

C 44292

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Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Mechanical Engineering

ME 19 402—COMPUTER PROGRAMMING IN C

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Compare procedure oriented programming and object oriented programming.
2. What is the role of interpreters in translating high level languages ?
3. Write an algorithm to check whether the given number is odd or even.
4. Describe the basic structure of C program.
5. Distinguish between while and do-while statements.
6. Identify various data types in C.
7. Define Arrays. How one dimensional array is declared and initialised ?
8. Explain the concept of sorting and searching operations on arrays.
9. Write a C program to copy one string to another and count the number of characters copied without using any standard library functions.
10. Write a function 'large' to find the largest element given in an array of elements.
11. What are the features of pointers ? Write a C program to print address of a variable.
12. Describe how arrays are passed to functions ?
13. Tabulate the differences between correlation and regression.

Turn over

14. Find the solution to the following system of equations using the Gauss-Seidel method.

$$12x_1 + 3x_2 - 5x_3 = 1$$

$$x_1 + 5x_2 + 3x_3 = 28$$

$$3x_1 + 7x_2 + 13x_3 = 76$$

15. List the steps involved in computing the co-efficients of the regression polynomial.

(10 × 5 = 50 marks)

Part B

*Answer one full section from each question.
Each question carries 10 marks.*

16. (a) Draw a block diagram to illustrate the basic organization of a computer system and explain the functions of various units.

Or

- (b) Construct an algorithm and draw a flowchart to find the roots of a quadratic equation.

17. (a) Explain the types of C tokens in the programs and syntax of the language.

Or

- (b) List and explain the classification of various operators used in C.

18. (a) Write a C program to multiply two matrices of size n by n .

Or

- (b) Explain the following string handling functions with example:

(i) strcpy(). (2 marks)

(ii) strcmp(). (2 marks)

(iii) strcat(). (2 marks)

(iv) strlen(). (2 marks)

(v) strrev(). (2 marks)

19. (a) Illustrate the concept of recursion and write a C program to generate Fibonacci series using recursion.

Or

- (b) What is call-by-reference ? Write a C program to explain call-by-reference parameter technique.

20. (a) Solve the following system of equation using Gauss-Jordan method.

$$\begin{aligned}x_1 - 2x_2 + 4x_3 &= 12 \\2x_1 - x_2 + 5x_3 &= 18 \\-x_1 + 3x_2 - 3x_3 &= -8\end{aligned}$$

Or

(b) Write a C program to solve the following system of equations using Gauss elimination method.

$$\begin{aligned}x_1 - x_2 + x_3 &= 1 \\-3x_1 + 2x_2 - 3x_3 &= -6 \\2x_1 - 5x_2 + 4x_3 &= 5\end{aligned}$$

(5 × 10 = 50 marks)

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Name.....

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Information Technology

IT 19 402—DIGITAL DATA COMMUNICATION

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Compare and contrast simplex, half duplex and full duplex mode.
2. Explain the causes of transmission impairment.
3. Specify the levels of addressing implemented in TCP/IP architecture.
4. Describe the characteristics of microwave propagation.
5. Point out the differences between serial and parallel transmission.
6. What is Phase Shift Keying ? Explain the two forms of Phase Shift Keying.
7. Calculate the pair wise Hamming distance of the following code words : 01101010, 11011011, 11011001 and 10011101. Find the minimum Hamming distance among them ?
8. Explain Wavelength Division Multiplexing with diagram.
9. Elaborate the principle behind spread spectrum in wireless applications.
10. Write short notes on Datagram networks.
11. What is the role of Stop and Wait protocol in noiseless channel ?
12. Explain the transfer modes of High-level Data Link Control protocol.
13. How the method of reservation can be done through controlled access ?
14. Give technical description on Polling in controlled access.
15. Tabulate the differences between TDMA and CDMA.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full section from each question.

Each question carries 10 marks.

16. a) Draw and compare the performance of each network topology with its advantages and disadvantages in detail.

Or

- b) Describe the services provided by various layers in the OSI model with diagram.

17. a) Discuss various line coding schemes used in the conversion of digital data to digital signals.

Or

- b) Explain the ways of representing analog information by an analog signal.

18. a) Discuss the significance of linear block coding in error detection and correction.

Or

- b) Briefly explain the two techniques to spread the bandwidth in wireless applications.

19. a) What are circuit switched networks ? Explain how actual communication takes place in a circuit switched network.

Or

- b) Explain the functions of framing, flow and error control in data link layer.

20. a) Define Random Access. Explain the protocols allotted for random access method.

Or

- b) What is Channelization ? Explain Frequency Division Multiple Access in detail.

(5 × 10 = 50 marks)

C 44304

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Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Electronics and Communication Engineering

EC 19 402—SIGNALS AND SYSTEMS

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. How are systems classified ?
2. Draw the basic building block of discrete time systems.
3. Find the order of the system which are described by the input output relation :
$$Y(n) = y(n-2) - 4Y(n-1) + s(n) - s(n-1).$$
4. What are the Fourier series co-efficients ?
5. List the properties of continuous time Fourier series.
6. Write the Parseval's relation for continuous time Fourier series.
7. Explain inverse Laplace transform.
8. List the important properties of Laplace transform pairs.
9. Discuss some special properties unilateral or one sided Laplace transform.
10. Discuss the determination of magnitude and phase of Fourier series co-efficient.
11. Write the Parseval's relation for discrete time periodic signal.
12. Compare CTFS and DTFS.
13. Explain region of convergence for Z-transform.
14. What is inverse Z-transform ?
15. Discuss some special properties unilateral Z-transform.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one question from each module.

Each question carries ten marks.

MODULE I

16. (a) Check the continuous time systems for time invariance $y(t) = \sin[s(t)]$, where $y(t)$ and $s(t)$ are input and output of the continuous time systems.

Or

- (b) Check the discrete time systems for time invariance $y(n) = n s(n)$.

MODULE II

17. (a) List and explain the properties of Fourier series.

Or

- (b) Determine the CTFT of the unit impulse function $s(t) = \delta(t)$.

MODULE III

18. (a) Find the unilateral LT for the exponential function e^{-at} .

Or

- (b) Discuss the properties of ROC for Laplace transform.

MODULE IV

19. (a) Discuss the multiplication property of DTFT. Mention the applications.

Or

- (b) Discuss some special properties DTFT.

MODULE V

20. (a) Find the Z transform of sequence $s(n) = u(-n)$.

Or

- (b) Discuss applications of unilateral Z transform in solving difference equations of discrete time LTI systems.

(5 × 10 = 50 marks)

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Electrical and Electronics Engineering

EE 19 402—ELECTROMAGNETIC FIELD THEORY

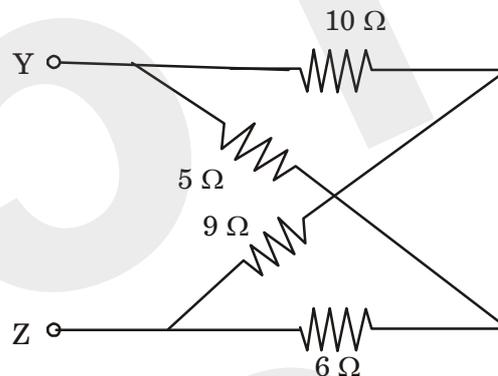
Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

- I. 1 Express the value of differential volume in rectangular and cylindrical Co-ordinate systems.
2 What are the source of electric field and magnetic fields ?
3 Write down the expression for capacitance between two parallel plates.
4 Find the equivalent resistance between the terminals Y and Z in Figure below.



- 5 State Gauss law for magnetic field.
6 Derive the expression for torque developed in a rectangular closed circuit carrying current I in a uniform field.
7 Explain Faraday's law in vector form.
8 Write point form of Ohm's law.
9 In a material for which $\sigma = 5 \text{ S/m}$, $r = 1$ and $E = 250 \sin 1010t$ (V/m) find the conduction and displacement current densities.

Turn over

- 10 Write Maxwell's equation in point and integral form for good conductors.
- 11 Compare the significance of conduction current density and displacement current density.
- 12 Point out the requirements for electromagnetic generator.
- 13 Write the properties of uniform plane wave.
- 14 State and explain Poynting Theorem.
- 15 Explain lossy dielectrics.

(10 × 5 = 50 marks)

Part B

*Answer any five questions.
Each question carries 10 marks.*

1. Check validity of the divergence theorem considering the field $D = 2xy \mathbf{a}_x + x^2y \mathbf{a}_y$ c/m² and the rectangular parallelepiped formed by the planes $x = 0, x = 1, y = 0, y = 2$ & $z = 0, z = 3$.

Or

2. Derive an expression for the capacitance of a parallel plate capacitor having two dielectric media.
3. Two resistances when they are in series have an equivalent resistance of 9 ohms and when connected in parallel have an equivalent resistance of 2 ohms. Find the resistances and ratio of voltage and current sharing between the elements if the supply voltage is 50 V.

Or

4. (a) Define and explain biot-savart's law.
(b) Find H at the center of an equivalent triangular loop of side 4m carrying current of 5 A.
5. Explain faradays law in vector form.

Or

6. In a material for which $\sigma = 5$ S/m. and $\epsilon r = 1$, the electric field intensity is $E = 250. \sin 1010t$ V/m. Estimate the conduction and displacement current densities, and the frequency at which both have equal magnitudes.

7. Derive the Maxwell's equation for a time varying are modified for time varying from fundamental laws of electric and magnetic fields.

Or

8. Derive solution of wave equation for potentials.
9. Briefly explain about the wave incident : (i) Normally on perfect conductor ; and (ii) Obliquely to the surface of perfect conductor.

Or

10. Assume that EI and H waves, traveling in free space, are normally Incident on the interface with a perfect dielectric with $r = 3$. Calculate the magnitudes of incident, reflected and transmitted E and H waves at the interface.

(5 × 10 = 50 marks)

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FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]**EXAMINATION, APRIL 2023**

Printing Technology

PT 19 402—OFFSET TECHNOLOGY

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. List the components of a web offset press with neat diagram.
2. With a neat diagram describe 4 color blanket to blanket press.
3. List the advantages and disadvantages of offset printing.
4. Explain the principle of swing arm gripper with neat diagram.
5. Explain the levy flap dampening system with neat diagram.
6. What are bearer and non-bearer presses ? Describe.
7. Explain the construction of plate cylinder with neat diagram.
8. Describe the roll of acid and Gum Arabic in fountain solution.
9. How do you set the dampening unit ? Write the sequence of operations.
10. What are the parts of an inking system ? Explain.
11. What are the types of blankets used in offset printing ? Brief.
12. Explain the principle of wet on wet printing.
13. What is the need of dryers and chill rolls ?
14. Brief on the parts of a former folding unit.
15. Describe the operations single roll stand while changing the rolls.

(10 × 5 = 50 marks)

Turn over

Part B

Each question carries 10 marks.

16. Explain the principle of lithography and offset printing. Describe the units of sheet-fed offset press with a neat diagram.

Or

17. Describe the sheet control and guiding devices used at the delivery side of a sheet-fed offset press with simple diagrams.

18. What is 3 point sheet registration system ? How is it carried out ? Explain.

Or

19. What are the different types of sheet detectors used on sheet feeder ? Explain each with simple sketches.

20. Describe the different types of continuous flow dampening systems with neat diagrams.

Or

21. Explain the significance of maintaining pH and conductivity of dampening solution.

What are the ingredients to be added to get the right pH and conductivity ?

22. Describe the offset pyramid inking system with neat diagram.

Or

23. Define the printing problem, mention the cause of the problem and give solutions to such print problems :

- a) Snow Flaking ;
- b) Dot Gain ;
- c) Plate Cracking ; and
- d) Slurring.

24. Discuss the following Plate scanner, Scanning Densitometer, Stroboscope and Ink Agitator.

Or

25. How does the splicing take place in a zero-speed splicer ? Explain the sequence of splicing.

(5 × 10 = 50 marks)

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Name.....

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**FOURTH SEMESTER B.Tech. (ENGINEERING) [2019 SCHEME] DEGREE
EXAMINATION, APRIL 2023**

B.Tech.

EN 19 401—ENGINEERING MATHEMATICS – IV

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. If $f(x,y) = \begin{cases} ke^{-(2x+y)}, & x \geq 0, y \geq 0 \\ 0 & , \text{ otherwise} \end{cases}$ is a joint pdf, find k .
2. If $f(x,y) = \begin{cases} x^2 + \frac{xy}{3}, & 0 < x < 1, 0 < y < 2 \\ 0 & , \text{ otherwise} \end{cases}$ is a joint pdf find $P(X < \frac{1}{2}, Y > \frac{1}{2})$.
3. The joint density of X and Y is given by $f(x,y) = xe^{-x(y+1)}$ for $x > 0, y > 0$. Are X and Y independent ?
4. It is known that 5% of the books bound at a certain binding have defective bindings. Find the probability that 2 of 100 book bound by this binding will have defective bindings using :
 - (a) The formula for the binomial distribution.
 - (b) The Poisson approximation to the binomial distribution.
5. A taxi cab company has 12 Ambassadors and 8 Fiats. If 5 of these taxi cabs are in the workshop for repairs and an Ambassador is as likely to be in for repairs as a Fiat, what is the probability that :
 - (i) 3 of them are Ambassadors and 2 are Fiats.
 - (ii) atleast 3 of them are Ambassadors.
6. If the probability that an applicant for a driver's licence will pass the road test on any given trial is 0.8, what is the probability that he will finally pass the test :
 - (a) on the fourth trial and (b) in fewer than 4 trials.

Turn over

7. A random sample of 400 members is found to have a mean of 4.45 cm. Can it be reasonably regarded as a sample from a large population whose mean is 5 cms and variance is 3.96 cm.
8. The mean produce of wheat of a sample of 100 fields is 200 lbs per acre with a S.D. of 10 lbs. Another sample of 150 fields gives the mean of 220 lbs with a S.D. of 12 lbs. Can the two sample be considered to have been taken from the same population whose S.D. is 11 lbs ? Use 5% level of significance.
9. A manufacturer of electric bulbs, according to a certain process, find the S.D. of the life of lamps to be 100 h . He wants to change the process, if the new process results in smaller variation in the life of lamps. In adopting a new process, a sample of 150 bulbs gave a S.D. of 95 h . Is the manufacturer justified in changing the process.
10. Show that $u = \frac{1}{2} \log(x^2 + y^2)$ is harmonic.
11. Verify whether $w = \sin z$ is analytic. If so find $\frac{dw}{dz}$.
12. Show that the transformation $w = e^z$ transforms the region between the axis and a line parallel to the real axis at $y = \pi$ into the upper half plane.
13. Evaluate $\int_C \frac{\cos \pi z^2 + \sin \pi z^2}{(z-1)(z-2)} dz$ where C is $|z| = 3$ by Cauchy's integral formula.
14. Expand $f(z) = \cos z$ in Taylor's series about $z = \frac{\pi}{2}$.
15. Evaluate $\int_C \frac{e^z}{(z+2)(z+1)^2} dz$ where C is $|z| = 3$ using Cauchy's residue theorem.

(10 × 5 = 50 marks)

Part B

*Answer one full section from each question.
Each question carries 10 marks.*

16. (a) If the joint p.d.f. of a two dimensional random variables (X, Y) is given by :

$$f(x, y) = \begin{cases} k(6 - x - y), & 0 < x < 2, 2 < y < 4 \\ 0, & \text{otherwise.} \end{cases}$$

find (i) the value of k ; (ii) $P(X < 1, Y < 3)$; (iii) $P(X + Y < 3)$ and (iv) $P(X < 1 / Y < 3)$.

Or

- (b) The joint mass function of (X, Y) is given by $f(x, y) = k(2x + 3y)$, $x = 0, 1, 2$, $y = 1, 2, 3$. Find all the marginal probability distributions. Find also the condition probability distribution of X given Y.
17. (a) At an examination 10% of the students got less than 30 marks and 97% got less than 62 marks. Assuming normal distribution find the mean and S.D.

Or

- (b) A random variable X has a uniform distribution over $(-3, 3)$, compute :
- (i) $P(X < 2)$; (ii) $P(|X| < 2)$; (iii) $P(|X - 2| < 2)$; (iv) Find k for which $P(X > k) = \frac{1}{3}$.
18. (a) The following data is collected on two characters. Based on this, can you say that there is no relation between smoking and literary ?

	Smokers	Non-smokers
Literates	83	57
Illiterates	45	68

Or

- (b) The nicotine contents in two random sample of tobacco are given below :

Sample I	21	24	25	26	27	
Sample II	22	27	28	30	31	36

Can you say that the samples came from the same population ?

Turn over

19. (a) Find the analytic function $f(z)$ whose real part is $e^{2x}(x \cos 2y - y \sin 2y)$ satisfying $f(1) = 3i$.

Or

(b) (i) Find the bilinear transformation which maps $1, i, -1$ into $i, 0, -i$ respectively.

(ii) Show that the transformation $w = z + \frac{1}{z}$ maps the circle $|z| = c$ into an ellipse. Discuss the case when $c = 1$.

20. (a) Expand $\frac{1}{(z-1)(z-2)}$ in (i) $|z| < 1$; (ii) $1 < |z| < 2$; (iii) $|z| > 2$; (iv) $0 < |z-1| < 1$.

Or

(b) Evaluate $\int_0^{2\pi} \frac{d\theta}{2 + \cos \theta}$.

(5 × 10 = 50 marks)

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Printing Technology

PT 19 405—ELECTRICAL DRIVES AND CONTROL

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Explain the construction, principle of operating, characteristics and applications of power transistors.
2. Give the constructional details and switching characteristics of a power MOSFET.
3. Explain the static V-I characteristics of an SCR.
4. List out the applications of AC voltage controllers.
5. Explain the working operation of 1-phase half controlled converter with circuit diagram and waveforms ?
6. List out the advantages and disadvantages of cyclo converters ?
7. Write a short notes on Chopper control of DC drive.
8. How is chopper used in speed control of DC motor ?
9. Write the applications of DC chopper.
10. What are the advantages of Electric drives ?
11. What are the similarities between brushless DC motor and a self-controlled motor drive ?
12. Write a short notes on Brushless DC motors.
13. Why stator voltage control is an inefficient method of induction motor speed control ?
14. Why VVVF method of speed control of a three phase induction motor is preferable to the frequency control method ?
15. Name the type of induction motor which produces highest starting torque ?

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full section from each question.

Each question carries 10 marks.

16. (a) Describe about any *one* driver circuit and snubber circuit of MOSFET.

Or

(b) Explain the turn-on and turn-off characteristics of IGBT with neat waveforms.

17. (a) Describe the working principle of single phase a.c. voltage controller with circuit and waveforms.

Or

(b) Discuss the working operation of 1-phase to 1-phase bridge type cyclo converter with neat circuit diagram and necessary waveforms ?

18. (a) Derive an expression for dc chopper operation average dc output voltage.

Or

(b) With the help of circuit diagram, explain the working of step-up chopper.

19. (a) Explain that the steady-state stability of a drive depends on relative characteristics of the motor and load and not just on motor (or load) characteristics.

Or

(b) What are the reasons for using load equalisation in an electrical drive and determine the moment of inertia of the flywheel required for load equalisation.

20. (a) Explain how the acceleration time and energy losses are calculated during starting of a three phase induction motor.

Or

(b) Explain the different methods of speed control of induction motor.

(5 × 10 = 50 marks)

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Name.....

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Electrical and Electronics Engineering
EE 19 405—SIGNALS AND SYSTEMS

Time : Three Hours

Maximum : 100 Marks

Part A

Answer any ten questions.

- I. 1 Explain the energy and power signal.
- 2 Create the mathematical and graphical representation of sum of discrete time unit step and ramp function.
- 3 What are the Conditions for a System to be LTI System ?
- 4 Find the Fourier transform of $x(t) = e^{j2\pi ft}$?
- 5 State Parseval's theorem of Fourier series.
- 6 List the properties of CTFS.
- 7 State the convolution Integral for CT LTI systems ?
- 8 Find the Laplace Transform of, $x(t) = t^2 e^{-2t} u(t)$.
- 9 Illustrate the convolution property of Laplace transform.
- 10 Define shifting property of the discrete time unit impulse function.
- 11 Find the DTFT of $x(n) = \{1, 1, 1, 1, 1, 1, 0, 0\}$.
- 12 State Parseval's relation for discrete time aperiodic signals.
- 13 Determine the Z Transform of the Signal $x(n) = \{1, 2, 3, 2\}$
- 14 Compare and Contrast one sided Z- transform and two sided Z-transform ?
- 15 Relate DTFT and Z transform with necessary explanations.

(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** questions.

- II. 1 Determine whether the following system are static or Dynamic, Linear or Non-linear, Shift variant or Invariant, Causal or Non-causal, Stable or unstable. $y(t) = x(t + 10) + x^2(t)$; and (ii) $dy(t)/dt + 10y(t) = x(t)$.

Or

- 2 A Discrete time System is given as $y(n) = y^2(n-1) = x(n)$. A bounded input of $x(n) = 2^n$ is applied to the system. Assume that the system is initially relaxed. Check whether the system is stable or unstable
- 3 Examine the Fourier transform of $x(t) = e^{-3|t|} u(t)$ and plot the Fourier spectrum.

Or

- 4 Find the Fourier Transform of Triangular function. Sketch the signal and Fourier transform
- 5 State and prove Parseval's theorem for energy signals.

Or

- 6 A stable LTI system is characterized by the differential equation

$$\frac{d^2y(t)}{dt^2} + 4\frac{dy(t)}{dt} + 3y(t) = \frac{dx(t)}{dt} + 2x(t).$$

Find the frequency response and Impulse response using Fourier transform.

- 7 Estimate the convolution of two signals $x_1(n) = (1/2)^n u(n)$ and $x_2(n) = (1/4)^n u(n)$ using DTFT.

Or

- 8 Prove the sampling theorem and explain how the original signal can be reconstructed from the sampled version with necessary illustrations
- 9 Find the inverse Z Transform of $X(z) = 1/(1 - 0.5z^{-1} + 0.5z^{-2})$ for ROC $|Z| > 1$.

Or

- 10 Determine the Z transform and ROC of $x(n) = u(-n) - u(n-3)$.

(5 × 10 = 50 marks)

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Electronics and Communication Engineering

EC 19 405—ANALOG CIRCUITS

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. What is level shifting ? Where it is used ?
2. Explain the concept of drift in differential amplifiers.
3. Explain CMRR.
4. List the characteristics of an ideal op-amp.
5. The output voltage of an op amp changes by 20 V in 4 μ s. Calculate the slew rate.
6. List the stages of an op-amp.
7. What is Sallen and Key filters ?
8. List the disadvantages of active filters.
9. Draw the Chebyshev frequency response characteristics.
10. List the specifications of DAC.
11. State and explain sampling theorem.
12. How can you convert a three terminal fixed voltage regulator into a variable one ?
13. List the applications of PLL.
14. Discuss the features of 555 timer.
15. Draw the typical low pass filter used in PLL.

(10 \times 5 = 50 marks)**Turn over**

Part B

*Answer one question from each module.
Each question carries 10 marks.*

Module I

- 16 a) Derive the expression for the CMRR in the CMOS differential amplifiers

Or

- b) Analyze a Widlar current mirror source.

Module II

17. a) Give a detailed analysis of three op amp instrumentation amplifier.

Or

- b) Design an op-amp differentiator that will differentiate an input signal with $f_{\max} = 100$ Hz.

Module III

18. a) Draw the circuit of a RC phase shift oscillator using op-amp and derive an expression for frequency of oscillation.

Or

- b) Design a first order Butterworth active low pass filter for cut off frequency of 1000Hz.

Module IV

19. a) Explain the successive approximation type ADC.

Or

- b) Explain the R-2R ladder type DAC.

Module V

20. a) Discuss the block diagram of PLL and derive the expression for Lock range and capture range.

Or

- b) Explain the working of 555 timer with block diagram.

(5 × 10 = 50 marks)

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**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Information Technology

IT 19 405—OBJECT ORIENTED PROGRAMMING USING JAVA

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Compare and contrast object oriented programming and procedural programming.
2. What are the differences between break and continue statements in Java ? Give an example Java program.
3. Explain Java ternary operator with suitable example.
4. Define object and class. How can we create instance of a class in Java.
5. What are constructors ? Enumerate the properties and types of Java constructors.
6. How the errors are handled with exceptions in Java ?
7. Tabulate the differences between classes and interfaces in Java.
8. What is polymorphism ? Explain the two types of polymorphism in Java.
9. Elaborate the mechanism of object cloning in Java.
10. Define Multithreading. List the advantages of Java Multithreading.
11. Explain the *two* ways to create a thread in Java.
12. Illustrate the usage of synchronized method in Java program.
13. Explain how to make a ResultSet as Updatable ResultSet.
14. Write short notes on RowSet in Java JDBC.
15. Explain the working of RMI application with diagram.

(10 × 5 = 50 marks)

Turn over

Part B

*Answer **one** full section from each question.*

Each question carries 10 marks.

16. (a) Write a Java program to copy all the elements of one array into another array.

Or

(b) Describe the usage of loop statements in Java with examples.

17. (a) What is Debugging ? Enumerate the steps involved in debugging and give its benefits.

Or

(b) What is string in Java ? How to create a string object ? Write a Java program to find the reverse of a string.

18. (a) What are the uses of streams ? Explain in detail about Java object streams.

Or

(b) How to create a Java file object ? List the various file operations with its methods and write a Java program to create a new file.

19. (a) Discuss the mechanism of Inter-thread communication in Java.

Or

(b) Illustrate the steps involved in the display of an image within the applet.

20. (a) Explain the steps to implement remote method invocation in Java.

Or

(b) Discuss the procedure of Java Database Connectivity with MySQL database with example.

(5 × 10 = 50 marks)

C 44295

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Mechanical Engineering

ME 19 405—MANUFACTURING PROCESS—I

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Discuss in detail the design of gating system for die-casting.
2. Write about the following types of sands : Facing sand, Backing sand, System sand, parting sand.
3. Sketch a common gating system. Label it and explain the function of its various elements.
4. Write briefly on “Testing and Inspection of welded joints”.
5. Discuss about five casting defects along with the cause and remedy.
6. Describe the effects of distortion on welded structure
7. What is slush casting ? Explain its working principle and applications.
8. Distinguish between Flux coated arc welding process and Inert gas arc welding ?
9. Explain the generation of heat in Friction welding process with its applications ?
10. Define residual stresses. And explain how these are induced in weld joints ?
11. Explain shell mold casting with a neat sketch.
12. Explain investment casting. Also write its advantages and disadvantages
13. Explain the process of nucleation and grain growth in metal casting. What is directional solidification ?
14. What is heat affected zone ? What are its implications in arc welding process ?
15. List out its advantages and disadvantages of gas welding.

(10 × 5 = 50 marks)

Turn over

Part B

Each question carries 10 marks.

16. With the help of diagrams discuss the various types of cores used in sand mould casting.

Or

17. Briefly discuss various pattern allowances used in casting.

18. Explain any *two* types of die casting machine and list out its advantages and disadvantages.

Or

19. Briefly explain centrifugal casting with a neat sketch and list out its advantages and disadvantages

20. Discuss the gas welding process and the necessary equipment's needed with suitable sketches.

Or

21. Explain about GMAW with a neat sketch and give its advantages and disadvantages and application.

22. Explain the plasma arc welding process and the necessary equipment's needed with suitable sketches.

Or

23. Differentiate between TIG and MIG welding. Discuss the role of inert gases in these processes and draw a comparison between the commonly used inert gases.

24. Briefly explain the joining processes of soldering, brazing and braze welding. Clearly bring out the differences between them and give specific applications of each type.

Or

25. Explain any *three* types of brazing processes with neat sketches.

(5 × 10 = 50 marks)

C 44310

(Pages : 3)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Information Technology

IT 19 404—OPERATING SYSTEMS

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Elaborate the concept of Multiprogramming.
2. Explain the ways for users to interface with the operating system.
3. Write short notes on open source operating systems.
4. How synchronous and asynchronous signals are handled ? Explain.
5. What is the role of CPU scheduler and dispatcher in CPU scheduling ?
6. State critical section problem with the general structure of typical process.
7. What is a Pipe ? Explain the types of pipes used on UNIX and Windows systems.
8. In what way resource allocation graphs are used for detection of deadlocks ?
9. Enumerate the differences between internal fragmentation and external fragmentation.
10. State the significance of initiation of boot block from disk.
11. Elaborate file access methods in detail.
12. Describe the physical structure of secondary storage devices.
13. Define a virus. Explain how viruses work in a computer system.
14. List and explain the security measures to protect a system.
15. With a neat sketch, explain the components of Linux system.

(10 × 5 = 50 marks)

Turn over

Part B

*Answer **one** full section from each question.*

Each question carries 10 marks.

16. a) Explain the major activities of an operating system with regard to storage management.

Or

- b) What are system calls ? Discuss the various categories of system calls.

17. a) Consider the set of 4 processes whose burst time are given below :

Process Id	Burst Time
P1	10
P2	15
P3	8
P4	6

Consider First Come First Serve (FCFS) and Round Robin (RR) (quantum = 10ms) scheduling algorithms. Illustrate the scheduling using Gantt chart and calculate average waiting time. Also identify the major issue of priority scheduling and find the solution to overcome it ?

Or

- b) What is a Process ? With a neat sketch, explain process states and process control block.

18. a) How to recover from deadlock situations ? Discuss in detail.

Or

- b) A system uses 3 page frames for storing process pages in main memory. It uses the First in First out (FIFO), LRU and Optimal page replacement policies. Assume that all the page frames are initially empty. What is the total number of page faults that will occur while processing the page reference string given : 4, 7, 6, 1, 7, 6, 1, 2, 7, 2.

Also calculate the hit ratio and miss ratio.

19. a) Define RAID. Describe various levels of RAID with diagrams.

Or

- b) Discuss in detail the advantages and disadvantages of linear list and hash table in directory implementation.

20. a) Describe and compare several methods of implementing access matrix.

Or

b) List and explain several forms of accidental and malicious security violations and standard methods to breach security in detail.

(5 × 10 = 50 marks)

C 44306

(Pages : 3)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Electronics and Communication Engineering
EC 19 404—ANALOG COMMUNICATION

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. What is VSB modulation ? How it differs from SSB modulation ?
2. An AM broadcast radio transmitter radiates 10KW of power if modulation percentage is 60 %. Calculate how much of this is carrier power.
3. Distinguish between high level and low level modulation.
4. Define Carson's rule.
5. Define modulation index for FM.
6. What is capture effect ?
7. Explain the term double spotting ?
8. What are the advantages of including an RF amplifier ?
9. Explain Pulse Width Modulation and Pulse Position Modulation.
10. Find the mean and variance of poisson random variable.
11. Let X be the random variable with pdf given by

$$f_X(X) = \begin{cases} cx^2, & |x| \leq 1 \\ 0 & \text{otherwise} \end{cases}$$

- (a) Find the constant c ; and
 - (b) Find mean and variance.
12. Give the condition required for Strictly Stationary Random Process. Also give the condition required for Wide Sense Stationarity.

Turn over

13. Derive Friis' formula for finding overall noise figure of amplifiers in cascade.
14. Explain Threshold effect in FM.
15. Write a short note on :
 - (i) Noise temperature ; and
 - (ii) Noise Figure.

(10 × 5 = 50 marks)

Part B

Answer one full question from each Section.

Each question carries 10 marks.

16. (a) Derive an expression for Amplitude Modulated carrier signal and draw the spectrum of AM.

Or

(b) Derive an expression for average power for sinusoidal AM. Also find the transmission efficiency.
17. (a) Explain the working of diode ring modulator for the generation of DSBSC signal with relevant diagrams and waveforms.

Or

(b) Explain about Armstrong method for FM generation.
18. (a) Explain the block diagram for super heterodyne FM receiver.

Or

(b) Write a short note on :
 - (i) Selectivity ;
 - (ii) Fidelity ; and
 - (iii) Sensitivity.
19. (a) Consider the random process $X(t) = A \cos(\omega t + \theta)$ where ω and θ are constants and A is a random variable uniformly distributed in the interval $(-a, a)$. Find mean, autocorrelation and check whether the given random process is wide sense stationary.

Or

(b) Consider the probability density function $f_X(X) = ke^{-|x|}$ for $-\infty < x < \infty$

Find the :

- (i) value of k ;
- (ii) $F_X(X)$; and
- (iii) $P(1 \leq X \leq 2)$.

20. (a) Derive the SNR at the output of envelope detector for receiving AM signal.

Or

(b) Derive the SNR at the output of FM receiver

(5 × 10 = 50 marks)

C 44302

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Electrical and Electronics Engineering

EE 19 404—DIGITAL ELECTRONICS AND LOGIC CIRCUITS

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

- I. 1 Give the truth tables for NAND and Ex-OR gates.
- 2 Convert [1010111] G to binary code
- 3 Add the BCD numbers : (a) 1001 and 0100 (b) 00011001 and 00010100.
- 4 How does don't care condition in K-map help for circuit simplification ?
- 5 Convert the given expression in canonical SOP form $Y = A' C + AB + BC'$.
- 6 Why is MUX called as data selector ?
- 7 Examine the drawback of RS flip-flop ?
- 8 What is a preset table counter and ripple counter ?
- 9 Draw the state diagram and characteristics equation of a D FF.
- 10 How the memories are classified ?
- 11 Write the advantages of E2PROM over an EPROM.
- 12 Compare the features of PROM, PAL and PLA
- 13 Draw the PIN diagram of 8085.
- 14 What is and Interrupt ? Explain the interrupts.
- 15 Write a program for multiplying two numbers

(10 × 5 = 50 marks)

Turn over

Part B

Answer any **five** questions.

Each question carries 10 marks.

- II. (1) (a) Convert 10002 into gray code and Excess 3 code.
(b) Convert binary number 11011110 into its decimal equivalent.
(c) Explain the classifications of binary codes.

Or

- (2) Given the 2 binary numbers $X = 1010100$ and $Y = 1000011$ perform the subtraction $Y - X$ by using 2's complements.
(3) Simplify the following function using K - map, $f = ABCD + AB'C'D' + AB'C + AB$ and realize the SOP using only NAND gates and POS using only NOR gates.

Or

- (4) Design a BCD to Excess-3 code converter and implement it using logic gates.
(5) Design and explain the working of an 4-bit Up/Down ripple counter

Or

- (6) Explain the operation of universal shift register with neat block diagram.
(7) Explain read cycle and write cycle timing parameter with the help of timing diagram.

Or

- (8) Design a combinational circuit using ROM. The circuit accepts a three bit number and outputs a binary number equal to the square of the input number.
(9) Construct an Internal Architecture of 8085 and explain.

Or

- (10) Describe the addressing modes of the microprocessor 8085.

(5 × 10 = 50 marks)

C 44298

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Printing Technology

PT 19 404—PRINTING MATERIAL SCIENCE

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Discuss the kinetic properties of colloids.
2. What are the applications of egg albumin and fish glue in printing industry ? Discuss.
3. Explain reciprocity law.
4. Discuss the preparation and properties of solid photopolymer flexo plates.
5. Explain the manufacturing process, properties and uses of polyimides in printing industry.
6. Explain the phenomenon of dye sensitized photopolymerization.
7. What are the ingredients of an adhesive ? Explain each with its function and features.
8. Discuss the features and applications of Gum Arabic and egg albumin in printing industry.
9. Explain various types of resins used in printing ink.
10. What are the features of publishing papers and business papers ?
11. What are the features of coated and commercial papers ?
12. Compare the features of writing and printing papers.
13. What are the various surface treatments done on plastic substrates to make it suitable for printing? Brief.
14. Write notes on graining of lithoplates.
15. Explain the properties of aluminium and stainless steel and their applications in printing industry.

(10 × 5 = 50 marks)

Turn over

Part B

*Answer any **five** questions.*

*Each question carries **10** marks*

16. What are the different methods of preparing lyophilic colloids ? Explain.

Or

17. Discuss various purification methods of colloids.

18. Explain the manufacturing, properties and uses of polyolefins in printing industry.

Or

19. Discuss various synthetic rubbers and their uses in printing industry.

20. What are the ingredients of a printing ink ? Explain each.

Or

21. Explain the purpose and features of 5 types of additives used in the printing ink.

22. Discuss various properties required for paper to be used for flexographic printing.

Or

23. Discuss various types of paper boards used for printing.

24. Explain various tests done on plastic substrates used for printing.

Or

25. Explain the properties of various metals used as printing substrates.

(5 × 10 = 50 marks)

C 44294

(Pages : 3)

Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]**EXAMINATION, APRIL 2023**

Mechanical Engineering

ME 19 404—HYDRAULIC MACHINERY

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Find the force exerted by a jet of water of diameter 75mm on a stationary flat plate, when the jet strikes the plate normally with a velocity of 20m/s.
2. Explain the concept of force exerted by jet on a stationary plate.
3. Find the propelling force acting on a ship which takes water through inlet orifices which are at right angles to the direction of motion of ship, and discharge at the back through orifices having effective areas of 0.04 m^2 . the water is flowing at the rate of 1000 liters/s and ship is moving with a velocity of 8m/s.
4. Brief on run away speed and its significance.
5. Classify the different types of draft tubes and elaborate on any *one* type.
6. Define the following : i) Speed ratio ; ii) Flow ratio ; and iii) Discharge of turbine.
7. Brief on mechanical efficiency and overall efficiency of centrifugal pump.
8. Brief on double volute casing with neat diagram.
9. List some applications of multi stage pumps.
10. List any *three* dimensionless numbers with their significance.
11. List some advantages of dimensional and model analysis.
12. Differentiate between geometric similarity and kinematic similarity.
13. List some advantages of dimensional and model analysis.

Turn over

14. What are the advantages of airlift pumps ?
15. A hydraulic press has a ram of 200 mm diameter and a plunger of 30 mm diameter. It is used for lifting a weight of 3 KN. Find the force required at the plunger.

(10 × 5 = 50 marks)

Part B

Each question carries 10 marks.

16. Water is flowing through a pipe at the end of which a nozzle is fitted the diameter of the nozzle is 100 mm and the head of water at the centre of nozzle is 100 m. Find the force exerted by the jet of water on a fixed vertical plate, the coefficient of velocity is given as 0.95.

Or

17. A 10 cm diameter jet of water strikes a curved vane with a velocity of 25 m/s. The inlet angle of the vane is zero and the outlet angle is 150° measured with respect to the impinging jet direction. Determine the resultant force on the vane (a) when the vane is stationary ; and (b) when the vane is moving in the direction of the jet at 10 m/s velocity.
18. A 1/5 scale model of a Kaplan turbine is designed to operate at a head of 25 m. The prototype produces 18.50 MW of power under a head of 49 m when operating at a speed of 250 r.p.m. Find the speed, discharge and power of the model. Assume the efficiency of the model and prototype is the same at a value of 88 %.

Or

19. Explain with neat sketch the principle and structure of Pelton wheel.
20. Explain with neat sketch the classification of pumps.

Or

21. A centrifugal pump is to discharge 0.118m³/s at a speed of 1450 r.p.m against a head of 25 m. the impeller diameter is 250 mm, its width at outlet is 50 mm and manometric efficiency is 75 %. Determine the vane angle at the outer periphery of the impeller.
22. Explain the different types of similitudes.

Or

23. Explain in detail any five dimensionless numbers with its applications.

24. With a neat sketch, elaborate on the principle and construction of reciprocating pump.

Or

25. A single-acting reciprocating pump has a 20 cm diameter piston with stroke of 40 cm. The suction pipe is 10 cm in diameter and 5 m long. The speed of the pump is 30 r.p.m. Find the maximum suction lift if minimum pressure head in the system is limited to 2.50 m (abs) from cavitation considerations. Assume atmospheric pressure at the site as 10.0 m of water.

(5 × 10 = 50 marks)

C 44297

(Pages : 4)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**

Printing Technology

PT 19 403—STRENGTH OF MATERIAL

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. What is plane surveying ?
2. What are the advantages of compass surveying ? Name any *two* compass that can be used for such surveying.
3. Define the following in reference to Levelling :
 - (a) Datum.
 - (b) Bench mark.
 - (c) Reduced level.
 - (d) Line of collimation.
 - (d) Height of instrument.
4. Draw the stress- strain diagram and explain any *two* salient points on it.
5. Explain the significance of the term Factor of Safety.
6. Explain the principle of superposition.
7. Derive the relationship between deflection, slope and bending moment of a beam.
8. List any five assumptions of simple bending theory.
9. Prove that $E = 3K \left(1 - \frac{2}{m}\right)$, where E is the modulus of elasticity, K is the bulk modulus and $1/m$ is the Poisson's ratio.
10. Develop the governing differential equation of beams.
11. State and prove the second moment area theorem.
12. Explain section modulus and its significance. Derive an expression for the same for a circular section.

Turn over

13. Develop the secant formula for long columns.
14. Discuss the limitations of Euler's buckling theory.
15. A solid circular shaft transmits 65 kW power at 100 r.p.m. Calculate the shaft diameter if the twist in the shaft is not to exceed 1° in 2 m. length of the shaft and the shear stress limited to $70 \times 10^6 \text{ N/m}^2$. Take $C = 100 \times 10^9 \text{ N/m}^2$.

(10 × 5 = 50 Marks)

Part B*Answer any five questions.**Each question carries 10 marks.*

16. What is chain surveying? List the uses of various instruments used in the same.

Or

17. Write the procedure involved in plotting a profile of a ground using dumpy level and levelling staff.

(10 marks)

18. A bar 600 mm. long and having rectangular cross section 150 mm. × 75 mm. is subjected to an axial tensile load of 120 kN and lateral compressive load of 300 kN on face 600 mm. × 50 mm. It is observed that the change in length = 0.08 mm. and change in dimension of 150 mm. is 0.008 mm. Find the value of Young's modulus and Poisson's ratio.

Or

19. In a tension test on mild steel rod of 12 mm. diameter using 200 mm. gauge length extensometer, the following observations were made :

Extension under a load of 17 kN	= 0.15 mm
Load at yield point	= 28.5 kN
Ultimate load	= 55 kN
Breaking load	= 42 kN
Final gauge length	= 242 mm
Diameter at the neck	= 8.66 mm

Determine (i) Young's Modulus (ii) Yield Stress (iii) Ultimate stress (iv) Nominal and true breaking stress (v) Percentage elongation in length (vi) Percentage reduction in cross sectional area.

(10 marks)

20. Draw the SFD and BMD for the beam loaded as shown in Figure. 1

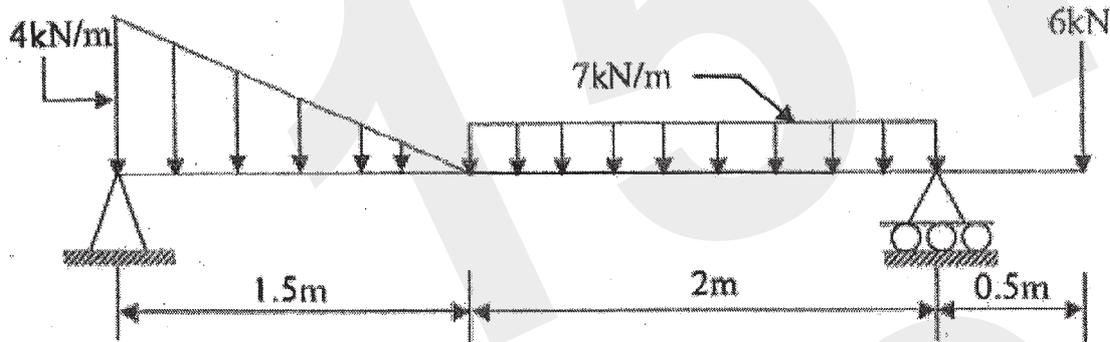


Figure 1

Or

21. Draw the SFD and BMD for the beam loaded as shown in Figure. 2. Obtain the point of contra flexure if any.

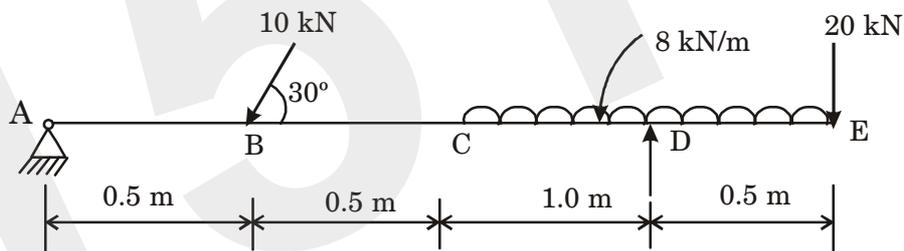


Figure 2

(10 marks)

22. A cantilever 15 cm. wide and 20 cm. deep projects 1.5 m. out of a wall and carries a point load of 50 kN at the free end. Find the slope and deflection of the cantilever at the free end. Take $E = 210 \text{ GPa}$.

Or

23. A cantilever 5 m. long carries a point load of 80 kN at a distance of 3 m from the fixed end. Determine the slope and deflection at the free end of the cantilever. Take $E = 210 \text{ GPa}$ and $I = 40000 \text{ cm}^4$.

(10 marks)

Turn over

24. A hollow circular shaft is to be designed to transmit a torque of 640 kW at 80 r.p.m. The permissible shear stress is 90 N/mm^2 . The diameter ratio is 0.8. Determine the dimensions of the shaft. What will be angular twist per meter length of shaft under this torque? Take $G = 90 \text{ GPa}$.

Or

25. A thin cylinder shell is 4 m. long and is having 1 m. internal diameter and 15 mm. thickness. Calculate the maximum intensity of shear stress induced and also the changes in the dimensions of the shell, if it is subjected to an internal fluid pressure of 1.5 N/mm^2 .

Take $E = 200 \text{ GPa}$ and $\mu = 0.3$

(10 marks)

[5 × 10 = 50 marks]

C 44301

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE (2019 SCHEME)
EXAMINATION, APRIL 2023**Electrical and Electronics Engineering
EE 19 403—ELECTRICAL MACHINES—I

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.
Each questions carries 5 marks.*

- I. 1 Recall various parts of DC machine and outline the importance of yoke.
2 Derive the emf equation of DC machine.
3 State the importance of compensating winding.
4 Explain the reasons for failure of build-up of EMF in self-excited generators with remedies.
5 What is the significance of critical resistance in DC generators ?
6 State the applications of DC generators.
7 Justify the need for a starter in DC motor.
8 Derive the condition for maximum efficiency in DC motor.
9 Outline the advantages and disadvantages Swinburne's test ?
10 What is transformation ratio and give their relations ?
11 Write short notes on separation of losses in a transformer.
12 State the importance of cooling in a transformer.
13 Explain the factors affecting speed in DC machine design.
14 Derive the output equation of DC machine.
15 Why cruciform core is normally preferred in transformer design ?

(10 × 5 = 50 marks)

Turn over

Part B

*Answer any five questions.
Each question carries 10 marks.*

- II. 1 Classify the types of winding and compare the simplex lap and wave windings.
Or
- 2 Explain the effects of armature reaction in a D.C generator and discuss briefly the methods to minimize these effects
- 3 Explain in detail about different methods of excitation and their types.
Or
- 4 State the need for parallel operation. What are the conditions to be satisfied to connect to DC generators parallel? Explain
- 5 A shunt DC motor has $E_b = 235\text{v}$ $V_t = 250\text{v}$ and $I_f = 1.35\text{A}$. The motor is operating at 1200 r.p.m. while supplying 25 HP to a coupled mechanical load. At the point of operation, the rotational losses are 550 Determine the developed torque, armature current, armature resistance and efficiency.
Or
- 6 Explain in detail about the working of Hopkinson's test with necessary calculations.
- 7 Develop an approximate equivalent circuit diagram of a transformer.
Or
- 8 With the help of circuit diagrams, explain delta-star and star-delta connections of three phase transformer.
- 9 For a preliminary design of a 1500 kW, 275 V, 300 r.p.m, dc shunt generator determine the number of poles, armature diameter and core length, number of slots and number of conductors per slot. Assume: Average flux density over the pole arc as 0.85T, Output co-efficient 276, Efficiency 0.91. Slot loading should not exceed 1500 A.
Or
- 10 A3 phase, 50 Hz, Oil cooled core type transformer has the following dimensions. Distance between the core centres = 0.2m, Height of the window = 0.24 m, Diameter of circumscribing circle = 0.14 m, The flux density in core = 1.25Wb/m^2 , the current density in the conductor = 2.5A/mm^2 . Assume the window space factor of 0.2 and the core area factor = 0.56. The core area is 2 stepped. Estimate the kVA rating of the transformer

(5 × 10 = 50 marks)

C 44305

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Electronics and Communication Engineering

EC 19 403—MICROPROCESSOR AND MICROCONTROLLER

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. Narrate the evolution of Microprocessor ?
2. Discuss basic concept of RISC processors.
3. Briefly discuss the concept of READY signal of 8086.
4. Brief about 8086 Flag register.
5. Differentiate between CALL and JUMP instruction ?
6. Why DRAM requires refresh ?
7. What types of memories are used in microprocessors ?
8. Why handshaking concept is used in data transfer ?
9. Describe the interrupt structure of 8086.
10. What are Procedures and Macros in 8086 ?
11. What is 8251 ? Illustrate with a diagram.
12. How do you select a microcontroller for an application ?
13. Give the PSW register status of 8051 ?
14. What for XRL instructions is used in 8051 ?
15. List instructions of 8051 for serial communication.

(10 × 5 = 50 marks)

Turn over

Part B

*Answer **one** full question from each section.*

Each question carries 10 marks.

16. (A) Illustrate about the architecture of 8086.

Or

(B) Illustrate about the addressing modes of 8086.

17. (A) With suitable diagram, illustrate about 8087.

Or

(B) With a suitable diagram, discuss about the memory organization of 8086 based microprocessor system.

18. (A) With an example, illustrate interrupt driven data transfer.

Or

(B) Draw the functional block diagram of 8259 and mark its components.

19. (A) With a diagram, list the features of 8051 microcontroller.

Or

(B) For an 8051 microcontroller kit with 20 MHz clock frequency, generate a delay of 10ms.

20. (A) With a suitable diagram, illustrate the procedure for connecting an 8bit parallel ADC with microcontroller.

Or

(B) With a diagram, illustrate the procedure for interfacing DAC to 8051 microcontroller kit.

(5 × 10 = 50 marks)

C 44309

(Pages : 2)

Name.....

Reg. No.....

**FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, APRIL 2023**

Information Technology

IT 19 403—DATA STRUCTURE AND ALGORITHM

Time : Three Hours

Maximum : 100 Marks

Part A

*Answer any ten questions.
Each question carries 5 marks.*

1. Enumerate the differences between array and record.
2. What are the characteristics of an algorithm ? Why algorithms need to be analyzed ?
3. Explain recursive algorithms with an example.
4. Give brief description about generalized linked lists.
5. Explain polynomial addition using linked list with an example.
6. Elaborate linked list implementation of queue in detail.
7. Compare and contrast Prim's and Kruskal's algorithm for minimum spanning tree.
8. What is tree traversal ? Explain the three methods of traversing a tree.
9. Explain threaded binary trees with diagram and mention its advantages and disadvantages.
10. Differentiate open addressing and closed addressing.
11. Define hashing. Describe the methods of computing hash function.
12. What is collision? State the three techniques used to resolve collisions in open addressing.
13. Give the algorithm for heap sort and analyze the complexity.
14. Write the procedure in sorting the sequence 64, 25, 12, 22, 11 using selection sort.
15. Explain the concept of merge sort algorithm in detail.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full section from each question.

Each question carries 10 marks.

16. a) Discuss the classification of algorithms based on running time complexity in detail.

Or

- b) With a neat sketch, explain basic asymptotic notations and give the procedure for the analysis of recursive function to generate Fibonacci sequence.

17. a) Illustrate the implementation of stack using array and mention the pros and cons of array implementation of stack.

Or

- b) Specify an algorithm to evaluate postfix expression using stack and trace the algorithm to calculate the value for the postfix expression "4 5 6 * +".

18. a) What is a binary search tree? Mention its advantages and explain the insertion and deletion operations on binary search tree.

Or

- b) With suitable example, explain Dijkstra's algorithm to compute the shortest path of an undirected graph.

19. a) Illustrate the method of searching in sequential and binary search with example.

Or

- b) What is separate chaining? Illustrate how collisions are resolved using separate chaining by inserting the following sequence of keys in the hash table with hash function 'key mod 6' - 24, 75, 65, 81, 42, 63.

20. a) Explain the algorithm of bubble sort and insertion sort with example.

Or

- b) Analyze the time and space complexities of various sorting techniques in detail.

(5 × 10 = 50 marks)

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(Pages : 3)

Name.....

Reg. No.....

FOURTH SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]**EXAMINATION, APRIL 2023**

Mechanical Engineering

ME 19 403—THERMODYNAMICS

Time : Three Hours

Maximum : 100 Marks

Part A*Answer any ten questions.**Each question carries 5 marks.*

1. Differentiate between homogeneous and heterogeneous system.
2. Define the following :
 - i) System ;
 - ii) Process ; and
 - iii) Surroundings.
3. What are state functions and path functions ?
4. Define internal energy and enthalpy.
5. A man whose weight is 600 N takes 2 min for climbing up a staircase. What is the power developed in him, if the staircase is made up of 20 stairs each 0.18 m in height ?
6. Calculate ΔU and ΔH in KJ for 1 kmol water, as it is vaporised at the constant temperature of 373K and constant Pressure of 101.3kPa. The specific volumes of liquid and vapour at these conditions are 1.04×10^{-3} and $1.675 \text{ m}^3/\text{kmol}$ respectively ; 1030KJ of heat is added to water for this change.
7. Is it possible to obtain zero temperature on the absolute thermodynamic temperature scale ? Why ?
8. A heat engine operates between a heat source at 700 K and a heat sink at 300K. What is the maximum efficiency of the engine ?
9. Two perfectly insulated tanks each of capacity 1m^3 are connected by means of a small pipeline fitted with a valve. The first tank contains an ideal gas at 300K and 200kPa and the second one is completely evacuated. The valve is opened and the pressure and temperature are equalised. Determine the change in total entropy.

Turn over

10. Define saturation temperature and saturation pressure.
11. One kilo mol CO_2 occupies a volume of 0.381m^3 at 313K . Compare the pressure given by i) ideal gas equation, ii) van der waals equation (Take $a = 0.365\text{Nm}^4/\text{mol}^2$ and $b = 4.2.8 \times 10^{-5} \text{m}^3/\text{mol}$)
12. Give the significance of compressibility charts.
13. What do you mean by inversion temperature ? Give its significance.
14. Brief on fundamental property relations.
15. State Amagat's law of additive volumes.

(10 × 5 = 50 marks)

Part B

Each question carries 10 marks.

16. A special manometer fluid has a sp.gr of 2.95 and is used to measure a pressure of 1.15 bar at a location where the barometric pressure is 760 mm of Hg. What height will the manometric fluid indicate ?

Or

17. Brief on the following : i) Macroscopic and microscopic approach ; and ii) Intensive and extensive properties
18. Heat is transferred to 10 kg of air which is initially at 100kPa at 300K until its temperature reaches 600K . Determine the change internal energy, change in enthalpy, the heat supplied and the work done in the constant volume and constant pressure process. Assume air is ideal gas for which the PVT relation ship is $PV = n RT$, $R = 8.314 \text{Kj}/\text{kmol.K}$, $C_p = 29.099 \text{Kj}/\text{kmol.K}$, $C_v = 20.785 \text{Kj}/\text{kmol.K}$, M_w of air = 29.

Or

19. Liquid CO_2 at 233K has a vapour pressure of $1.005 \times 10^3 \text{kPa}$ and a specific volume of $0.9 \times 10^{-3} \text{m}^3/\text{kg}$. Assume that CO_2 is a saturated liquid at these conditions and its enthalpy is zero. Latent heat of vaporization of CO_2 is $320.5 \text{Kj}/\text{kg}$ and the specific volume of saturated vapour is $38.2 \times 10^{-3} \text{m}^3/\text{kg}$. Calculate the internal energy and enthalpy of saturated liquid and internal energy and enthalpy of saturated vapour.

20. Hydrocarbon oil is to be cooled from 425K to 340K at a rate of 5000 kg/h in parallel flow heat exchanger. Cooling water at a rate of 10000 kg/h at 295 K is available. The mean specific heat of the oil and water are respectively 2.5 KJ/kg.K and 4.2 KJ/kg.K. Determine the total change in entropy. Is the process reversible? if a reversible carnot engine is to be operated receiving the heat from the oil and rejecting the heat to the surroundings at 295K, how much work would be available?

Or

21. Oil at 500K is to be cooled at a rate of 5000kg/h in a counter current exchanger using cold water available at 295K. A temperature approach of 10k is to be maintained at both ends of the exchanger. The specific heats of oil and water are respectively 3.2 and 4.2 KJ/kg. K. Determine the total entropy change in the process.

22. Explain the following i) Compressibility factor ; ii) Law of corresponding states ; and iii) Virial equation

Or

23. Explain the following : i) Equation of state ; and ii) Limiting conditions for equation of state.

24. Derive an expression for Gibbs - Helmholtz Equation.

Or

25. The molar volume of an organic liquid at 300K and 1 bar is 0.1 m³/kmol and its co-efficient of expansion is $1.25 \times 10^{-3} \text{K}^{-1}$. What would be the change in entropy if the pressure is increased to 20 bar at 300K? What assumption is involved in the solution?

(5 × 10 = 50 marks)