

**FACULTY OF ENGINEERING****B.E. (CIVIL) VII Semester (CBCS) (BACKLOG) Examination, March / April 2022****Subject: Estimation Costing and Specification****Time: 3 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer all questions.****(10 x 2 = 20 Marks)**

1. Define the term contract and list essentials of contract.
2. Explain the purpose of rate analysis and how it is done.
3. What is the significance of measurement book?
4. What is work order?
5. What are the basic requirements for estimating a building?
6. Differentiate between long wall and short wall method with clear diagrams.
7. Define the terms lead and lift.
8. What methods can be used to estimate the earthwork of roads?
9. What is construction estimating software?
10. Write short notes on Work charged Establishment.

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

11. (a) Distinguish between general specifications and detailed specifications.  
(b) What is turnkey projects? Write its advantages and disadvantages.
12. (a) What is e-tendering? Explain its advantages?  
(b) What are PPP projects? Explain briefly.
13. Prepare a detailed estimate for the following items of work for a residential building plan shown in fig. 1 using center line method.  
(a) Earthwork excavation for foundation  
(b) 1st class brickwork in superstructure with CM (1:6).
14. An irrigation canal has the following details. Bed width = 6m, top width of left bank = 3.3m, top width of right bank = 3.5 m, side slopes in cutting 1:1 and side slopes of both banks 1.5:1. Height of banks from bed 2.55m, longitudinal slope of the bed 1 in 4000. There was no reverse slope of the bed and ground. Ground level at consecutive stations which are at 50m intervals are as follows.

Station	1	2	3	4	5	6
R.L of ground, m	100	100.3	100.5	100.6	99.7	99.2

Bed level at station 1 is 98.5m. Compute the earthwork in cutting and filling.

15. Explain any five types of softwares used for estimation of road works?

16. Find out the brick work in foundation and plinth with 9" x 4½" x 3 (nominal size) with cement mortar 1:4. Cost of brick is ₹ 4.50/-, sand ₹ 1200/- cum cement rupees 350/- per bag. The labour requirement per cum is Head mason 1no. masons 8 no's and mazdoors 15 no's and the corresponding rates are ₹ 450/-, ₹ 400/-, ₹ 350/- respectively.
17. Write short notes on the following:
- Bar bending schedule
  - Turnkey projects
  - Bill of quantities.

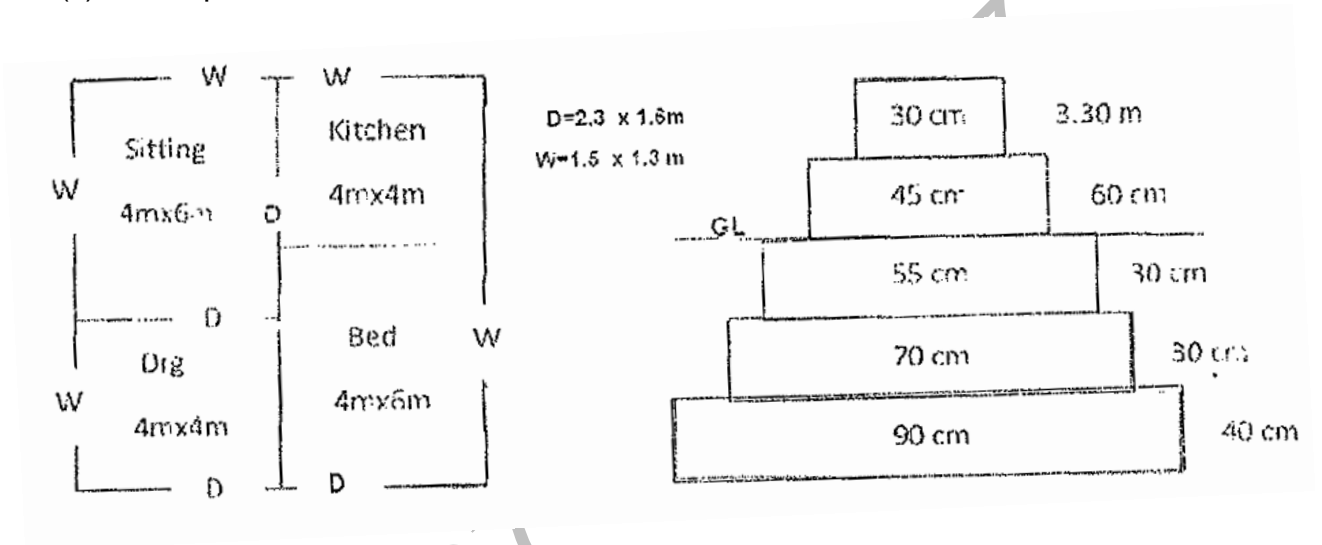


Fig. 1

\*\*\*\*

**FACULTY OF ENGINEERING**

**B. E. (EEE) VII – Semester (CBCS) (Backlog) Examination,**

**March / April 2022**

**Subject: Electrical Drives & Static Control**

**Time: 3 hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Explain the difference between the group and individual drive
2. Draw and explain the block diagram of an Electric drive
3. Prove that the energy loss during starting is equal to the kinetic energy stored in the rotating parts
4. What are the advantages of using electric braking?
5. State the advantages of semi controlled converter over fully controlled converter.
6. Define critical speed and give its expression and importance.
7. What happens to the performance of AC motor if the stator voltage control technique is adopted with constant frequency?
8. Draw the block diagram of speed control of induction motor using VSI.
9. What are the applications of BLDC motor?
10. What are different ways of generating firing pulses in self controlled mode of operation?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 (a) Obtain the equilibrium points and determine the steady state stability when motor and load torque are  $T_m = -1-2W_m$  and  $T_l = -3(w_m)^{1/2}$  .  
(b) A drive has the following parameters  
 $T = 150 - 0.1N$  N-M Where N is the speed in rpm.  $T_1 = 100$ N-M. Initially the drive is operating in steady state. The characteristics of the load torque are changed to  $T_1 = -100$ N-M. Calculate initial and final equilibrium speeds.
- 12 (a) Explain with a neat diagram, the variation of T-N of a separately excited dc motor during regenerative braking and also sketch the T-N when the voltage is smoothly varied.  
(b) A 220V DC series motor runs at 1000rpm (CW) and takes an armature current of 100A when driving a load with constant torque. Resistances of armature and field windings are 0.05 ohms each, Find the magnitude and direction of the motor speed and armature current if the motor terminal voltage is reversed and the number of turns of the field winding is reduced to 80%. Assume linear magnetic circuit.

- 13 (a) Explain the operation of a single phase Half controlled rectifier fed separately excited DC motor.
- (b) A 220v 1200rpm, 10ph sep excited dc motor has armature resistance of  $0.25\Omega$  and draws a rated armature current of 40 A. it is fed from a single phase fully controlled rectifier with an AC source voltage of 230V 50Hz. Assume the motor current to be constant and ripple free for a firing angle of 30 degree, Calculate the following
- Speed of the motor
  - Motor torque
  - Power supplied
- 14 (a) Explain the Krammer's drive with a neat schematic diagram.
- (b) A 220v 960rpm, 12.8A Sep excited dc motor has armature resistance of  $2\Omega$  and inductance of 150mH. It is fed from a single phase half controlled rectifier with an AC source voltage of 230V 50Hz. Calculate.
- The motor torque for  $\alpha = 60^\circ$  and 500rpm.
  - Motor speed for  $\alpha = 60^\circ$  and torque = 20Nm.
- 15 (a) What is the principle of operation of SRM drive.
- (b) What do you understand by the self controlled and separately controlled synchronous motor drive explain with neat block diagrams.
- 16 (a) Draw the speed torque characteristics of a shunt motor with field diverter.
- (b) Sketch seven possible cases of the load torque and motor torque and discuss the stability in each case.

\* \* \*

**FACULTY OF ENGINEERING**

**B.E. (Inst.) VII Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Virtual Instrumentation**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Define Virtual Instrumentation and also mention its advantages.
2. What are Local variables?
3. What do you mean by timing interrupts in DMA?
4. Compare RS232 and RS485 interfacing buses.
5. Explain the history of GPIB system buses?
6. Differentiate between conventional and graphical programming.
7. Discuss any one method to create Sub VI?
8. Which software of Lab VIEW is used for image processing applications?
9. What do you mean by Counters and Timers?
10. Explain Fourier Transform with suitable equation?

**PART – B**

**Note: Answer any five questions.**

**(5x10 = 50 Marks)**

11. (a) Write the phases of historical development of VI.  
(b) Explain data flow techniques with suitable examples?
12. (a) What is the use of Formula node in Lab VIEW?  
(b) What is array and clusters in Lab VIEW? Explain both using examples?
13. (a) Why signal conditioning is needed in Data acquisition system?  
(b) Explain in detail the components of Data acquisition system?
14. Explain in detail the architecture of USB?
15. List and explain the importance of image processing algorithm. Discuss the necessary software and hardware available for the same in VI Lab VIEW?
16. (a) Explain the architecture of VI with advantages?  
(b) What are the various modes of waveform chart? Explain?
17. Discuss briefly the following;
  - (a) ADC Vs DAC
  - (b) GPIB
  - (c) Correlation methods

**FACULTY OF ENGINEERING**

**B.E. (ECE) VII – Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Very Large – Scale Integration Design (VLSI)**

**Time: 3 Hours**

**Max marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Define transconductance of MOS transistor.
2. What are pull ups and write about the resistor pull up invert.
3. What do you mean by MOS scaling?
4. Represent the stick diagram of a NMOS inverter.
5. What do you mean by edge triggering in flip flops?
6. Draw the logic implementation of NOR based ROM.
7. What is meant by CMOS testing?
8. What is the need for testing and BIST.
9. Draw Wilson current mirror circuit.
10. Draw the small signal of the MOSFET.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. a) Draw the fabrication steps of n-well CMOS transistor in detail.  
b) Discuss the working of enhancement mode NMOS transistor.
12. a) Draw the Stick and layout diagram for the given function  $f = (A+B)*C$ .  
b) Determine the pull-up to pull-down ratio of NMOS inverter driven through one or more pass transistors.
13. a) Explain in detail about the scaling concept in VLSI circuit design.  
b) Draw the layout diagrams for 2 input NAND gate using CMOS.
14. a) Explain the behavior of Bi-Stable elements and clocked latch.  
b) What is the layout design for improved testability?
15. a) What the chip testing is needed? At what levels testing a chip can occur?  
b) Explain the working of clock-based SR Latch using CMOS logic.
16. a) Calculate gate capacitance value of 5  $\mu\text{m}$  technology with relative minimum sized transistor with gate to channel capacitance value of  $4 \times 10^{-4} \text{ pF}/\mu\text{m}^2$   
b) With the help of the diagram explain the working of Manchester adder.
17. Write short notes on any of the two
  - a) Draw CMOS based D Latch and explain.
  - b) Baugh-Woolley Multiplier
  - c) VLSI design flow.

\*\*\*\*\*

**FACULTY OF ENGINEERING**  
**B.E. (MECH / PROD) VII - Semester (CBCS) (Backlog) Examination,**  
**March / April 2022**

**Subject: Finite Element Analysis**

Time: 3 Hours

Max. Marks: 70

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

**PART – A**

Note: Answer all questions.

(10 x 2 = 20 Marks)

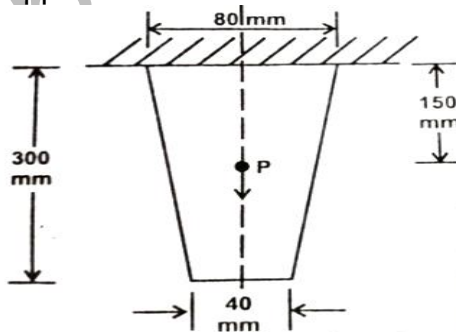
1. Define the term degree of freedom as used in Finite Element Methods.
2. What are shape functions? What are their properties?
3. Write the stiffness matrix for a simple truss element.
4. With the help of a simple figure explain a simply supported and a cantilever beam.
5. What is a frame element?
6. What do you understand by discretization?
7. What is Constant Strain Triangle?
8. What do you understand by axi-symmetric solids?
9. Define conduction and convection w.r.t. FEM.
10. Enlist the use of Gauss Quadrature.

**PART – B**

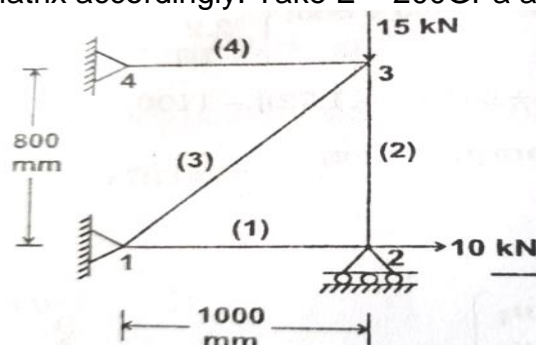
Note: Answer any five questions.

(5 x 10 = 50 Marks)

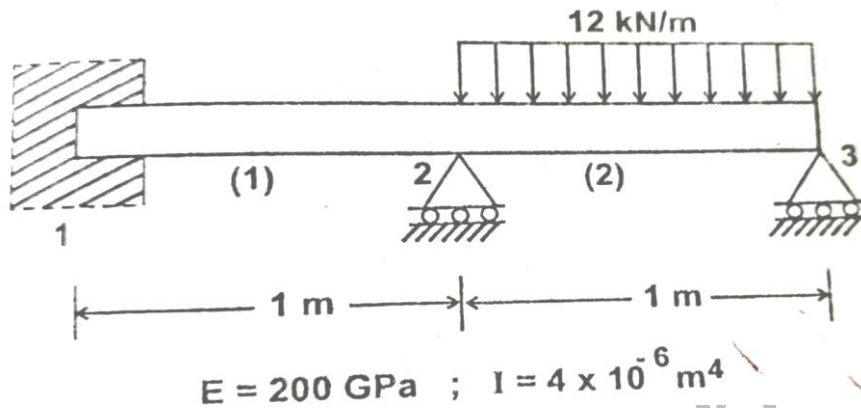
11. For a tapered bar of uniform thickness  $t = 10\text{mm}$ , find the displacements at the nodes by taking two elements model. The bar as shown below has a mass density  $\rho = 7800\text{kg/m}^3$ ,  $E = 2 \times 10^5 \text{MN/m}^2$ . In addition to self weight, the bar is subjected to a point load  $P = 1\text{KN}$  at its center. Apart from displacements determine the reaction forces at the supports also.



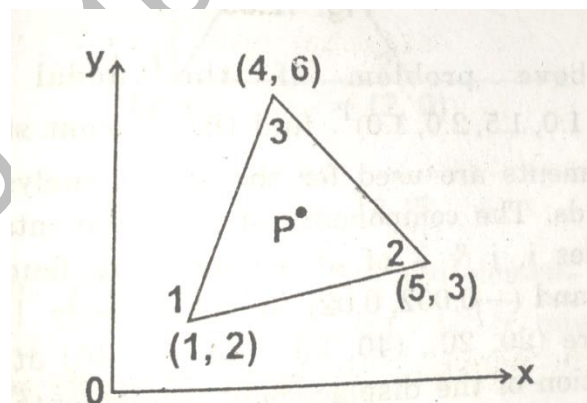
12. For a four bar truss shown below, find the element stiffness matrices and arrange the global stiffness matrix accordingly. Take  $E = 200\text{GPa}$  and  $A = 500\text{mm}^2$ .



13. For the beam loaded as shown below, determine the global finite element equation, nodal bending moments and the slopes  $\theta_2$  and  $\theta_3$ .



14. a) Discuss about the different types of beams depending upon the nature of supports and the types of loads.  
 b) Write the differences between iso-parametric, super-parametric and sub-parametric elements.
15. a) Formulate the element stiffness matrix for a one-dimensional circular rod subjected to torsion.  
 b) List and explain the various steps involved in solving problems using FE software.
16. The nodal coordinates of the triangular elements are shown below. At the interior point P, the y-coordinate is 4.2 and  $N_2 = 0.2$ . Find  $N_1$ ,  $N_3$  and x-coordinate.



17. Write short notes on the following:  
 a) Eigen values and Eigen vectors.  
 b) Convergence requirements.



**FACULTY OF ENGINEERING**

**B.E. (AE) VII Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Vehicle Maintenance**

**Time: 3 Hours**

**Max marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. A thick dark smoke is emitted from the exhaust pipe of old vehicles running on the roads. What could be the probable reason?
2. Draw any two special tools used in the maintenance of an engine.
3. Explain the inspection procedure of piston.
4. Define engine tune up, draw sequential block diagram of engine tune up procedure.
5. List out types of propeller shafts and differentials.
6. If a engine is overheating, list out the possible problems and their solution.
7. What are the different methods of test on batteries?
8. Explain any four problems experienced in starter motor with their causes and remedies.
9. Write the procedure of inspection of lubrication system.
10. Give reasons for the pulling of vehicle to one side on application of brake.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 a) Explain general servicing that are carried out during first servicing of a car  
b) What are the safety precautions to be considered in the maintenance of an automobile? Explain scheduled and break down maintenance of an automobile.
- 12 a) What should be the sequence of piston rings from piston skirt? Write the function of each ring.  
b) Explain how valve clearance is adjusted in a four cylinder engine.
- 13 a) Describe the overhauling of clutch and gear box of a car.  
b) Briefly explain various troubles that may occur in a single plate dry clutch system and bring out their causes.
- 14 a) Explain the procedure for brake bleeding operation.  
b) Explain the maintenance procedure and the various tests to be conducted on a 4 lead acid battery of a vehicle.
- 15 a) What is vapour lock in fuel system? How it is caused.  
b) Explain lubrication system maintenance with procedure for oil filter replacement.
- 16 a) Explain tuning of carburetor for optimum fuel supply.  
b) Write about cooling system troubles.
- 17 Write a short note on
  - a) Maintenance of electrical system
  - b) Maintenance of Transmission system
  - a) Maintenance of vehicle body

\*\*\*\*\*

**FACULTY OF ENGINEERING**

**B.E. (CSE) VII Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Distributed Systems**

**Time: 3 hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

- 1 Differentiate between multi-processor and multi-computers.
- 2 What are the services of middleware in DS?
- 3 Explain about 3 logical layers to implement Name Space.
- 4 Define external and internal synchronization.
- 5 What are the different types of failure models in distributed systems?
- 6 Explain about Byzantine Agreement Problem with 3 non faulty processes and one faulty process.
- 7 Is a file server implementing NFS version 3 required to be stateless?
- 8 Write down six top-level MIME types and some common sub-types.
- 9 Explain about coordination models along with temporal and referential dimensions.
- 10 Write short notes on Windows AZURE.

**PART – B**

**Note: Answer any five questions**

**(5 x 10 = 50 Marks)**

- 11 (a) Explain the Design Issues of Distributed Systems.  
(b) Explain about Multithreading in distributed Systems.
- 12 (a) Define DNS and explain with suitable example.  
(b) Explain about Algorithms for achieving distributed Mutual Exclusion.
- 13 (a) Explain about RPC's semantics in the presence of failures.  
(b) Explain and compare the services provided by CORBA, DCOM, GLOBE.
- 14 Draw the architecture of SUN NFS and explain the flow control of SUN NFS.
- 15 Explain in detail about Map-Reduce programming approach with suitable example.
- 16 (a) Explain about Data-Centric consistency models.  
(b) Explain about Apache web.
- 17 Write short notes on:
  - (a) RMI
  - (b) Failure Masking using Redundancy

**FACULTY OF ENGINEERING**

**B.E. (IT) VII Semester (CBCS) (Backlog) Examination, March / April 2022**

**Subject: Big Data Analysis**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. What is Big Data?
2. What are data nodes?
3. What is HDFS File system API?
4. What is the replication policy used in hadoop?
5. What are no sql distribution models?
6. Briefly explain sharding.
7. What is MR unit?
8. What are task trackers?
9. What is Apache pig?
10. What is job tracker failure?

**PART – B**

**Note: Answer any five questions**

**(5 x 10 = 50 Marks)**

11. What are the characteristic and challenges of Big Data?
12. Explain HDFS read and write anatomy in detail.
13. Explain hadoop 2.0 ecosystem components.
14. Explain different aggregate data models.
15. Explain anatomy of classic mapReduce job run.
16. What are four types of functions in pig? Explain
17. Explain Hive architecture.

**FACULTY OF ENGINEERING**

**B.E. (Civil) VII - Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Prestressed Concrete**

**Time: 3 Hours**

**Max marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

- 1 Distinguish between linear and circumferential prestressing.
- 2 What are the losses in prestress in pre-tensioned and post tensioned members?
- 3 What are the basic assumptions of prestressed concrete structures?
- 4 Draw the stress distribution diagram due to eccentric prestressing.
- 5 What are the different types of flexural failure modes observed in PSC beams?
- 6 Explain the mechanism of shear failures in the beams.
- 7 A pre-tensioned prestressed concrete beam having a rectangular section 150 mm wide deep an effective cover 50 mm. If  $f_{ck} = 40 \text{ N/mm}^2$ ,  $f_p = 1600 \text{ N/mm}^2$  and the area of high tensile wires is  $461 \text{ mm}^2$ , estimate the flexural strength of the section using the IS:1343-2012.
- 8 The horizontal prestress at the centroid of a concrete beam of rectangular cross-section, 120mm by 250mm, is  $7 \text{ N/mm}^2$  and the maximum shearing force on the beam is 70kN. Calculate the maximum principal tensile stress. What is the minimum vertical prestress required to eliminate this principal tensile stress?
- 9 What are the factors influencing deflections?
- 10 List the types and importance of end block.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 a) What are the differences between pretensioned and post-tensioned members?  
b) What are the advantages of prestressed concrete?
- 12 A prestressed concrete T-beam having a cross-section of flange 1200 mm wide and 200 mm thick rib is 240 mm wide and 1000 mm deep. The beam carries a load of 12 kN/m over a span of 16 m. Determine the prestressing force and its eccentricity to produce net stresses equal to zero and 12 MPa at top and bottom fibers.
- 13 A prestressed concrete beam of 250 x 500 mm is used over an effective span of 8m. It is subjected to a central concentrated load of 80 kN. The effective prestressing force is 600 kN acting at concentricity of 60 mm. Draw the pressure line indicating its location at quarter and midspan of the beam.

- 14 Determine the ultimate strength of the flanged beam for the following data: Top flange = 500x100 mm, Bottom flange = 500x100 mm, Web thickness = 125 mm, Area of prestressing steel = 1900mm<sup>2</sup>. Distance between bottom of top flange to the centre of prestressing steel = 425 mm Use IS 1343-2012 code.
- 15 A prestressed concrete beam of size 300 x 600 mm is subjected to the following requirements: Bending moment,  $M = 320 \text{ kNm}$ ; twisting moment,  $T = 50 \text{ kNm}$ , Shear force,  $V = 300 \text{ kN}$ . The effective prestressing force 600 kN acting at an eccentricity of 250 mm. Design longitudinal and traverse reinforcement necessary as per IS 1343-2012. Assume  $f_{ck} = 40 \text{ N/mm}^2$ ,  $f_y = 415 \text{ N/mm}^2$  and  $f_p = 1600 \text{ N/mm}^2$ . Take effective prestress in steel as  $0.6 f_p$
- 16 A prestressed concrete beam is simply-supported over a 10 m span. The beam carries a uniformly distributed load of 5 kN/m. Sixty percent of the load which is non-permanent. The eccentricity is 100 mm within the middle third of the span and varies linearly from third points to zero at the supports. The tendons area is 400 mm<sup>2</sup> and the effective prestress is 1400 N/mm<sup>2</sup>. The sectional details of the beam as follows ; Area =  $5.5 \times 10^4 \text{ mm}^2$ , Moment of inertia =  $5.0 \times 10^6 \text{ mm}^2$ ,  $E_c = 35 \text{ kN/mm}^2$ ,  $E_s = 210 \text{ kN/mm}^2$ .
- 17 The end block of a prestressed concrete beam, rectangular in section, is 120 mm wide and 300 mm deep. The prestressing force of 250 kN is transmitted to concrete by a distribution plate, 120 mm wide and 75 mm deep, concentrically located at the ends. Calculate the position and magnitude of the maximum tensile stress on the horizontal section through the centre of the end block using Guyon's method.

\*\*\*\*\*

**FACULTY OF ENGINEERING**  
**B.E. (EEE) VII Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Switchgear and Protection**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

- 1 Define: (i) Pick-up value (ii) Operating time of relay.
- 2 What is meant by plug setting multiplier of an over current relay?
- 3 An over current relay of rating 5A and setting 150% is connected to the secondary of a C.T of ratio 400/5. Calculate the current in the line for which the relay pick up.
- 4 At TMS=1, the operating time is 10 seconds. If the TMS is changed to 0.6, then find the operating time of the relay.
- 5 What is Universal relay torque equation?
- 6 Define: (i) Reach (ii) Over reach and (iii) Under reach with respect to the operation of a protective relay.
- 7 What is Buchholz relay?
- 8 What is meant by current chopping?
- 9 Write the causes of over voltages in a power system network.
- 10 What is surge diverter?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 (a) Draw one line diagram of power system network to illustrate different protective zones of power system.  
(b) Derive the expression for torque developed in induction disc type relay.
- 12 (a) With a neat diagram explain the protective schemes for parallel feeders and ring main system.  
(b) What are the protection schemes for generator protection?
- 13 (a) Explain with reasons the connection of C.Ts for protecting delta/star transformer. Justify your scheme of protection for (i) internal fault and (ii) external fault.  
(b) A 3-phase transformer rated for 33 kV/6.6 kV is connected star/delta and the protecting current transformer on the high voltage side have a ratio of 80/5. Determine the ratio of the current transformer on the LV side.
- 14 Explain what is meant by restriking voltage and recovery voltages. Derive an expression for restriking voltage and rate of rise of restriking voltage of a circuit breaker.

- 15 (a) Explain SF<sub>6</sub> Circuit breaker with a neat diagram.  
(b) For a 132 kV system, the reactance and capacitance up to the location of the circuit breaker is 3 ohms and 0.015 μF respectively. Calculate the following:  
(i) Frequency of transient oscillation.  
(ii) The maximum value of restriking voltage across the contacts of the circuit breaker.  
(iii) The maximum value of RRRV.
- 16 (a) Define: (i) Rated current (ii) Breaking current (iii) Making current  
(iv) Short time current rating.  
(b) A circuit breaker is rated at 1500 amps, 2000 MVA, 33 kV, 3 sec, 3 phase circuit breaker. Determine the rated normal current, breaking current, making current and short time rating.
- 17 (a) Explain Valve type Lightning arrester with a neat diagram.  
(b) Mention the advantages and disadvantages of Gas insulated Substation.

\*\*\*\*

**FACULTY OF ENGINEERING**

**B. E. (EIE) VII – Semester (AICTE) (Main) Examination,**

**March / April 2022**

**Subject: Opto – Electronic Instrumentation**

**Time: 3 hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Mention the properties of laser.
2. What are the methods of excitation?
3. What are the biomedical applications of laser?
4. What is the principle of laser interferometer?
5. What are the losses in optical fibre?
6. List the fibre fabrication techniques.
7. Write the classification of fibre optic sensor.
8. Explain liquid level measurement using optical fibre.
9. Define LED and what are its types.
10. Define photo transistor.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 Explain the ND-YAG laser in detail.
- 12 Mention the LASER classification and safety in detail.
- 13 Explain fibre splicing in detail.
- 14 Write short notes on temperature, voltage and liquid level measurement using optical sensor.
- 15 Write about LED and PLASMA display.
- 16 (a) List the methods of Q switching and explain any one in detail.  
(b) Explain laser strain gauge.
- 17 (a) Find numerical aperture critical angle and acceptance angle of the optical fibre from the following data new1 (Core) is equal to 1.55 and new2 (cladding) is equal to 1.50.  
(b) Write short notes on solar cell.



**FACULTY OF ENGINEERING**

**B.E. (ECE) VII - Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: EMBEDDED SYSTEMS**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Differentiate between a general purpose system and Embedded System.
2. Draw the CPSR register and show its contents.
3. What are the pipeline stages of ARM9 CPU.
4. What is the nomenclature of ARM{x}{y}{z}TDMI core?
5. Draw the frame format of CAN protocol and explain each field.
6. Discuss about of Fire wire Protocol.
7. Explain the use of linker and locator in embedded software.
8. Why do we need cross compiler?
9. What is the use of target emulator and ICE.
10. Describe the performance accelerating methods in the embedded system design.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. (a) Define design metrics in embedded systems. What are the constraints and challenges of embedded system design.  
(b) With a neat block diagram, explain the architecture of an embedded Process (Soc).
12. Explain about ARM core with the help a neat diagram and also explain about ARM Extension i.e., Coprocessor.
13. (a) What is I<sup>2</sup>C protocol? Explain use of each control bit of I<sup>2</sup>C bus.  
(b) Describe the various Internet enabled system network protocols.
14. Explain about Embedded System design and Co-design issues in System Development Process.
15. (a) Describe an Instruction Set Simulation and mention its advantages and disadvantages.  
(b) What is a logic analyzer?
16. Write a case study of an automatic vending machine describing its hardware and software features.
17. Write short notes on the following:
  - (a) System on chip
  - (b) HTTP
  - (c) Circuit Emulator

**FACULTY OF ENGINEERING**  
**B.E. (MECH) VII Semester (AICTE) Examination, March / April 2022**

**Subject: Refrigeration and Air Conditioning**

**Time: 3 Hours**

**Max marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Define the Unit of refrigeration and give its value in SI units.
2. Present atleast four of alternative refrigerants used to reduce Ozone depletion and global warming.
3. Draw schematic sketch for vapor compression refrigeration system: show it on P-H chart and T-s diagram.
4. List the advantages of vapour compression system over air refrigeration system.
5. Outline the working of air refrigeration system?
6. Discuss the concept of thermoelectric refrigeration system?
7. Define the terms Dry bulb temperature and specific Humidity
8. Draw psychrometric hart for summer air conditioning process.
9. Explain the terms (i) Room Sensible heat factor (ii) Grand Sensible heat factor.
10. Discuss about apparatus dew point temperature.

**PART - B**

**Note: Answers any five questions.**

**(5 x 10 =50 Marks)**

11. Explain the working of Reduced ambient air refrigeration system used in aircrafts with a schematic layout.
- 12A simple vapor compression refrigerator uses R12 as refrigerant and operates between the temperature limits of 12°C and – 14°C respectively. At entry to the compressor, the refrigerant is dry saturated and after compression it acquires a temperature 15°C. Find C.O.P of the system if the liquid is cooled by 6°C before expansion by throttling. Use the following table for the properties of the refrigerant.

Temperature (°C)	Enthalphy (KJ/Kg)		Specific Entropy (KJ/Kg-K)	
	Liquid	Vapour	Liquid	Vapour
12°C	44.5	192.6	0.1750	0.6921
-14°C	23.3	181.8	0.0904	0.7051

13. Explain Lithium-Bromide refrigeration system with the help of neat sketch.
14. (a) Draw psychrometric chart for winter air conditioning process.  
 (b) Explain the conditions of comfort air conditioning.

15. An air-conditioned hall is to be maintained at 25°C DBT and 65% RH. The ambient condition is 37°C WBT and 30°C WET. The total sensible heat load is 75 000 KJ/h and total latent heat load is 35000 KJ/h. 65% of the return air is re-circulated and mixed with 35% of make up air after cooling coil. The condition of air leaving the cooling coil is at 18°C Determine i) RSHF, ii) the condition of air entering the auditorium, iii) The amount of make – up air, iv) ADP and v) BPF of cooling coil.
16. a) Explain the working principle of Electrolux refrigeration system with the help of configuration diagram.  
b) Discuss the desirable properties of refrigerant.
17. Explain the working principle of Bell Coleman refrigeration with a neat sketch and derive expression for COP.

\*\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING**  
**B.E. (PROD) VII Semester (AICTE) Examination, March / April 2022**

**Subject: Modern Machining & Forming Methods**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Write the advantages and limitations of USM.
2. List out the applications & advantages of WJM
3. How machining takes place in Electro Chemical Machining process?
4. What are the advantages of high speed machining?
5. Different types of lasers used in LBM?
6. Write the applications of PAM process.
7. What are the advantages of Hydro forming process?
8. What is standoff explosive forming process?
9. What are the applications of Radial Draw forming?
10. Write the limitations of stretch forming process.

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 a) Explain the working of Abrasive Jet machining with a neat sketch.  
b) What are the types of transducers used in USM?
- 12 a) What are the various flushing mechanism of metal removal in EDM process?  
b) List out the functions and characteristics of electrolyte.
- 13 a) Explain the working principle of Plasma Arc Machining with a neat sketch.  
b) Discuss the different process parameters, advantages & limitations of Electron Beam Machining.
- 14 a) Explain the EHF with a neat sketch.  
b) Explain the Rubber Pad Forming process with a neat sketch.
- 15 a) Discuss Hydrostatic forming process with a neat sketch.  
b) Explain Water Hammer Forming process with a neat sketch.
- 16 a) Explain 'HERF' process, give its advantages & applications.  
b) State the principle of LASER Beam production
- 17 Write a short note on
  - a) Tube forming process.
  - b) Rotary Machining.

\*\*\*\*\*

**FACULTY OF ENGINEERING**

**B. E. (A.E) VII – Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Metrology & Automobile Instrumentation**

**Time: 3 hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. State the limitations of a sine bar. Give reasons.
2. Classify various types of fits with neat sketch.
3. What are the uses of dial indicator?
4. Define a Comparator. Discuss the functional requirements of a comparator.
5. Distinguish between roughness and waviness.
6. What is a Profilometer?
7. Write the applications of (a) Bulk modulus gauge (b) Pirani gauge.
8. Explain the working of a proving ring with a neat sketch.
9. Explain the use of extension wires in thermocouples.
10. What is the relationship between electric resistance with temperature?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

- 11 (a) State and explain Taylor's principle of plain limit gauges.  
(b) What are common materials and working process used in Manufacture of Slip gauges.
- 12 (a) Explain the working principle of back pressure type pneumatic comparator with neat sketch.  
(b) How are CMMs are classified with respect to constructional features? Sketch and state there main applications, merits and demerits.
- 13 (a) Explain the operation of Taylor-Hobson Talysurf in measurement of surface finish. With the help of a neat sketch.  
(b) Describe a gear tooth Vernier caliper and explain its use for checking tooth thickness and depth of tooth.
- 14 (a) What are strain gauges? Explain the applications of Wire and foil type resistance strain gauges with neat sketches.  
(b) Explain the uses of proving ring with a sketch to measure load.
- 15 (a) Explain the working of a Pirani gauge. With a neat diagram.  
(b) Discuss the Thermocouple circuit principles.
- 16 (a) Explain the working mechanism of a dial indicator.  
(b) Explain static and dynamic characteristics of instrumentation.
- 17 (a) Explain with a neat sketch the principle, operation and uses of an optical projector.  
(b) Explain the various geometrical tests that are to be done to get a better accuracy in the machine tool.

**FACULTY OF ENGINEERING****B.E. (CSE) VII - Semester (AICTE) (Main) Examination, March / April 2022****Subject: Data Science Using R Programming****Time: 3 Hours****Max. Marks: 70****(Missing data, if any, may be suitably assumed)****PART – A****Note: Answer all questions.****(10 x 2 = 20 Marks)**

1. How Data Mining is a part of Data Science?
2. What are Orthogonal Vectors? Give Example?
3. Explain Random Variable with an Example?
4. Give an example of Null Hypothesis and Alternative Hypothesis?
5. What is the general equation for computing linear regression?
6. Why Regularisation is used?
7. Create a data frame by the name "Employee" to store three vectors EmpNo", "EmpName" and "PojName" and then print the data frame.
8. Write an R code to draw a Scatter Plot?
9. Explain the k-means() function with syntax and example?
10. How .csv , .txt file is read in R?

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

11. (a) Elucidate Data Science from Mathematics perspective?  
(b) Discuss with an example how Eigen vectors and Eigen values help in answering problems in data science?
12. (a) Explain Binomial Mass Function, Normal Density Function and Chi-Square Density Function?  
(b) Discuss with an example Hypothesis Testing Procedure?
13. (a) Calculate the Kendall Rank Correlation Coefficient for the following data of two experts ranking the food items.

Food Item	Expert1	Expert2
1	1	1
2	2	3
3	3	6
4	4	2
5	5	7
6	6	4
7	7	5

- (b) Compare multiple linear regression with linear regression?

-2-

14. (a) Discuss different data types and Objects in R?

(b) Explain getwd(), setwd() and dir() commands in R?

15. (a) Explain implementing KNN in R?

(b) Discuss Time Series Analysis?

16. (a) `> H<-c(7,12,3,41,35)`

`>M<-c("jan","FEB","mar","APR","may")`

`>barplot(H,names.arg=M,xlab="MONTH",ylab="revenue",col="Blue",main="BAR PLOT",border="red")`

Explain the above R code with the output?

(b) Write an R code using Function to calculate area of a circle given radius?

17. (a) Write short notes on Hyper planes and Half spaces?

(b) Write short notes on Sample Statistic?

\*\*

**FACULTY OF ENGINEERING**

**B.E. (IT) VII – Semester (AICTE) (Main) Examination, March / April 2022**

**Subject: Big Data Analytics**

**Time: 3 Hours**

**Max. Marks: 70**

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

**PART – A**

**Note: Answer all questions.**

**(10 x 2 = 20 Marks)**

1. Explain in brief the characteristics of Big Data.
2. What do you mean by block caching in HDFS?
3. List the three major components of Hadoop.
4. What are the different ways to construct version stamps in NoSQL?
5. Describe the usefulness of Materialized Views.
6. Compare Map Reduce and YARN.
7. Describe what is meant by Speculative execution.
8. What are the different modes of executing Pig?
9. Define eval user defined function in Pig Latin.
10. What are the different Hive Services?

**PART – B**

**Note: Answer any five questions.**

**(5 x 10 = 50 Marks)**

11. (a) Explain the challenges faced in Big Data.  
(b) Explain structured, semi structures and unstructured data in Big Data Analytics.
12. (a) Explain the Hadoop Ecosystem in detail.  
(b) Explain how Data is read from a URL in Hadoop.
13. (a) Explain in detail the Graph databases and Schema less databases.  
(b) Explain the aggregate data models.
14. (a) Explain anatomy of YARN Map Reduce job run.  
(b) Explain the failures in classic/YARN Map Reduce.
15. (a) Explain the procedure for installing Pig and running Pig Programs.  
(b) Explain User Defined Functions (UDF) in Pig.
16. (a) Explain in detail the Anatomy of File Read and Write.  
(b) Explain Map Reduce Input formats.
17. Write Notes on the following.
  - (a) YARN based execution model.
  - (b) Compare Hive with databases.



**FACULTY OF ENGINEERING**  
**B.E. IV / IV (MECH) I Semester (NON-CBCS) (Backlog) Examination,**  
**March / April 2022**

**Subject: Thermal Turbo Machines**

**Time: 3 hours**

**Max. Marks: 75**

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

**PART – A**

**Note: Answer all questions**

**(25 Marks)**

- 1 Explain the terms Mach number, Mach cone and Mach Angle.
- 2 How is Rayleigh flow different from Fanno flow?
- 3 Define chord, angle of attack and camber in an aerofoil.
- 4 Write the differences between centrifugal and axial flow compressors.
- 5 Draw the velocity triangle of a 50% reaction steam turbine.
- 6 Give the relation among the blade, nozzle and stage efficiencies of steam turbine.
- 7 List the merits of open cycle gas turbine over closed cycle configuration.
- 8 State the advantages and disadvantages turbo jet.
- 9 Write the differences between solid propellant and liquid propellant.
- 10 Define propulsive efficiency, thermal efficiency and overall efficiency of an Aircraft propulsion system.

**PART – B**

**Note: Answer any five questions**

**(5 x 10 = 50 Marks)**

- 11 A gas ( $\gamma=1.4$ ,  $R=0.287$  kJ/kg – K) at  $P_1=1.0$  bar,  $T_1=400$  K enters a 30 cm diameter duct at a mach number of 2.0. a normal shock occurs at a Mach number of 1.5 and exit mach number is 1.0. If the mean value of friction factor is 0.003 determine (i) Length of the duct upstream and downstream of the shock wave, (ii) mass flow rate of gas.
- 12 Derive Rankine-Hugoniot equation
- 13 An axial flow compressor with an overall isentropic efficiency of 82% draws air at  $18^\circ\text{C}$  and compresses it in the pressure ratio of 5:1. The mean blade speed and flow velocity are constant throughout the compressor. Assume 50% reaction blading. Take blade velocity as 242 m/s and work input factor as 1.05, Calculate (i) flow velocity and (ii) number of stages. Assume  $\alpha=15^\circ$  and  $\theta=45^\circ$ .
- 14 In an open cycle constant pressure gas turbine, air enters the compressor at 1 bar and 300 K. The pressure ratio is 4:1. The isentropic efficiencies of compressor and turbine are 78% and 85% respectively. The air fuel ratio is 80:1, calculate the power developed and thermal efficiency of the cycle if the flow rate of air is 2.5 kg/sec. Assume  $C_P = 1.005$  k J/Kg-K,  $\gamma=1.4$  for air  $C_{Pg} = 1$  KJ/Kg,  $\gamma = 1.33$  for gases,  $R=0.287$  k J/kg-K, calorific value of fuel is 42000 kJ/kg.

- 15 In a De Laval turbine, the steam enters the wheel through a nozzle with a velocity of 500 m/s and at an angle of  $20^\circ$ . The blade speed is 200 m/s and the exit angle of the moving blade is  $25^\circ$ . Find the inlet angle of the moving blade, exit velocity of steam and work done per kg of steam.
- 16 a) Draw a configuration diagram and temperature entropy diagram for a gas turbine cycle with regeneration.  
b) In a gas turbine plant, operating on Joule cycle, air is compressed from 1 bar and  $15^\circ\text{C}$  through a pressure ratio of 4.5. It is then heated to  $700^\circ\text{C}$  in a combustion chamber and expanded to a pressure of 1 bar. Calculate the net work done, cycle efficiency and work ratio.
- 17 a) Distinguish between reciprocating and rotary compressor.  
b) With the help of neat sketch explain the principle and working of Ram jet engine.

\*\*\*\*\*

**FACULTY OF ENGINEERING**  
**BE IV / IV (PROD) I Semester (NON CBCS) (Backlog) Examination,**  
**March / April 2022**

**Subject: CONTROL SYSTEMS THEORY**

**Time: 3 Hours**

**Max. Marks: 75**

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

**PART – A**

**Note: Answer all questions**

**(25 Marks)**

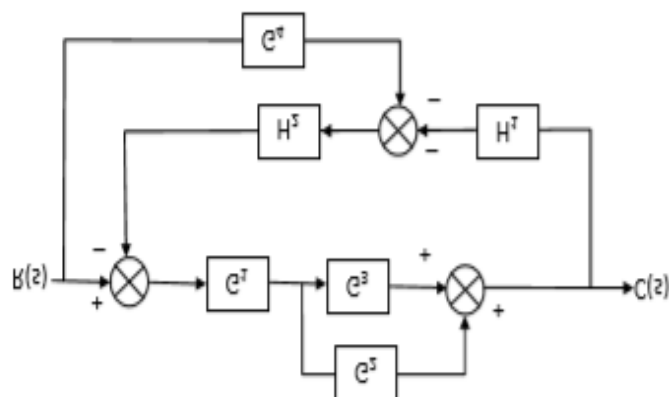
1. What are different types of Servomotor.
2. Obtain the transfer function of hydraulic system.
3. Determine the range of 'k' for the system to be stable  $s^3+3s^2+(k+2)s+5k$
4. List few time domain specifications.
5. Define Gain cross over frequency and phase cross frequency.
6. What is transfer function and its limitation.
7. Draw the circuit of lag network.
8. Why compensator are required for system.
9. State what is State Transition matrix.
10. If  $A = \begin{bmatrix} 1 & 2 \\ 2 & 4 \end{bmatrix}$  find  $\phi(t)$

**PART – B**

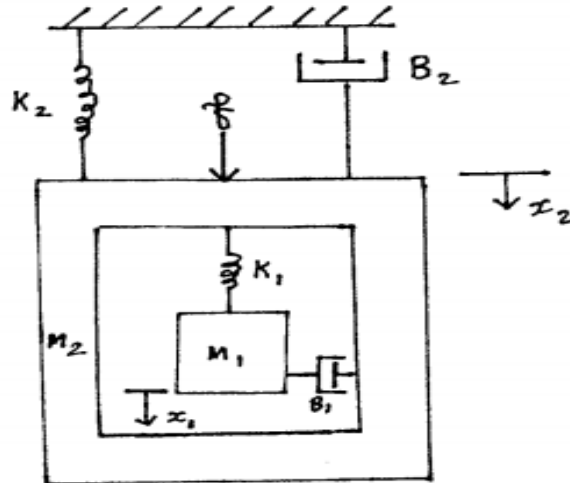
**Note: Answer any five questions**

**(5 x 10 = 50 Marks)**

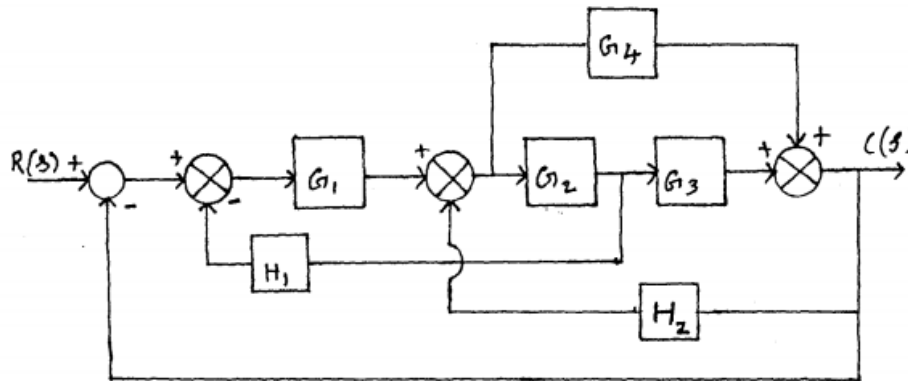
11. Reduce the block diagram in fig and obtain its transfer function



12. For the spring, damper and mass system shown in Fig, Obtain the differential equations governing the system if  $f$  is the force applied.



13. Draw the equivalent signal flow graph for the system shown in fig.



14. Draw the bode plot of the system  $G(s) = \frac{k}{s(s+1)(0.1s+1)}$ .

Hence obtain the exact plot by doing necessary corrections at corner frequencies. (i) Find the gain margin and, phase margin (ii) The value of  $K$  for phase margin =  $20^\circ$ .

15. Check the controllability and observability of a unity feedback system

represented by  $G(s) = \frac{5s^2+15s+35}{s^3+4s^2+14s+20}$

16. The open loop transfer function of a uncompensated system is

$G(s) = \frac{5}{s(s+2)}$ . Design a suitable lag compensator for the system so that  $s(s+2)$  the static velocity error constant  $K_v$  is  $20 \text{ sec}^{-1}$ , the phase margin is atleast  $55^\circ$  and the gain margin is atleast 12 dB.

17. a) Explain about transfer function of Electrical system.  
b) Explain about PID controller.

\*\*\*\*\*

OU - 1607 OU - 1607

**FACULTY OF ENGINEERING**  
**B.E. IV / IV (CSE) I Semester (NON-CBCS) (Main) Examination,**  
**March / April 2022**

**Subject: Distributed Systems**

**Time: 3 hours**

**Max. Marks: 75**

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

**PART – A**

**Note: Answer all questions.**

**(25 Marks)**

- 1 Differentiate between distributed system and computer network.
- 2 Define Distributed System.
- 3 What is java objet serialization? Give an example.
- 4 Define Scalability.
- 5 What properties should be satisfied for reliable multicast?
- 6 Explain briefly about internal and external synchronization.
- 7 What is Name Space?
- 8 What is Cryptography?
- 9 Define Multicast Communication.
- 10 What is Network Partition?

**PART – B**

**Note: Answer any five questions**

**(5 x 10 = 50 Marks)**

- 11 List out the challenges of distributed system. Explain in detail.
- 12 (a) Explain how a new process is created in distributed systems.  
(b) How directory service is implemented in distributed systems?
- 13 (a) What are Election algorithms? Explain about bully algorithm.  
(b) Explain about distributed debugging.
- 14 (a) Explain nested transaction.  
(b) What are distributed deadlocks? Explain.
- 15 Explain the implementation and working of X.500 Directory Service.
- 16 Explain the CODA file system Architecture.
- 17 Write short notes on:
  - (a) Consensus in synchronous systems
  - (b) Logical time and logical clock