Code No: 15092/AICTE

FACULTY OF ENGINEERING

BE V - Semester (CE) (AICTE) (Main) Examination, July 2021

Subject: Structural Engineering Design & Detailing

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Note: Answer any five questions. **(5x2=10 Marks)**

1 Explain major and minor compounds in cement.
2 Determine modulus of elasticity and flexural strength of M20 grade concrete as per IS 456.
3 Draw the stress strain curve for concrete and explain.
4 What are the limiting values of depth of neutral axis for different grades of steels?
5 Explain anchorage and development length.
6 Summarize the IS specifications required for the shear design.
7 Explain the serviceability in limit state design.
8 Determine balanced percentage of steel for M30 grade concrete and Fe 500 grade steel.
9 What is the maximum and minimum percentage of reinforcement in columns?
10 Distinguish between Uniaxial and Biaxial Bending.

PART – B

Note: Answer any four questions. **(4x15=60 Marks)**

11. (a) Write short notes on (i) Curing of concrete (ii) Admixtures used in concrete (iii) Abraham's water-cement ratio law.
    (b) Differentiate between working stress method and limit state method of design

12. Determine the flexural reinforcement required for an RCC beam of effective dimensions 230 x 350mm subjected to a udl, working load of 30kN/m. The beam is simply supported at the ends on the effective span of 5.0m. Draw neat sketches showing reinforcement details use M20 grade concrete and Fe500 grade steel. Use limit state method.

13. An RCC beam of effective dimensions 250 x 300mm is subjected to a factored load of 25kN/m on an effective span of 6.0m. It is provided with 4 bars of 1.6mm diameter on the tension face. Design the beam for shear reinforcement if 2 bars are cranked at 45^o . Provide suitable vertical stirrups. Use limit state method M20 grade concrete and Fe500 grade steel.

14. Design a section of a ring beam 500 mm wide and 700 mm deep subjected to a bending moment of 140 kNm, twisting moment of 18 Kn-m and a shear force of 50 N at ultimate. Use M30 grade concrete and fe500 grade steel.

15. Design a roof slab for a room 5.00 m x 6.50m clear in size to support a super imposed service load of 6.5 kN/m^2, if two of its adjacent edges are continuous and the other two are discontinuous. Use M20 and fe415 grade steel

16. Design a circular column to carry an axial load of 2000 kN, using lateral ties, helical reinforcement. Use M30 grade concrete and fe500 grade steel.

17. Design a footing for a rectangular column 300 mm X 500 mm carrying an axial service load of 1200 kN. The net bearing capacity of the soil is 130 kN/m^2. Use M20 grade concrete and Fe 500 grade steel.

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Code No: 15098/AICTE

FACULTY OF ENGINEERING

BE V-Semester (EEE/EIE) (AICTE) (Main) Examination, July 2021

Subject: Linear Control Systems

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Note: Answer any five questions. **(5x2=10 Marks)**

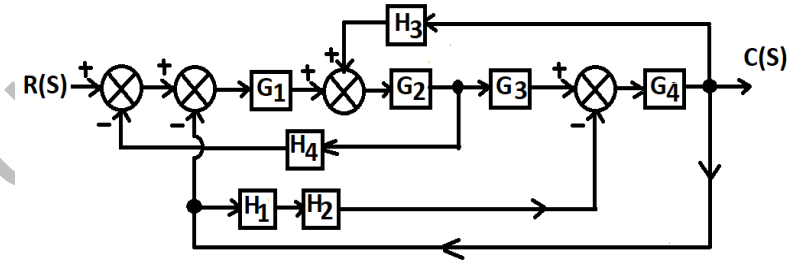
1. Distinguish between Open loop system and Closed loop system.
2. What are the components of feedback control system and draw its block diagram.
3. What is the type and order of the system with the open loop transfer $\mathbf{G(S)} = \frac{\mathbf{10}}{\mathbf{S^2(S^2+6S+10)}}$
4. Classify the systems according to damping ratio ($\boldsymbol{\zeta}$)
5. What is Centroid? How to calculate it?
6. By means of Routh's Criterion , determine the stability of the system represented by the characteristic equation $\mathbf{S^4 + 2S^3 + 10S^2 + 8S + 3 = 0}$
7. Define Resonant Frequency and write its expression.
8. What is Phase cross over frequency and Gain cross over frequency
9. State and prove any two properties of State Transition Matrix $\phi(t)$.
10. Find the controllability of the following system

$$\dot{\mathbf{X}} = \begin{bmatrix} \mathbf{1} & \mathbf{2} \\ \mathbf{2} & \mathbf{-1} \end{bmatrix} \begin{bmatrix} \mathbf{x_1} \\ \mathbf{x_2} \end{bmatrix} + \begin{bmatrix} \mathbf{1} \\ \mathbf{0} \end{bmatrix} \mathbf{u}$$

PART-B

Note: Answer any four questions. **(4x15=60 Marks)**

11. Rearrange the following block diagram in to a single block and obtain the transfer function C/R.



12. If a open loop transfer function of unity feedback control system is given by $\mathbf{G(S)} = \frac{\mathbf{100}}{\mathbf{S(S+10)}}$. Determine Maximum Overshoot, Rise Time, Settling time, Steady State Error if the input is Unit Step.

13. Sketch the root locus of a unity feedback system whose open loop transfer function is given by $\boldsymbol{G(S)} = \frac{\boldsymbol{k}}{\boldsymbol{S(S^2+4S+11)}}$.

14. Plot the Bode Plot for the given System $\mathbf{G(S)} = \frac{\mathbf{10}}{\mathbf{S(1+0.4S)(1+0.1S)}}$. Determine Gain Crossover Frequency, Phase Crossover Frequency.

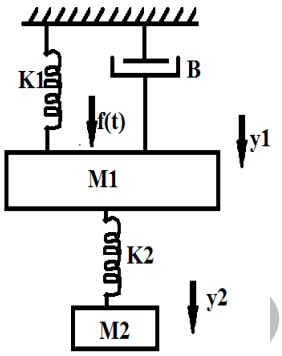
..2..

15. a) Obtain the solution of following Homogeneous state equation.

$$\begin{bmatrix} \frac{dX_1}{dt} \\ \frac{dX_2}{dt} \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -6 & -5 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} \text{ and } X_0 = \begin{bmatrix} 0 \\ 1 \end{bmatrix}$$

b) Determine the State Transition Matrix for $\mathbf{A} = \begin{bmatrix} \mathbf{0} & \mathbf{1} \\ \mathbf{-2} & \mathbf{-3} \end{bmatrix}$

16. a) Determine the transfer function **$Y_2(S)/F(S)$** for the given system shown below.



b) The closed loop transfer function of a second order system is given as $\mathbf{T(S)} = \frac{\mathbf{200}}{(\boldsymbol{S^2+20S=200})}$.
Determine Damping ratio (**ζ**) and the natural frequency of oscillation ($\boldsymbol{\omega_n}$).

17. Write short notes on the following
    a). PID Controllers
    b). Gain Margin and Phase Margin with their expressions
    c). Observability and Controllability

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Code No.15110/AICTE

FACULTY OF ENGINEERING

B.E. V – Semester (ECE) (AICTE) (Main) Examination, July 2021

Subject: Automatic Control Systems

Time: 2 Hours **Max.Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

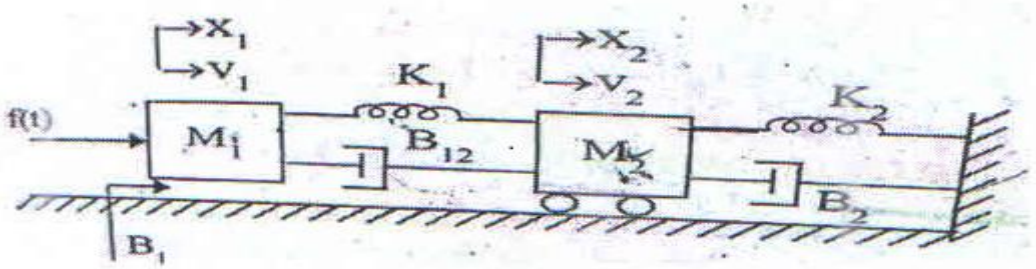
Answer any five questions. **(5x2=10 Marks)**

1 What are the basic components of an automatic control systems?
2 What is PID controller?
3 A second order system has a damping ration of 0.6 and natural frequency of oscillation is 10 rad/sec. Determine the damped frequency of oscillation.
4 Lit the time domain specifications.
5 What is principle of argument?
6 Define a) Gain cross over frequency. B) Phase cross over frequency.
7 What is sampled data control system?
8 Distinguish between discrete time systems and continuous time systems.
9 State the final value theorem with regard to z-transform.
10 What are the advantages of state space analysis?

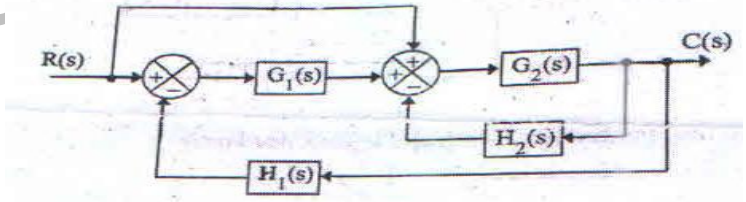
PART – B

Answer any four questions. **(4x15=60 Marks)**

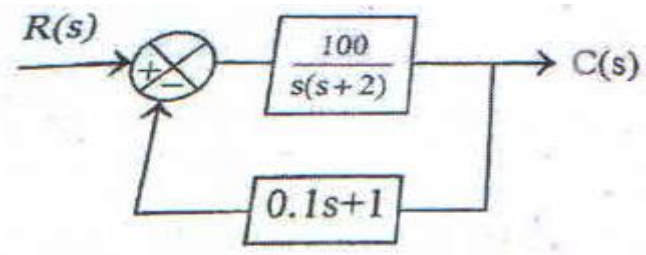
11 Write the differential equations governing the mechanical system shown in the figure below. Draw the force-voltage electrical analogous circuit and verify by writing mesh equations.



12 The block diagram of a loop system is shown in the figure below. Find the C(s)/R(s).



13 a) A positional control system with velocity feedback is shown in the figure below. What is the response of the system for unit step input?



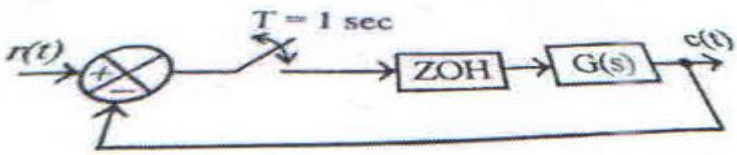
b) Define the various time domain specifications.

..2..

14 A unity feedback control system has an open loop transfer function $G(s)=K/s(s^2+4s+13)$. Sketch the root locas.

15 Draw the bode plot for a system having G(s) H(s)=100/s(s+1)(s+2). Find:
a) Gain margin; b) Phase margin; c) Gain cross over frequency; d) phase cross over frequency.

16 For the sampled data control system shown in the figure below, find the response to unit step input where G(s)=1/(s+1).



17 Write short notes on:

a) Close loop and open loop control system
b) State transition matrix
c) Masons gain formula

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Code No: 15116/AICTE

FACULTY OF ENGINEERING

BE V-Semester (M/P/AE) (AICTE) (Main) Examination, July 2021

Subject: Dynamics of Machines

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions. **(5x2=10 Marks)**

1. Discuss the gyroscopic effect on aeroplanes.
2. What do you mean by dynamical equivalent system?
3. Define Isochronism and Hunting of the governors.
4. Define the term coefficient fluctuation of energy in case to flywheels?
5. How the balancing of several masses revolving in different planes is obtained?
6. Discuss the effect of inertia of a shaft on the free torsional vibrations.
7. What are the causes and effects of vibrations?
8. What is the expression for natural frequency of free longitudinal vibrations?
9. Explain the terms critical damping and over damping?
10. Explain the term logarithmic decrement as applied to damped vibration?

PART – B

Answer any four questions. **(4x15=60 Marks)**

11 (a) The turbine rotor of a ship has a mass of 3500 kg. It has a radius of gyration of 0.45m and a speed of 3000 rpm clockwise when viewed from stern. Determine the gyroscopic couple and its effect when the ship is steering to the left on a curve of 100m radius at a speed of 36 km/hr.

(b) A vertical petrol engine 100mm diameter and 120mm stroke has connecting rod 250mmlong. The mass of the piston is 1.1 kg and the speed is 2000 rpm. On the expansion stroke with a crank 20º from top dead centre, the gas pressure is 700 KN/m^2. Determine net force on the piston and thrust on the cylinder walls.

12 (a) The arms of a porter governor are each 250mm long and pivoted on the governor axis. The mass of each ball is 5 kg and the mass the sleeve is 30 kg. The radius of rotation of balls is 150mm when the sleeve begins to rise and reaches a maximum value of 200mm for maximum speed. Determine the range of speed of the governor.

(b) State the different types of governors. What is the difference between centrifugal and inertia type governors?

13 (a) A shaft fitted with flywheel rotates at 250 rpm and drives a machine. The torque of machine varies in a cyclic manner over a period of 3 revolutions. The torque rises from 750 N-m to 3000 N-m uniformly during half revolution and remains constant for the following revolution. It then falls uniformly to 750 N-m during the next half revolution and remains constant for 1 revolution, the cycle being repeated thereafter. Determine the power required for driving the machine and percentage fluctuation in speed, if the driving torque applied to the shaft is constant and the mass of the flywheel is 500 kg with radius of gyration 600mm.

(b) What is the function of a flywheel? How does it differ from governor?

..2..

14 (a) A single cylinder horizontal engine runs at 120 rpm. The length of stroke is 400mm. The mass of the revolving parts assumed concentrated at the crank pin is 100 kg and the mass of the reciprocating parts is 150 kg. Determine the magnitude of the balancing mass required to be placed opposite to the crank at a radius of 150mm which is equivalent to all the revolving and 2/3 of the reciprocating masses. If the crank turns 30º from the inner dead centre, find the magnitude of the unbalanced force due to the balancing mass.

(b) Explain the terms static balancing and dynamic balancing.

15 (a) Calculate the whirling speed of a shaft which is 20mm diameter and 0.6m long carrying a mass of 1kg at its midpoint. The density of shaft material is $40x10^3$ kg/m^3 and Young's modulus is 200 GN/m^2. Assume the shaft to be freely supported.

(b) A vibrating system consists of a mass of 200 kg, a spring of stiffness 80 N/mm and a damper with damping coefficient of 800 N/m/sec. Determine the frequency of the vibration of the system.

16 (a) A four cylinder engine and a flywheel coupled to a propeller are approximated to a three rotor system in which the engine is equivalent to a rotor of moment of inertia 800 kg-m^2, the flywheel to a second rotor of 320 kg-m^2 and the propeller to a third rotor of 20 kg-m^2. The first and the second rotors being connected by 50mm diameter and 2m long shaft and the second and third rotors being connected by a 25mm diameter and 2mm long shaft. Neglecting the inertia of the shaft and modulus of rigidity as 80 GN/m^2. Determine natural frequency of torsional oscillations and the positions of the nodes.

(b) How the natural frequency torsional vibrations for a two rotor system are obtained?

17 Write short notes on the following

(a) Effect of balancing of reciprocating parts.

(b) Forced vibrations and Resonance.

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Code No: 15126/AICTE

FACULTY OF ENGINEERING

BE V-Semester (CSE) (AICTE) (Main) Examination, July 2021

Subject: Automata Languages & Computation

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Note: Answer any five questions. **(5x2=10 Marks)**

1 Give a R.E for L={w| Na(w)mod 3=0, where w belongs to (a,b)*}
2 Mention closure properties of CFLs
3 State pumping lemma for Regular Languages
4 What are ambiguous grammars? Give an example
5 What is the ID of a PDA? Explain with an example
6 Define PCP with an example
7 What are the reasons for a TM for not accepting the input
8 Halting problem of TM
9 Compare Right Linear and Left Linear grammars.
10 What is UTM

PART – B

Note: Answer any four questions. **(4x15=60 Marks)**

11a) Construct an $\in$ -NFA for the expression: $ab\,((a+b)^* ab\,(a^* + b^*))^*$

b) What is minimization of an FA? Explain with an example

12 a) Construct a CFG for palindrome. Generate (i) 0110110 (ii) 010010

b) Given S→S + S| S * S| (S)|2|3|4 generate LMD, RMD, and parse tree for the string " 2+((3*4)*2) "

13 a) Explain the process of converting CNF into GNF with an example

b) Convert the given grammar to CNF : S →aS | AB | € , A → € , B → € , D → b

14 a) Design a TM to recognize L = {1n2n3n| n >= 1}

b) Design a TM to multiply 2 numbers m and n separated by a 1

15 a) Give short notes on Chomsky Hierarchy

b) P and NP problems.

16 a) Define Recursively Enumerable Languages and their properties

b) Construct DFA for the R.E : 10 + (0 + 11) 0*1

17 a) Explain the process and application of CYK algorithm

b) Design a PDA recognizing the set L of balanced parenthesis

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Code No.15138/AICTE

FACULTY OF ENGINEERING

B.E. V – Semester (IT) (AICTE) Main) Examination, July 2021

Subject: Web Application Development

Time: 2 Hours **Max.Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions. **(5x2=10 Marks)**

1 What is the difference between IP address and domain?
2 Give an example of inline cascading style sheet.
3 Define XML namespace.
4 Give the difference between XML and HTML.
5 Mention JavaScript primitive data types.
6 Mention any one DOM element of JavaScript with example.
7 What do you mean by JQuery CDN?
8 How JSON is better than XML.
9 Name some the directives used in angular JS with their functions.
10 What is Mongo DB?

PART – B

Answer any four questions. **(4x15=60 Marks)**

11 a) What is cascading style sheet and explain different levels of style sheets?
b) Write a HTML program to implement table tag and its attributes.

12 Write XML Schema for the XML document which has the employee details. With the following fields (empno, empname, age, salary). Also assume values of each field.

13 a) How to handle events from body element using JavaScript?
b) Describe the features of JSON.

14 a) Write an angular JS program to validate user input.
b) Describe any two services of angular JS with an example.

15 a) How Kafka best manages messaging system in SMACK, justify.
b) Describe the role of Node .JS in MEAN.

16 a) How to convert JSON text to JavaScript object, with an example.
b) Explain the working of apache Mesos as an distributed system.

17 a) Explain event handling in JQuery with an example.
b) What are the different types of CSS selectors?

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Code No: 14599/CBCS

FACULTY OF ENGINEERING

BE V-Semester (CE) (CBCS) (Backlog) Examination, July 2021

Subject: Concrete Technology

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions. **(5x2=10 Marks)**

1 What are the effects of hot weather on fresh concrete?
2 Differentiate between mineral and chemical admixtures.
3 Give any three advantages of fiber reinforced concreter?
4 What is shrinkage of concrete?
5 Explain the Abraham's law.
6 What is the difference between segregation and bleeding?
7 Write a shot note on thermal properties of concrete.
8 What is heat of hydration?
9 Define workability of concrete.
10 What are the grade of cement? Which grade of cement should be used in RCC?

PART – B

Answer any four questions. **(4x15=60 Marks)**

11 (a) What are the different types of cement and their composition.
(b) Explain Gel theories.

12 (a) Explain in detail various classification of aggregates.
(b) Why sieve analysis is done for grading of aggregate.

13 (a) Explain properties of fresh concrete.
(b) Why vibration is done to concrete and types of vibrators used.

14 (a) Explain micro cracking of concrete.
(b) Explain the properties f hardened concrete.

15 (a) What is the use quality control in civil engineering.
(b) What is the difference between IS code and British code.

16 Define admixture and why it is used in self-compacting concrete.

17 Explain in detail about FRC and types of fibers.

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Code No. 14610/CBCS

FACULTY OF ENGINEERING

B. E. V – Semester (CBCS) (EEE/Inst.) (Backlog) Examination, July 2021

Subject: Electrical Measurements and Instrumentation

Time: 2 hours **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any five questions. **(5x2 = 10 Marks)**

1. Explain the importance of damping torque.
2. Define 'Accuracy' and 'Precision'.
3. List out a meter which does not require any controlling force. Explain why?
4. What is the importance of Driving Torque in Energy Meter?
5. What is Desauty's bridge?
6. What is a strain guage?
7. Draw the hysteresis loop with all specifications.
8. Define (i) Nominal ratio (ii) Turns ratio.
9. What are the differences between AC polar and co-ordinate type Potentiometer?
10. Give some applications of CRO.

PART – B

Note: Answer any four questions. **(4x15 = 60 Marks)**

11. Explain the constructional details and working principle of single phase Electrodynamometer type wattmeter and also derive an expression for deflecting torque.

12. (a) Describe Schering Brdige for the measurement of capacitance and 'loss Angle' of unknown capacitors. Draw the phasor diagram and derive the necessary equations of the bridge under balance conditions.
    (b) Explain the operation of Wanger's earthing device.

13. (a) Explain the working of Weston type of synchroscope, with the help of neat diagram.
    (b) A 230V, 50Hz, Single phase energy meter has a constant of 1200rev/KWh. Determine the speed of the disc in rpm for current of 10A at a power factor of 0.8 lagging.

14. (a) Explain how B-H curve is determined by step by step method.
    (b) List the differences between Current transformer and potential transformer.

15. (a) Describe the circuit of a Kelvin's double bridge and obtain the value of low resistance.
    (b) Explain the construction and operation of single phase electrodynamometer type power factor meter.

16. Explain with the help of neat diagram, the construction and working of AC coordinate type potentiometer.

17. Answer any two of the following:
    (a) Determination of Hysteresis loop using CRO.
    (b) Reactive power measurement.
    (c) Calibration of Wattmeter using DC Potentiometer.

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Code No: 14624/CBCS

FACULTY OF ENGINEERING

B.E. V-Semester (CBCS) (ECE) (Backlog) Examination, July 2021

Subject: Digital Signal Processing

Time: 2 hours **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any five questions. **(5x2 = 10 Marks)**

1. Write any two differences between DFT and FFT?
2. Compute the circular convolution of a sequences $x_1(n)=\{1,2,-3,4\}$, $x_2(n) =\{2,3,-1,1\}$?
3. State any two properties of DFT?
4. What are two properties of Butterworth filter?
5. Write any two differences between Analog and Digital filter?
6. Write the characteristic features of Hamming window?
7. What is anti aliasing filter?
8. List the application of multirate signal processing.
9. Write any two differences between Von Neumann and Harvard architecture?
10. List the on-chip peripherals in TMS320C54xx processor.

PART – B

Answer any four questions. **(4x15 = 60 Marks)**

11. Determine the 8-point DFT of the sequence x(n) = {2,1,3,4,5,4,2,3} using DIFFFT algorithm?

12. Design a Butterworth digital IIR low pass using Bilinear transformation by taking T=1 sec, to satisfy the following specifications.
    $0.6 \le H(ejw) \le 1.0$; for $0 \le w \le 0.35\pi$
    $H(ejw) \le 0.1$; for $0.7\pi \le w \le \pi$

13. Design a linear phase FIR band pass filter to pass frequencies in the range 0.4π to 0.65π rad/sample by using Hanning window sequence and N=9 ?

14. (a) Explain any two application of multirate signal processing.
    (b) Consider a discrete time signal given by x(n)={1,3,5,6,4,7,9}. Determine the up sampled version of the signal for the sampling rate factor I=2?

15. (a) Explain circular addressing modes of TMS320C54XX processor?
    (b) Draw and explain the functional block diagram of TMS320C54xx Processor?

16. (a) Obtain the direct form I, Direct form II realization for the following Systems
    $y(n)=0.1y(n-1)+0.5y(n-2) + 0.4y(n-3)+ 0.3x(n)+0.7x(n-1)+0.8x(n-2)+2\,x(n-3)$
    (b) What is the relation between analog and digital frequency in impulse invariant transformation?

17. Write short notes on following.
    (a) Overlap add method of convolution.
    (b) Sampling rate conversion by an arbitrary factor.

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Code No: 14630/CBCS

FACULTY OF ENGINEERING

BE V-Semester (CBCS) (M/A.E) (Backlog) Examination, July 2021

Subject: Heat Transfer

Time: 2 Hours **Max. Marks: 70**

Missing data, if any, may be suitably assumed

PART – A

Note: Answer any Five Questions **(5x2= 10 Marks)**

1. Explain the mechanisms of heat conduction in gases, liquids and solids.
2. Define thermal conductivity? What is its dimension?
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 ones?
4. Define fin effectiveness. When is the use of fin not-justified?
5. What do you mean by thermal boundary layer? How do the ratio δ/δ_t vary with prandtl number?
6. Define local and mean heat transfer coefficients. On what factors do the value of h depends?
7. Explain Kirchhoff's law of Radiation. What do you mean by the statement: A perfect absorber of radiant energy is also a perfect emitter?
8. How does an enclosure with a small hole in it behave as a black body?
9. What do you mean by fouling factor? What are the causes of fouling?
10. Define effectiveness and NTU of a heat exchanger?

PART – B

Note: Answer any Four Questions **(4x15= 60Marks)**

11. A 1mm diameter electrical wire is covered with a 2-mm thick layer *of plastic* insulation (k = 0.5 W/m K). The wire is surrounded by air with an ambient temperature of 25°C and h = 10 W/m^2 K. The wire temperature is 100°C. Determine the rate of heat dissipated from the wire per unit length with and without insulation. Find the radius of insulation when the rate of heat dissipation is maximum. What is the maximum value of this heat dissipation?

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? Take density of copper sphere=8950 kg/m^3 and specific heat C_p= 0.383 Kj / kg°C. State the assumptions made and derive the relation used.

..2

13. List various parameters which influence the natural convection heat transfer. Explain each parameter which inference the process.

14. A pipe carrying steam has an OD of 20 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 that loss if the pipe is enclosed in a 40 cm brick conduct of emmisivity 0.9.

15. A process industry employs a counter-flow heat exchanger to cool 0.8 kg/s of oil (C_p = 2.5 kJ/kgK) from 120°C to 40°C by the use of water entering at 20°C. The overall heat transfer coefficient is estimated to be 1600 W/m^{2}K. It is assumed that the exit temperature of water will not exceed 80°C. Using NTU method and taking NTU = 4 in this case, calculate the following:-
    (i) Mass flow rate of water.
    (ii) Surface area required.
    (iii) Effectiveness of heat exchanger.

16. A long steel cylinder 12cm in diameter and initially at 20^{0}C is placed into a furnace at 820^{0}C with the local heat transfer coefficient h=140 W/m^2 K. Calculate the time required for the axis temperature to reach 800^{o}C. Also calculate the corresponding temperature at a radius of 5.4cm at that time. The physical properties of steel are α=6.11X10^{-6} m^2/h, K=21 W/m K.

17. (a) Explain the Boiling Heat transfer Phenomena , its types and applications.
    (b) Derive the expression for LMTD in parallel flow heat exchangers.

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Code No. 14635/CBCS

FACULTY OF ENGINEERING

B.E. (Prod.) V –Semester (CBCS) (Backlog) Examination, July 2021

Subject: Machine Tool Engineering

Time: 2 hours **Max. Marks: 70**

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any five questions. **(5x2 = 10 Marks)**

1 Mention the important features of HSS and Carbide tool materials.
2 Show the machining forces induced in turning operation.
3 Define tool life. State the Taylor's tool life equations.
4 Differentiate drilling, boring and reaming operations.
5 Sketch the twist drill geometry and show its nomenclature.
6 Mention the important operations on lathe machine.
7 Write about the broaching operation and its applications.
8 Mention the different types of cutting fluids.
9 Write about the tool holding devices on lathe machine with their suitable applications.
10 Define machinability. What is machinability index?

PART – B

Answer any four questions. **(4x15 = 60 Marks)**

11 Draw neatly, the merchant circle of machining forces and show its nomenclature. Write all the governing equations that are used in the analysis of metal cutting.

12 Explain the sources of heat generation in metal cutting. Show its distribution. Explain the working principle of tool-work thermocouple for cutting temperature measurement.

13 Explain the constructional details of lathe machine with neat figure.

14 Give comparison of shaper, slotter and planar machines. Explain the quick return mechanism with neat figure.

15 Explain the constructional details of column and knee type horizontal milling machine with neat figure. Differentiate up-milling and down-milling techniques.

16 What is the importance of grinding process? Explain the designation of grinding wheel. Give the classification of grinding machines.

17 a) Explain the principle of thread chasing operation.
b) Explain the principle of gear hobbing process.

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Code No: 14642/CBCS

FACULTY OF ENGINEERING

BE V-Semester (CSE) (CBCS) (Backlog) Examination, July 2021

Subject: Automata Languages and Computation

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions. **(5x2=10 Marks)**

1 Mention closure properties of Regular Languages.
2 Construct a DFA for L={w | | w | mod 5=0}
3 State pumping lemma for CFLs.
4 Construct a CFG for 0*1(0+1)*
5 Give an application for CYK algorithm.
6 What are ambiguous grammars? Give an example.
7 What is ID of a Turing machine? Give an example.
8 Construct a TM for adder function.
9 Define PCP with an example.
10 Define CHURCH's hypothesis.

PART – B

Answer any four questions. **(4x15=60 Marks)**

11 (a) State and prove pumping lemma for Regular Languages.
(b) Construct an NFA without ϵ transitions for the given €–NFA {0"1"2" | *n*≥*o*}

12 (a) Construct a CFG for balanced parenthesis and generate the strings
(i) (( )) (ii) (( ) (( )))
(b) Given E→+EE | *EE | -EE | x | y, generate LMD, RMD and parse tree for the string "+*-xyxy"

13 (a) Convert the given grammar to CNF: S→aS | AB | €, A→€, B→€,D→b
(b) Construct a PDA for L={wCw^r, where w belongs to {0,1}*}

14 (a) Design a TM to compute 2n, n>=1
(b) Design a TM which recognizes equal number of a's and b's

15 (a) Explain Universal Turing Machine.
(b) Give short notes on Chomsky Hierarchy

16 (a) Differentiate between FA, PDA and TMs.
(b) Explain the process of converting CNF into GNF with an example.

17 (a) Write notes on P and NP Problems.
(b) Define Regular Expressions, Give a regular expression for strings containing not more than 3 a's given Σ={a,b}

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Code No: 14651/CBCS

FACULTY OF ENGINEERING

BE V -Semester (IT) (CBCS) (Backlog) Examination, July 2021

Subject: Automata Theory

Time: 2 Hours **Max .Marks: 70**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any five questions. **(5x2=10 Marks)**

1 Define DFA and give applications of FA.

2 draw a FA that accepts even number of 'a's followed by odd number of 'b's over alphabet Σ={a,b}.

3 Construct ε-NFA for the regular expression (a+bb+c*).

4 List the closure properties of a regular language.

5 Define left most and right most derivation. Give an example.

6 Write the CFG for Regular Expression 0*1(0+1)*.

7 What do you mean by (a) PDA by empty stack (b) PDA by final state.

8 Explain instantaneous description for a PDA with an example.

9 What is a restricted Turing Machine?

10 When does a Turing machine halt?

PART – B

Answer any four questions. **(4x15=60 Marks)**

11 (a) Design a DFA to accept $L=\{(ab)^n \mid n>1\}$

(b) Convert the constructed DFA in 11(a) to NFA.

12 Convert the DFA given below to regular expression, R_{13}^3 using.
$R^k_{ij} = R^{k-1}_{ij} + R^{k-1}_{ik}(R^{k-1}_{kk})^* R^{k-1}_{kj}$. Show detailed working steps in Basis and Induction.

δ	0	1
→q1	q2	q1
q2	ϕ	q3
*q3	q3	q2

13 (a) Explain about decision properties of CFL.

(b) Show that the following grammar is ambiguous.

S→a S b S

S→b S a S

S→ε

14 Construct a PDA equivalent to CFG.

S→0BB, A→00 | B, B→0s | 1S | 0

15 Design a TM for accepting the language, $L=\{a^n b^n c^n \mid n\geq 1\}$

16 Define CNF. Illustrate the steps needed to generate Chomsky normal Form of CFL
S->0A0 | 1B1 | BB, A->C, B->S | A, C->S | ε.

17 (a) Explain Reduction and show that a language that is not recursive is undecidable.

(b) Obtain a regular expression for the language

a) $L=\{a^n b^m / m>=1, n>=1, nm>=3\}$

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Code No. 14084

FACULTY OF ENGINEERING

B.E. 3/4 (Civil) I-Semester (Backlog) Examination, July 2021

Subject: Theory of Structures-I

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 Define Kinematic Indeterminancy.

2 Write the fixed end moments on a beam of a length L subjected to

a) a uniformly distributed load 'W' kN/m throughout the beam

b) settlement of the right end support by 'Δ' units

3 What is the stiffness factor used for a member with one end simply supported in moment distribution method?

4 Why is sway correction factor used in moment distribution method? Explain.

5 What are the advantages of Kani's method over the slope-deflection method?

6 Differentiate between the distribution factors in moment distribution method and the rotation factors in Kani's method of analysis of frames.

7 Define Eddy's theorem.

8 Define the two theorems of Castigliano and state their specific applications.

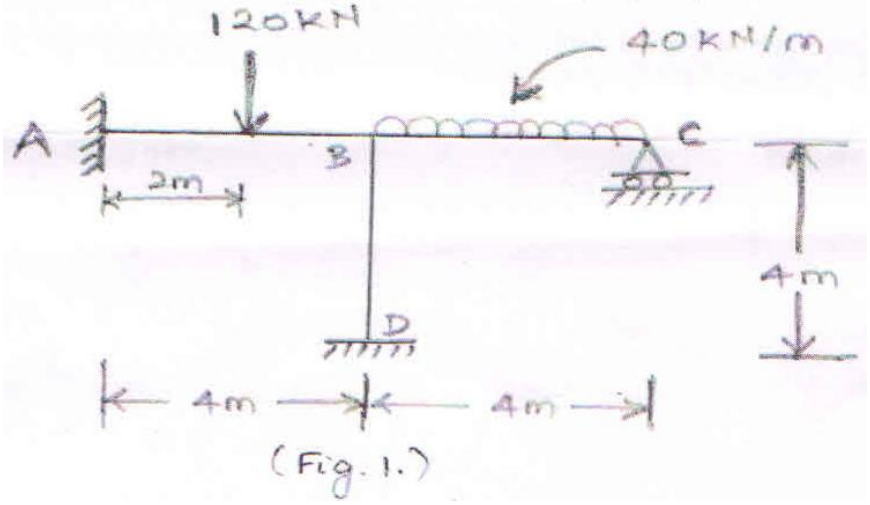
9 Draw the bending moment diagram for a three hinged arch subjected to a point load of W at the crown, which has a span length L and rise h.

10 What are the different types of arches? How does an arch differ from a beam?

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 Analyse the frame shown in figure below (Fig.1) by slope deflection method and draw the bending moment diagram. Assume same flexural rigidity (EI) for all members.



(Fig. 1.)

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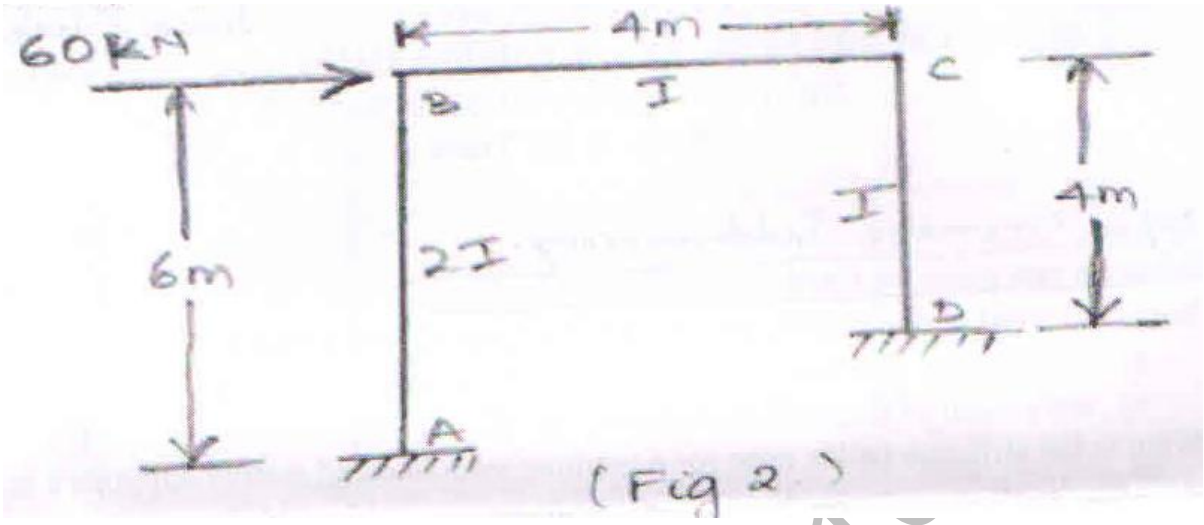
12 Analyse the rigid frame shown in figure (Fig 2) by moment distribution method including sway effects.



(Fig 2)

13 Analyse the rigid jointed frame shown in Figure (Fig.3) by Kani's method.

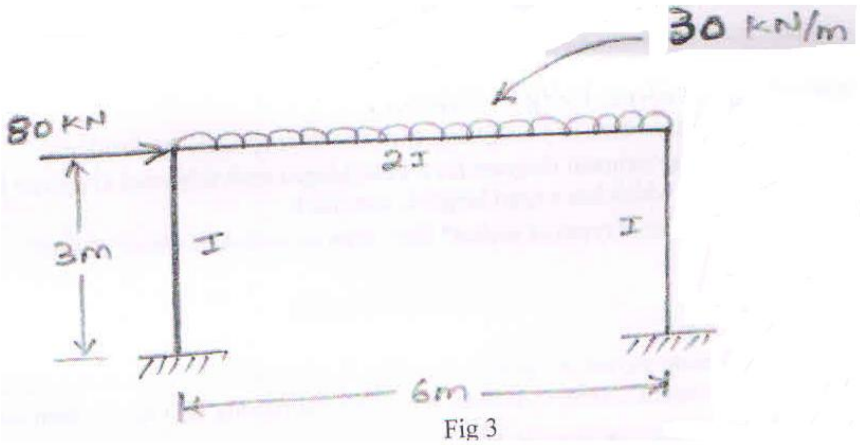


Fig 3

14 Determine the vertical displacement of joint A in the figure shown below (Fig.4). Take A=1000 mm^2 and E=200 kN/mm^2.

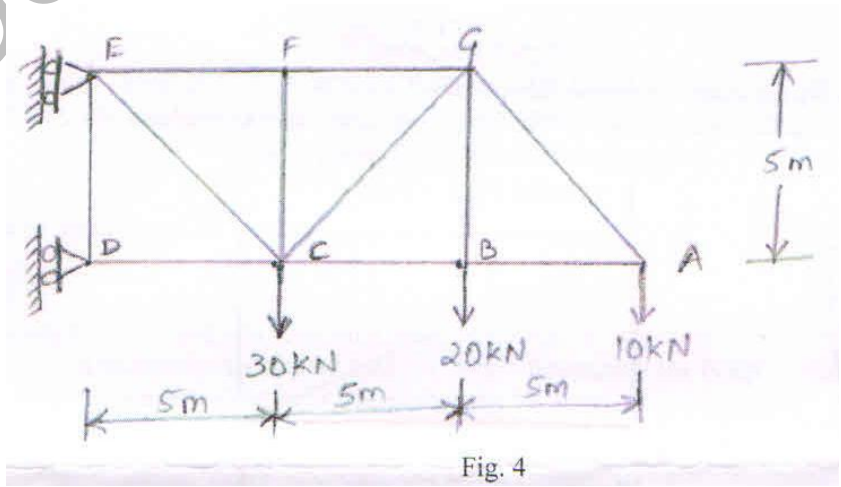


Fig. 4

15 A two-hinged parabolic arch is loaded as shown in the figure(Fig.5). Determine the horizontal thrust, moment, radial shear and normal thrust at D.

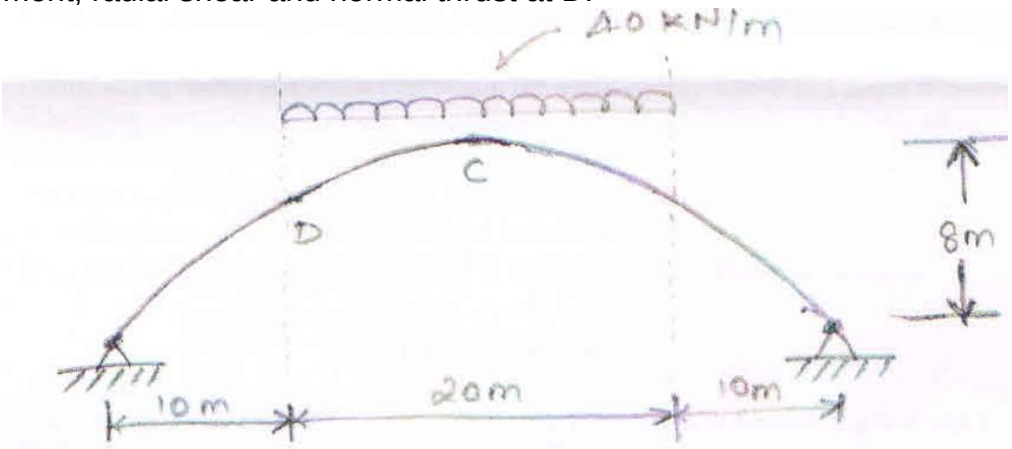
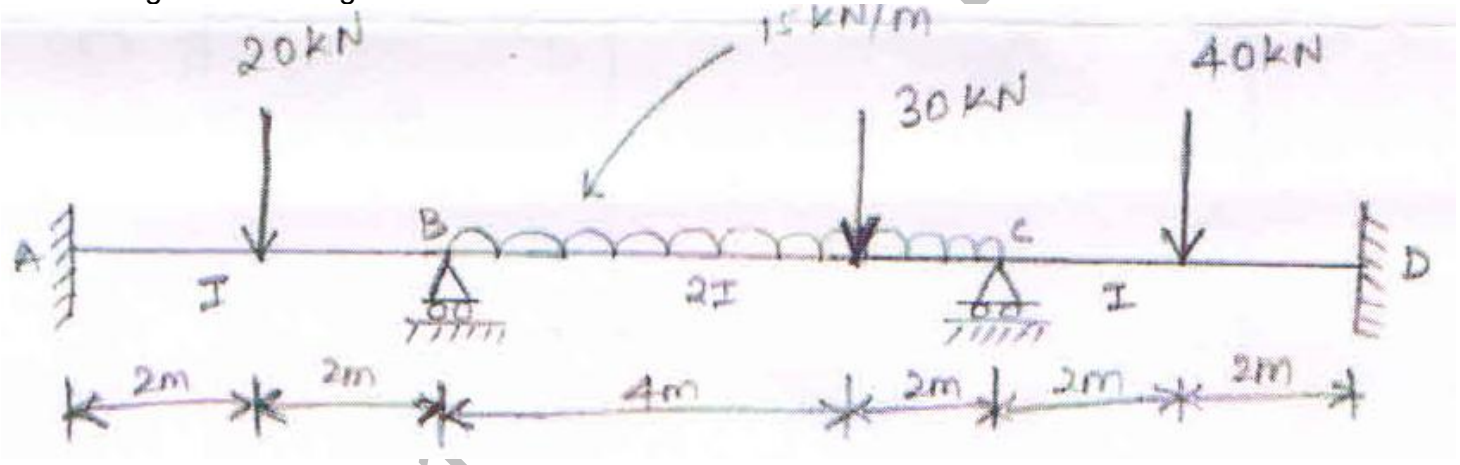


Fig. 5

16 Analyse the continuous beam shown below figure (Fig. 6) by Kani's method. Draw the bending moment diagram.



17 Determine the displacement in vertical direction of joint C of the frame shown in the figure (Fig.7). Area of cross section of each members is 800 mm^2 and E = 200kN/mm^2.

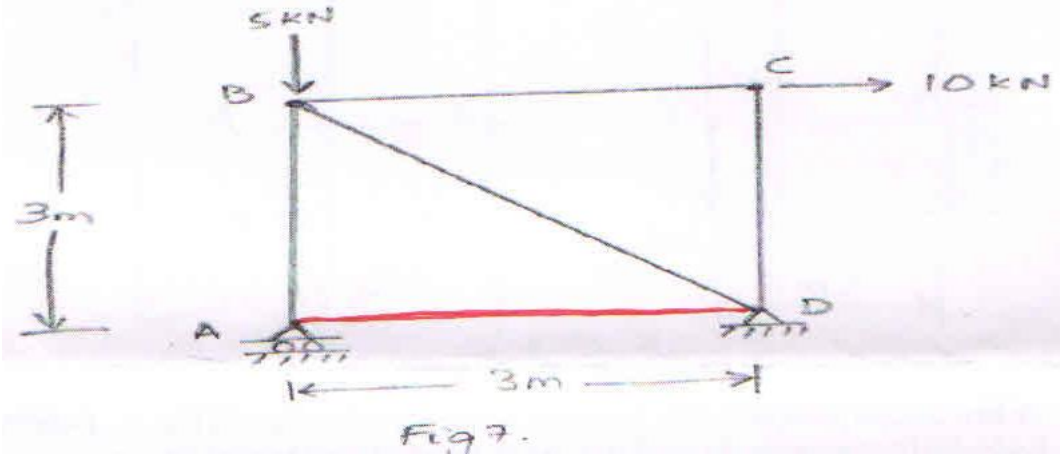


Fig 7.

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Code No: 14090

FACULTY OF ENGINEERING

BE 3/4 (EEE/Inst.) I - Semester (Backlog) Examination, July 2021

Subject: Power Electronics

Time: 2 Hours **Max. Marks: 75**

Missing data, if any, may be suitably assumed

PART – A

Note: Answer any Seven Questions **(7x3= 21 Marks)**

1. What are the different types of power diodes? State the limitations of Schottky diodes.
2. Discuss latch-up in IGBT.
3. Why enhancement type Power MOSFETs are preferred over depletion type Power MOSFETs?
4. Distinguish line commutation and forced commutation.
5. Discuss the effect of source inductance on the performance of 1-ϕ full converter.
6. Brief about full-converter operates in inversion mode with relevant waveforms.
7. Sketch the variants of two quadrant choppers with neat circuit diagrams.
8. Draw Cuk regulator circuit diagram.
9. List the applications of Inverters.
10. Define amplitude modulation index and frequency modulation index in sinusoidal pulse width modulation.

PART – A

Note: Answer any Three Questions **(3x18= 54 Marks)**

11. a) Explain the working with neat structure of power IGBT and plot its output characteristics.
    b) Draw and explain two transistor analogy of SCR.

12. a) Discuss about isolated and non-isolated driver circuits for MOSFET.
    b) Discuss dv/dt protection of SCR and deduce related the expression.

13. a) A single-phase fully controlled bridge rectifier is supplied at 230 V rms and at a frequency of 50Hz. The Source inductance L_s = 5 mH and the load current on the DC side is constant at 12 A. Calculate a) firing angle b) overlap angle.
    b) Write about control strategies of choppers with relevant diagrams.

14. a) A 1-ϕ full controlled bridge rectifier is supplied from a 230 V ac source with a load resistance of 10 ohms. If the firing angle is 30^0 find i) the average load voltage ii) the average load current iii) RMS load current and iv) Power supplied to the load.
    b) Derive voltage gain expression for Boost chopper.

15. a) Explain the operation of a 1-ϕ AC voltage controller with RL-load.
    b) Explain the working of 1-ϕ to 1-ϕ step-down cyclo-converter and draw relevant wave forms. Assume inductive load, continuous conduction and load voltage frequency as $f_s/_2$.

16. a) Explain 180^0 conduction mode of 3-phase bridge inverter.
    b) Brief about techniques of Pulse width modulation of Inverters.

17. Write short notes on
    a) Circulating current mode of single-phase dual converter.
    b) Performance parameters of inverters.

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Code No. 14098

FACULTY OF ENGINEERING

B.E. 3/4 (ECE) I – Semester (Backlog) Examination, July 2021

Subject: Digital System Design with Verilog HDL

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Answer any seven questions. **(7x3 = 21 Marks)**

1 Explain timing and delay concept in Verilog.
2 What is meant by logic verification?
3 Write Verilog code for AND in switch level modeling
4 Describe function of parity generator and checker
5 Write Verilog code for D flip-flop in behavioral modeling
6 Describe mealy incompletely specified circuit
7 Differentiate between ASM and ASMD chart
8 Draw sate diagram to detect sequence 101
9 Classify types of RAM
10 Implement the given function F(a, b, c, d) = Σm(2,3,5,8,11) using PLA.

PART – B

Answer any three questions. **(3x18 = 54 Marks)**

11 a) What are the compiler directive in Verilog HDL?
b) Write the program for full adder module using arithmetic operators and verify its functionality using stimulus.

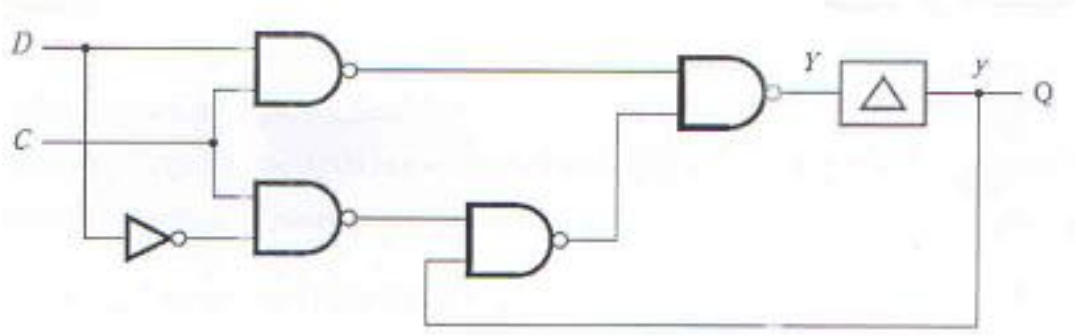
12 a) Explain static timing analysis.
b) Explain Hierarchical structural model with one example and write its Verilog code.

13 Design an up/down counter with four states (0-, 1, 2, 3) using clocked JK, FF. A control signal x is to be used as follows, when x=0 the circuit counts forward (up), when x=1, backward (down).

14 Design coffee/tea vending machine controller and write its Verilog code.

15 a) Explain how to expand word size and capacity in memory devices.
b) Realize binary to excess-3 code converter using PROM.

16 a) Given function F(A,B,C,D) = Σm(0,2,7,10) + d(12,15) realize its logic function and implement its Verilog code.
b) Analyze the given asynchronous sequential circuit and obtain its flow table.



17 Write short notes on the following:
a) Partitioning Minimization technique
b) FPGA and CPLD.

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Code No. 14106

FACULTY OF ENGINEERING

B.E. 3/4 (M/P) I-Semester (Backlog) Examination, July 2021

Subject: Design of Machine Elements

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 Briefly explain about Guest's theory.
2 Explain the following terms subjected to variable loads:
i) Cumulative Fatigue ii) Stress concentration factor
3 Enumerate the type of stresses induced in keys
4 Briefly write about Chain drives.
5 Explain briefly strength of transverse fillet welded joints with neat diagram.
6 What is meant by Preferred numbers?
7 Define the following terms
i) Crushing stress ii) Fluctuating stress
8 Explain briefly with the help of a neat sketch, how a split muff coupling is made.
9 Explain briefly with the help of a neat sketch, how a knuckle joint is made.
10 What is an eccentric loaded riveted joint?

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 A cylindrical shaft made of steel of yield strength 700MPa is subjected to static loads consisting of bending moment 10kN-m and a torsional moment 30kN-m. Determine the diameter of the shaft using two different theories of failure, and assuming a factor of safety of 2. Take E = 210GPa and Poisson's ratio = 0.25.

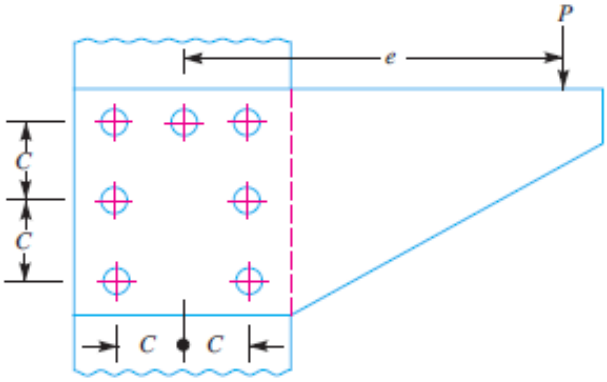
12 A circular rod of 500mm length is supported freely at its two ends. It is acted upon by a central concentrated cyclic load having a minimum value of 20kN and a maximum value of 50kN. Find the diameter of rod by taking a factor of safety of 1.5, size effect of 0.85, surface finish factor of 0.9, stress concentration factor of 1. The material properties of rod are given by: ultimate strength of 650MPa, yield strength of 500MPa and endurance strength of 350MPa.

13 (a) A line shaft rotating at 200r.p.m. is to transmit 20kW. The shaft may be assumed to be made of mild steel with an allowable shear stress of 42MPa. Determine the diameter of the shaft, neglecting the bending moment on the shaft.
(b) A shaft made of mild steel is required to transmit 100 kW at 300r.p.m. The supported length of the shaft is 3 metres. It carries two pulleys each weighing1500 N supported at a distance of 1 metre from the ends respectively. Assuming the safe value of stress as 200MPa, determine the diameter of the shaft.

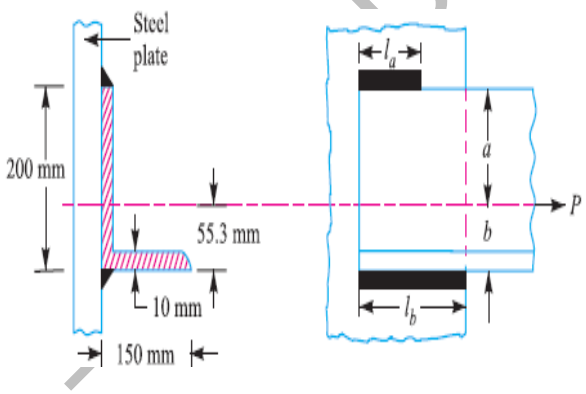
14 Design a sleeve and cotter joint to resist a tensile load of 50kN. The design stresses may be taken as 60MPa in tension, 70MPa in shear and 125MPa in compression.

..2

15 An eccentrically loaded lap riveted joint is to be designed for a bracket as shown in figure. The bracket plate is 25mm thick. All rivets are to be of the same size. Load on the bracket, P = 50kN; rivet spacing, C = 90mm; load arm, e = 380mm.Permissible shear stress is 70MPa and crushing stress is 125MPa. Determine the size of the rivets to be used for the joint.



16 A 200 × 150 × 10 mm angle is to be welded to a plate by fillet welds as shown in figure. If the angle is subjected to a static load of 150kN, find the length of weld at the top and bottom. The allowable shear stress for static loading may be taken as 75MPa.



17 Write short notes on

(a) Mechanical properties of material used in design
(b) Soderberg's diagram
(c) Gib head keys
(d) Gasket joints
(e) Power screws

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Code No: 14113

FACULTY OF ENGINEERING

BE III/IV (AE) I-Semester (Backlog) Examination, July 2021

Subject: Design of machine Components

Time: 2 Hours **Max .Marks: 75**

Note: Missing data, if any, may be suitably assumed

PART – A

Answer any seven questions. **(7x3=21 Marks)**

1 Write the Important Mechanical properties of materials used in design.
2 What are preferred numbers? Explain their importance in design.
3 Distinguish fatigue strength and fatigue life.
4 Define the terms a) Stress Concentration factor and b) Notch sensitivity.
5 Draw neat sketches of the following:
(i) Sunk key (ii) Woodruff key.
6 Why a flexible coupling is called by that name? Explain with a sketch.
7 Write the applications of Cotter and Knuckle joints.
8 Why gaskets are provided at joints?
9 Distinguish between differential and compound screw.
10 Compare riveted joints with welded joints.

PART – B

Answer any three questions. **(3x18= 54 Marks)**

11 A hollow shaft of 40 mm outer diameter and 25 mm inner diameter is subjected to a twisting moment of 120 N-m, simultaneously; it is subjected to an axial thrust of 10 KN and a bending moment of 80 N-m. Calculate the maximum compressive and shear stresses.

12 Design a split muff coupling to transmit 30 kW at 100 r.p.m. The allowable shear stress for the shaft and key is 40 MPa and the number of bolts connecting the two halves are six. The permissible tensile stress for the bolts is 70 MPa. The coefficient of friction between the muff and the shaft surface may be taken as 0.3.

13 Design a knuckle joint to withstand a load of 100 kN. All the parts of the joint are made of the same material with $\sigma_{ut}=\sigma_{uc}=480$ MPa and $u\tau=360$ MPa. Use factor of safety of 6 on ultimate strength. Where σ_{ut} and σ_{uc} are ultimate tensile and compression strengths and $u\tau$ is ultimate shear strength.

14 Design a cotter joint to transmit a load of 2 KN. Take allowable stress values in tension and shear as 70 N/mm2 and 30N/mm^2, respectively.

15 A screw jack is to lift a load of 80 kN through a height of 400 mm. The elastic strength of screw material in tension and compression is 200 MPa and in shear 120 MPa. The material for nut is phosphor -bronze for which the elastic limit may be taken as 100 MPa in tension, 90 MPa in compression and 80 MPa in shear. The bearing pressure between the nut and the screw is not to exceed 18 N/mm^2 . Design the screw jack.

16 Design a triple riveted lap joint to join two plates of 6 mm thick. The permissible stresses are: $\sigma t=80$ MPa, $\sigma c=100$ MPa and $\tau=60$ MPa. Calculate the rivet diameter, rivet petels, and distance between the rows of rivets. Use zig-zag riverting state how the joint will fail.

17 Write short notes on the following:
(a) Maximum principal and shear tress theory (b) S-N diagram

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Code No. 14119

FACULTY OF ENGINEERING

B.E. 3/4 (CSE) I-Semester (Backlog) Examination, July 2021

Subject : Automata Languages and Computation

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 Distinguish between a DFA and an NFA.
2 Define regular expression and give two examples.
3 Write the pumping lemma for regular languages.
4 What is a parse tree? Give one example.
5 Give the formal definition of pushdown automata.
6 Write the closure properties of context free languages.
7 List the programming techniques for Turing Machines.
8 What is a Restricted Turing Machine?
9 What is a Modified Post's Corresponding Problem?
10 Define P and NP class problems.

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 a) Convert the following ϵ– NFA to DFA

δ	ϵ	a	b	c
→p	{q, r}	ϕ	{q}	{r}
q	ϕ	{p}	{r}	{p, q}
*r	ϕ	ϕ	ϕ	ϕ

b) Construct an ϵ–NFA for the regular expression (0+1)0*

12 a) Minimize the following DFA

δ	a	b
→A	B	D
B	C	E
C	B	E
D	C	E
*E	E	E

b) Define an Ambiguous Grammar and check whether the following grammar is ambiguous or not.

S –> aB / bA
A –> aS / bAA / a
B –> bS / aBB / b

13 a) Convert the following context free grammar to Pushdown Automata

I –> a / b / Ia / Ib / I0 / I1
E –> I / E*E / E+E / (E)

b) State pumping Lemma for Context-Free Languages and prove that the following Language is not Context free Language.

$\{0^n 1^n 0^n \mid n>=1\}$

…….2

14 Design a Turing Machine to compute the proper subtraction function which is defined as below

$$m - n = m-n \quad \text{if } m >= n$$
$$= 0 \quad \text{if } m < n$$

15 a) What is PCP and test whether the following PCP instance has a solution or not.

A= (ab, a, bc, c) B=(bc, ab, ca, a).

b) Explain about undecidable problems of Turing machines.

16 a) Convert the following DFA to a regular expression using state elimination method.

δ	a	b
–> *P	S	P
Q	P	S
R	R	Q
S	Q	R

b) Design a PDA that accepts L={ $a^n b^n \mid n \geq 1$}.

17 a) Convert the following grammar into Chomsky normal form.

S–>aAbB
A–>aA/a
B–>bB/b

b) Discuss about various modifications of Turing Machines.

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Code No. 14127 / O

FACULTY OF ENGINEERING

B.E. 3/4 (I.T) I – Semester (Old) Examination, July 2021

Subject: Digital Signal Processing

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1 How Z-transform is related to DFT?

2 Determine the DFT of the sequence x(n) = {1, -1, 1, -1}.

3 What do you understand by linear phase response?

4 Why FIR filters are always stable?

5 Write the expression for Bilinear transformation.

6 Write the properties of Butterworth filter.

7 What are the peripherals available on TMS320C54x processor?

8 Describe any two application specific instructions of TMS320C54x processor.

9 What are the applications of DSP processors?

10 Distinguish between the dual access RAM and single access RAM used in the on-chip memory of 5X.

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11 a) Find linear convolution of x[n] = {1, 2, 3}, h[n] = {2, -1} using DFT and IDFT.

b) Distinguish between DTFT and DFT.

12 a) Design a FIR low pass filter using rectangular window with cut-off frequency of 1.2 rad/sec and N=9.

b) Explain Gibb's phenomenon.

13 a) An analog filter has the following system function convert this filter into a digital filter using the impulse invariant technique. Assume T = 1 sec.

$$H(s) = \frac{1}{(s + 0.1)^2 + 9}$$

b) Design a Butterworth low-pass filter using impulse invariance concept for the following specifications:

$$0.9 \le |H(e^{jw})| \le 1, \quad 0 \le |\omega| \le 0.2\pi$$

$$|H(e^{jw})| \le 0.18, \quad 0.3\pi \le |\omega| \le \pi$$

Assume $T_d = 1$. Also, assume additional data if required.

..2

14 a) Describe the MAC unit of a TMS C54xx processor with a neat block diagram.

b) Assume that the current contents of AR3 to be 400 h, what will be its contents after each of the following TMS320C54xx addressing mode is used? Assume that the contents of ARO and 40 h.

1) *AR3 + 0; 2) *AR3 +; 3) *AR3 + OB

15 a) Find the DFT of sequence x[n] = {1, -1, -1, -1, 1, 1, 1, -1} using DIT FFT.

b) Obtain the FIR linear phase and cascade realization of the system function

$$H(z) = \left(1 + \frac{1}{2}z^{-1} + z^{-2}\right)\left(1 + \frac{1}{4}z^{-1} + z^{-2}\right)$$

16 a) Obtain H(Z) for $H(s) = S^3 / \{(s+1)(s^2 + s + 1)\}$ using Bilinear Transformation technique when T = 1 sec.

b) Explain the concept of pipelining and how pipeline depth is measured.

17 Write short notes on:

a) JPEG Algorithm

b) DSP based Bio-telemetry system.

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Code No. 14124

FACULTY OF ENGINEERING

B.E.3/4 (IT) I-Semester (Backlog) Examination, July 2021

Subject: Design and Analysis of Algorithms

Time: 2 hours **Max. Marks: 75**

Note: Missing data, if any, may be suitably assumed.

PART – A

Note: Answer any seven questions. **(7x3 = 21 Marks)**

1. Define time complexity and space complexity of an algorithm.
2. Write the control abstraction for divide and conquer.
3. Differentiate implicit and explicit constraints.
4. Solve the recurrence relation $T(n) = 4T(n/2) + n^{2.}$
5. State the optimality principle.
6. What is a multistage graph?
7. Show the intermediate steps when the number {123, 23, 1, 43, 54, 36, 75, 34} are sorted using merge sort.
8. What is a NP Complete problem?
9. Explain briefly branch and bound method.
10. State Cook's theorem.

PART – B

Note: Answer any three questions. **(3x18 = 54 Marks)**

11. (a) Explain the asymptotic notations with examples.
    (b) Write the algorithm for quick sort and explain with an example.

12. (a) Consider the following instance of knapsack problem.
    n = 3, m = 20 (P1, P2, P3) = (25, 24,13) (W1, W2, W3) = (18, 15, 10)
    Find the optimal solution using greedy method.
    (b) Let n=4, (P1, P2, P3, P4) = (100, 10, 15, 27) and (d1, d2, d3, d4)=(2, 1, 2, 1)
    Find the optimal solution for job sequence using greedy method.

13. (a) Explain the DFS algorithm with an example.
    (b) Explain all pairs shortest path problem.

14. (a) Explain Dictionaries and heap data structure.
    b) Explain Reliability design problem.

15. (a) State 'n' Queen's problem and write an algorithm for n queen's.
    (b) Explain Hamiltonian cycle with an example.

16. (a) Explain NP Hard and NP Complete problem.
    (b) Explain non-deterministic algorithm for traveling salesman problem.

17. Write notes on any **two** the following
    (a) Graph coloring algorithm
    (b) Optimal binary search trees
    (c) Branch and bound method

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