{B}$  are defined in the interval  $X = \{1, 2, 3, \dots, 10\}$  of real numbers by the membership functions  $\mu_{\tilde{A}} = X/(X+2)$ ,  $\mu_{\tilde{B}} = 2^{-X}$ .
- Determine      (i)  $\tilde{A} \cup \tilde{B}$                       (ii)  $\tilde{A} \cap \tilde{B}$   
                    (iii) Complement of  $\tilde{A}$                       (iv) Complement of  $\tilde{B}$
- 8 (a) Let  $\tilde{A} = \{(x_1, 0.8), (x_2, 0.1), (x_3, 0)\}$  and  $\tilde{B} = \{(y_1, 0.3), (y_2, 1)\}$  be two fuzzy sets defined on the universe of discourse  $X = \{x_1, x_2, x_3\}$  and  $Y = \{y_1, y_2\}$  respectively. Then find the fuzzy relation  $\tilde{R}$  resulting out of the fuzzy Cartesian product  $\tilde{A} \times \tilde{B}$  and  $\tilde{B} \times \tilde{A}$ .
- (b) What are the basic operations on the Fuzzy Sets? Explain them with examples.

### SECTION - V

- 9 (a) Explain various issues involved in Fuzzification Process.
- (b) Define Defuzzification and explain the following methods with an example.
- (i) Centroid method  
(ii) Weighted Average method  
(iii) Centre of Sums
- 10 Let  $X = \{a, b, c, d\}$ ,  $Y = \{1, 2, 3, 4\}$  and
- $\tilde{A} = \{(a, 0), (b, 0.8), (c, 0.6), (d, 1)\}$   
 $\tilde{B} = \{(1, 0.2), (2, 1), (3, 0.8), (4, 0)\}$   
 $\tilde{C} = \{(1, 0), (2, 0.4), (3, 1), (4, 0.8)\}$
- Determine the implication relations
- i. IF x is  $\tilde{A}$  THEN y is  $\tilde{B}$   
ii IF x is  $\tilde{A}$  THEN y is  $\tilde{B}$  ELSE y is  $\tilde{C}$

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester****COMPUTER ORGANIZATION**

(Electronics &amp; Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Explain the basic functional units of a simple computer.  
(b) Explain arithmetic micro operations briefly.
- 2 (a) With an example of each, explain memory reference instructions.  
(b) Draw the block diagram of a bus system connected to four register with information transferred serially from any register to any other register. Use a decoder and multiplexer to select the source register and a decoder to select destination register.

**SECTION - II**

- 3 (a) Explain the difference between Machine Language and Assembly language.  
(b) Explain the concept of Subroutine with example.
- 4 (a) Give the organization of typical hardwired control unit and explain the functions performed by the various blocks.  
(b) Explain the function of a six segment pipeline showing the time it takes to process eight tasks.

**SECTION - III**

- 5 Explain various addressing modes found in modern processors.
- 6 (a) Explain the function of a six segment pipeline showing the time it takes to process eight tasks.  
(b) Given the sequence of control signals to be generated to fetch an instruction from memory in a single-bus organization.

**SECTION - IV**

- 7 Explain the functions to be performed by a typical I/O interface with a typical input output interface.
- 8 (a) Discuss the DMA driven data transfer technique.  
(b) Explain the principle of DMA with a neat Block diagram.

**SECTION - V**

- 9 (a) Explain the organization of magnetic disks in detail.  
(b) Give the basic cell of an associative memory and explain its operation.
- 10 Explain the concept of virtual memory with any one virtual memory management technique.





**III B.Tech. II Semester****DIGITAL DESIGN**

(Electronics &amp; Communication Engineering)

Time : 3 hours

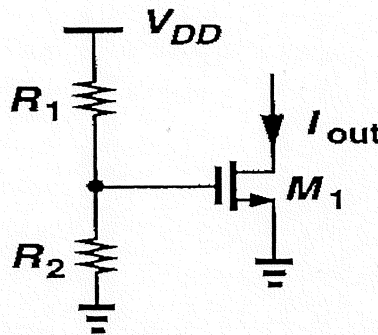
Max. Marks :60

Answer **FIVE** Questions, Choosing **ONE** Question from each section  
All Questions carry equal marks

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**SECTION - I**

- 1 (a) Explain briefly about Transfer characteristics of Differential amplifier;  
(b) Write down Derivation of CMRR in detail.
- 2 (a) For the Circuit shown below determine  $R_2/R_1$ , and also calculate the sensitivity of  $I_{out}$  to  $V_{DD}$ , defined as  $\delta I_{out}/\delta V_{DD}$  and normalized to  $I_{out}$ .



- (b) Write down comparison between cascode and active current mirrors without signal analysis -

**SECTION - II**

- 3 (a) Describe the specifications of Power supply rails for a CMOS logic family.  
(b) Describe the operation basic Emitter-Coupled Logic (ECL) logic gate.
- 4 (a) Summarize the internal three sections of basic TTL-NAND gate circuit.  
(b) Compare TTL, CMOS and ECL logic families.

**SECTION - III**

- 5 (a) Explain the Behavioral model with examples.  
(b) Explain the use of Packages. Give the syntax and structure of a Package in VHDL.
- 6 (a) Describe the syntax and explain the terms in "Package" of VHDL program.  
(b) Develop VHDL code for full adder circuit in data flow modeling.

#### SECTION - IV

- 7 (a) Explain the commercially available MSI device IC 74X138 used as 3-to-8 decoder with gate level circuit diagram and analyze using truth table.
- (b) Develop a behavioral-style VHDL program for 8 input priority encoder.
- 8 (a) Write a VHDL program for Binary to Excess-3 code convertor.
- (b) Write a VHDL program for IC 74x151.

#### SECTION - V

- 9 (a) Model the dataflow-style VHDL for S-R latch. Explain the operation with help of functional table.
- (b) Describe various types of Shift-Registers with its structures.
- 10 (a) Write a short note on Registers.
- (b) Outline the various impediments to synchronous Design

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**  
**OPTICAL COMMUNICATION**  
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Explain the advantages & disadvantages of Optical fibers over Co-axial cables.  
(b) Define acceptance angle. Derive the equation for numerical aperture .
- 2 (a) Discuss merits, demerits and applications of Optical fibers.  
(b) Compare single mode and multi mode in fibers.

**SECTION - II**

- 3 (a) Relate the internally generated power of an LED with the drive current and derive the same .  
(b) Describe about the three key transition processes involved in laser action with necessary diagrams.
- 4 (a) Write notes on reflection fiber noise.  
(b) Explain various fiber splicing techniques.

**SECTION - III**

- 5 (a) Explain the operation of PIN Photo detector with neat sketch.  
(b) Derive the expression for BER in a digital receiver.
- 6 (a) Illustrate the operation of PIN Photo detector.  
(b) Explain principle of photo transistor.

**SECTION - IV**

- 7 (a) Explain about different types of optical amplifiers in detail.  
(b) Explain principle behind semiconductor optical amplifier .
- 8 (a) Discuss any two topologies used in broadcast-and-select network in optical communication.  
(b) Outline the concept of WDM used in optical communication.

**SECTION - V**

- 9 (a) Distinguish between passive and active sensing.  
(b) Write the applications of optical communications in Telephony.
- 10 (a) Write the applications of optical communications in Military  
(b) Explain the components used in optical communication system transmitter.



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**  
**MICROWAVE TECHNIQUES**  
(Electronics & Communication Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

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**SECTION - I**

- 1 (a) Explain why conventional tubes are not used for microwave signal generation.  
(b) Explain about Microwave applications.
- 2 (a) Generate the gain of TWT using propagation constants .  
(b) Illustrate the importance Pi-mode of operation cylindrical magnetron.

**SECTION - II**

- 3 (a) Explain the construction of Gunn diode using RWH theory.  
(b) Discuss the differences between Transferred electron devices and Avalanche transit time devices .
- 4 (a) Derive the criterion for classifying the modes of operation for Gunn effect diodes  
(b) Explain the principle of working of IMPATT diode with suitable structure and characteristics.

**SECTION - III**

- 5 (a) What are S parameters? Write the properties of S matrix.  
(b) Explain the principle of operation of an isolator? What is the significance of using isolator in microwave circuits.
- 6 (a) Develop the relation between cutoff, guided and free space wavelengths from dispersion equation in a waveguide.  
(b) A rectangular waveguide has  $a=4\text{cm}$ ,  $b=3\text{cm}$  as its sectional dimensions. Conclude all the modes which will propagate at 500MHz.

**SECTION - IV**

- 7 (a) Explain in detail about the bolometric method of power measurement.  
(b) Explain the frequency measurement in microwaves.
- 8 (a) Discuss the measurement of impedance using slotted line method.  
(b) Describe the procedure to calculate the Q-factor of cylindrical cavity resonator.

## **SECTION - V**

- 9 (a) Describe the different types of horn antennas.
  - (b) Explain in detail about monolithic MICs.
- 10 What is parabolic Antenna and explain different feedings of it?

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester****MICROPROCESSOR & INTERFACING**

(Common for EEE, ECE, &amp; CSE )

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

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**SECTION - I**

- 1 (a) With a neat architecture and explain the elementary components of a microprocessor.
- (b) Draw and explain the architecture of 8085.
- 2 (a) Explain the General Bus operation of a microprocessor with neat Timing diagrams.
- (b) Explain in brief about the different pins in 8085 microprocessor with pin diagram.

**SECTION - II**

- 3 Write a program for addition and subtraction in 8085 microprocessor.
- 4 (a) What is the difference between Memory mapped & I/O mapped interfacing? Explain.
- (b) Why interrupt is needed in 8085 programming? Explain.

**SECTION - III**

- 5 (a) With a block diagram, explain the various registers that are present in 8086.
- (b) Explain different addressing modes of 8086.
- 6 (a) Write an ALP in 8086 to perform Multibyte BCD addition.  
(Assume suitable input data.)
- (b) With the timing diagram, explain 8086 bus architecture during a write machine cycle.

**SECTION - IV**

- 7 (a) Describe the data transfer schemes (a) Synchronous (b) DMA
- (b) Differentiate Synchronous and Asynchronous data transfer scheme with an example.
- 8 (a) With a block diagram, explain the operation of USART 8251.
- (b) Explain about RS-232 serial communication interface standard.

**SECTION - V**

- 9 (a) Explain how the ROM chips are interfaced to the processor with neat diagram.
- (b) Explain briefly how ADC are interfaced to the processor.
- 10 Draw the interfacing circuitry of DAC with 8086 and write an ALP to generate an Triangular waveform with an amplitude of 5V and a frequency of 2 KHz.





B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**  
**DYNAMICS OF MACHINERY**  
 (Mechanical Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

\* \* \*

**SECTION - I**

- 1 (a) Explain the following.
- (i) Angle of repose
  - (ii) Friction circle
- (b) The pitch of 50 mm mean diameter threaded screw of a screw jack is 12.5 mm. The coefficient of friction between the screw and nut is 0.13. Determine the torque required on the screw to raise a load of 25 kN, assuming the load to rotate with the screw. Determine the ratio of the torque to raise the load to the torque required to lower the load and also the efficiency of the machine.
- 2 (a) A single plate clutch with both sides of the plate effective is required to transmit 25 kW at 1600 rpm. The outer diameter of the plate is limited to 300 mm and intensity of pressure between the plates not to exceed 0.07 N/mm<sup>2</sup>. Assuming uniform wear and coefficient of friction as 0.3, find the inner diameter of the plates and axial force necessary to engage the clutch.
- (b) A centrifugal clutch consists of four shoes, each having a mass of 1.5 kg. In the engaged position, the radius to the centre of gravity of each shoe is 110 mm, while the inner radius of the drum is 140 mm. The coefficient of friction is 0.3. The pre-load in the spring is adjusted in such a way that the spring force at the beginning of engagement is 700 N. The running speed is 1440 rpm. Calculate:
- i) The speed at which the engagement begins
  - ii) The power transmitted by the clutch at 1440 rpm

**SECTION - II**

- 3 In a band and block brake, the band is lined with 14 blocks each of which subtends an angle of 20° at the drum centre. One end of the band is attached to the fulcrum of the brake lever and the other to a pin 15 cm from the fulcrum. Find the force required at the end of the lever 100 cm long from the fulcrum to give a torque of 4000 N-m. The diameter of the drum is 1 m and the coefficient of friction between the block and the drum is 0.25.
- 4 (a) Describe the construction and operation of a prony brake or rope brake absorption dynamometer.
- (b) A car moving on a level road at a speed 50 km/h has a wheel base 2.8 meters, distance of C.G. from ground level 600 mm and the distance of C.G. from rear wheels 1.2 meters. Find the distance travelled by the car before coming to rest when brakes are applied . 1. To the rear wheels 2. To the front wheels and 3 to all the four wheels.
- The coefficient of friction between the tyres and the road may be taken as 0.6.

### SECTION - III

- 5 (a) Explain the following.  
Sensitiveness of governors (ii) Hunting of Governor
- (b) A governor of Hartnell type has equal balls of 3kg initially at radius of 200 mm. The length of bell cranks are 110 mm vertically and 100 mm horizontally. Find (i) Initial compressive force on the spring at a radius of 200 mm at 240 rpm and (ii) the stiffness of the spring required to permit a sleeve movement of 4 mm on a fluctuation of 7.5 percent in the engine speed-
- 6 (a) Explain the following  
Stability of Governors (ii) Isochronism of Governor
- (b) A porter governor has four arms of 30 cm long. The upper arms are pivoted at the axis of rotation and the lower arms are attached to the sleeve at a distance of 3.5 cm from the axis. The mass of each ball is 54 kg. Determine the equilibrium speed for the two extreme radii of 20 cm and 25 cm of rotation of the governor balls and the range of speed -

### SECTION - IV

- 7 The turning moment diagram for a multi-cylinder engine has been drawn to a scale 1mm = 600 N-m vertically and 1 mm = 3° horizontally. The intercepted areas between the output torque curve and the mean resistance line taken in order from one end are as follows : 52, -124, 92, -140, 85, -72 and 107mm<sup>2</sup>, when the engine is running at a speed of 600 r.p.m. If the total fluctuation of speed is not to exceed ± 1.5% of the mean, find the necessary mass of the flywheel of radius 0.5m.
- 8 (a) Explain the turning moment diagram of a four stroke cycle internal combustion engine.
- (b) A machine punching 40 mm diameter holes in 30 mm thick plates requires 7 N-m of energy/mm<sup>2</sup> of shear area. The punch has a stroke of 100 mm and takes 10sec to complete one cycle. The mean speed of the flywheel is 25m/s and the fluctuation of speed should not exceed 3% of the mean speed. Assuming that the motor supplies energy to the machine at a uniform rate. Determine the power of the motor and the mass of the flywheel required.

### SECTION - V

- 9 (a) Discuss the effect of gyroscopic couple on ships.
- (b) A disc with radius of gyration 60 mm and a mass of 4kg is mounted centrally on the horizontal axle of 80 mm length between the bearing. It spins about the axle at 800 rpm in counter clockwise direction when viewed from right hand side bearing. The axle precesses about vertical axis at 50 rpm in C.W direction when viewed from above. Determine the resultant reaction at each bearing due to the mass and gyroscopic effect.
- 10 (a) Write a short notes on gyroscopic couple.
- (b) Find the angle of inclination with respect to the vertical of a two wheeler negotiating a turn. Given: combined mass of the vehicle with its rider 250 kg; moment of inertia of the engine flywheel 0.3 kg-m<sup>2</sup>; moment of inertia of each road wheel is 1 kg-m<sup>2</sup>; speed of engine flywheel 5 times that of road wheels and in the same direction; height of centre of gravity of rider with vehicle 0.6 m; two wheeler speed 90 km/h; wheel radius 300 mm; radius of turn 50 m.

**R-13**

**Code : 13CS3202**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**

**CRYPTOGRAPHY & NETWORK SECURITY**  
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

\* \* \*

**SECTION - I**

- 1 Explain the following :  
(a) Caesar cipher (b) Monoalphabetic cipher (c) Playfair cipher
- 2 Using play fair cipher algorithm, encrypt the message using the key MONARCHY and explain.

**SECTION - II**

- 3 Explain the RSA algorithm in detail with an example.
- 4 Discuss the discrete logarithm and explain Diffie- Hellman key exchange algorithm with its merits and demerits.

**SECTION - III**

- 5 Write about Fermat's and Euler's theorems.
- 6 Explain in detail about the security of Hash functions and MACS.

**SECTION - IV**

- 7 Explain Secure Hash algorithm with example
- 8 Discuss X.509 authentication service in detail.

**SECTION - V**

- 9 List out the participants of SET system and explain in detail.
- 10 Explain :  
(a) SSL (b) TLS



B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY 2022

**III B.Tech. II Semester**  
**COMPILER DESIGN**  
(Computer Science & Engineering)

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

\* \* \*

**SECTION - I**

- 1 (a) Discuss the cousins of the compiler in detail.  
(b) Explain the process of compilation with a neat diagram.
- 2 (a) Discuss in brief about the Role of Lexical analyser in a compiler.  
(b) Explain in brief about Lexical errors .

**SECTION - II**

- 3 (a) Differentiate between Top-down and Bottom Up parsing techniques.  
(b) Describe in brief about LR parsers.
- 4 Construct CLR parsing table for the following grammar.  
 $E \rightarrow E+T/T$   
 $T \rightarrow T * F / F$   
 $F \rightarrow (E) / id$

**SECTION - III**

- 5 Explain constructing Syntax tree for expression with an example
- 6 (a) Explain type expressions in detail.  
(b) Explain about overloading of functions and operators.

**SECTION - IV**

- 7 What is intermediate code? Translate the expression  $(a+b)/(c+d)*(a+b/c)-d$  into quadruples, triples and indirect triples.
- 8 (a) Explain different ways of implementing Three address statements with examples.  
(b) Give Syntax Directed Translation to produce Three-address code for assignment statements.

**SECTION - V**

- 9 (a) What is Register? Explain Register allocation and assignments with examples.  
(b) Generate the code sequence using code generation algorithm for the following expression :  $W=(A-B)+(A-C)+(A-C)$ .
- 10 Why code optimisation phase is optional in compiler? Justify your Answer.



**R-13**

**Code : 13CS32E1**

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, JULY2022

**III B.Tech. II Semester**  
**MOBILE COMPUTING**  
(Computer Science & Engineering )

Time : 3 hours

Max. Marks :60

*Answer FIVE Questions, Choosing ONE Question from each section*  
*All Questions carry equal marks*

\* \* \*

**SECTION - I**

- 1 What is multiplexing? Explain different types of multiplexing.
- 2 Explain i) SDMA ii) FDMA

**SECTION - II**

- 3 Explain the GSM architecture with neat diagram.
- 4 (a) Explain the integration process of tele, bearer and supplementary services through GSM.  
(b) Explain the Handover concept in GSM.

**SECTION - III**

- 5 Describe the process of optimization in mobile IP with a suitable timeline. Diagram.
- 6 Explain Dynamic Host Configuration Protocol.

**SECTION - IV**

- 7 Explain all the enhancements made to classical TCP to make it suitable for mobility.
- 8 (a) What is Selective re-transmission.  
(b) Explain Transaction – oriented TCP.

**SECTION - V**

- 9 Explain component of WAP architecture with neat diagram.
- 10 Explain the WML script used in mobile devices.

