

D 14130

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Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

EN 19 301—ENGINEERING MATHEMATICS—III

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Express $V = (2, 7, -4)$ in \mathbb{R}^3 as a linear combination of the vectors $u_1 = (1, 2, 0)$, $u_2 = (1, 3, 2)$ and $u_3 = (0, 1, 3)$.
2. Find the dimension of the subspace generated by $(1, -3, 2, -4)$, $(-3, 9, -6, 12)$, $(2, -1, 4, 2)$ and $(-4, 5, -3, 7)$.
3. Find the angle between the vectors $u = (1, 3, -5)$ and $v = (2, -3, 4)$ in \mathbb{R}^3 .
4. Find the Fourier transform of $f(x) = \begin{cases} 1 & \text{for } |x| < a \\ 0 & \text{for } |x| > a. \end{cases}$
5. Find the Fourier sine transform of $f(x) = e^{-ax}$, $a > 0$.
6. Find the Fourier cosine transform of $f(x) = \begin{cases} x^2, & \text{if } 0 < x < 1 \\ 0, & \text{if } x > 1. \end{cases}$
7. Find the Laplace transform of $te^{-4t} \sin 4t$.
8. Find $L^{-1}\left(\frac{1}{s^3 + as^2}\right)$.
9. Find $L^{-1}\left(\log\left(\frac{s}{s-1}\right)\right)$.
10. Prove that $J_{1/2}(x) = \sqrt{\frac{2}{\pi x}} \sin x$.
11. Prove that $2J'_n = J_{n-1} - J_{n+1}$.
12. Show that $\frac{d}{dx}(x^n J_n(x)) = x^n J_{n-1}(x)$.
13. Solve the partial differential equation $z = p^2 + q^2$.
14. Solve the p.d.e. $pqz = p^2(xq + p^2) + q^2(yq + q^2)$.
15. Solve the p.d.e. $\frac{y-z}{yz}p + \frac{z-x}{zx}q = \frac{x-y}{xy}$.

(10 × 5 = 50 marks)

Turn over

Part B

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

Each question carries 10 marks.

16. (a) Find a, b, c such that $(2, 1, -1)$, $(a, 1, -1)$ and $(b, 3, c)$ form an orthogonal basis of \mathbb{R}^3 . Find the co-ordinate vector of $(7, 1, 9)$ relative to that basis.

Or

- (b) Find the set of orthonormal vectors in \mathbb{R}^3 for the basis $\{(1, 2, 2), (-2, 1, 0), (3, 0, 4)\}$.

17. (a) Find a Fourier cosine and a Fourier sine integral representation of the function

$$f(t) = \begin{cases} \cos t, & 0 \leq t \leq \pi/2 \\ 0, & t > \pi/2. \end{cases}$$

Or

- (b) Express the function $f(x) = \begin{cases} 1, & \text{for } |x| \leq 1 \\ 0, & \text{for } |x| > 1 \end{cases}$ as a Fourier integral. Hence evaluate

$$\int_0^{\infty} \frac{\sin \lambda \cos \lambda x}{\lambda} d\lambda.$$

18. (a) Solve $\frac{d^2 y}{dt^2} + \frac{dy}{dt} = t^2 + 2t$, $y(0) = 4$, $y'(0) = -2$ using Laplace transforms.

Or

- (b) Find the Laplace transforms of (i) $\frac{\cos 5t - \cos 3t}{t}$, (ii) $t^2 \cos 3t \sin t$.

19. (a) Solve in series the equation $\frac{d^2 y}{dx^2} + x^2 y = 0$ by Frobenius method.

Or

- (b) Solve in series the equation $2x^2 \frac{d^2 y}{dx^2} + (2x^2 - x) \frac{dy}{dx} + y = 0$.

20. (a) Derive the one-dimensional wave equation.

Or

- (b) Solve the one dimensional heat equation.

(5 × 10 = 50 marks)

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

EN 19 302—DISCRETE COMPUTATIONAL STRUCTURES

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Show that $(p \Rightarrow q) \Leftrightarrow (q^- \Rightarrow p^-)$ is a tautology.
2. State the rules for $P \Leftrightarrow Q$ is in logical equivalence and show that

$$p \leftrightarrow q \equiv (p \rightarrow q) \wedge (q \rightarrow p) \equiv (p \wedge q) \vee (\neg p \wedge \neg q)$$
 using truth table.
3. Prove that if $n = ab$ where a and b are positive integers, then $a \leq \sqrt{n}$ or $b \leq \sqrt{n}$.
4. Using Mathematical induction prove that $1 + 2 + 3 + \dots + n = n(n + 1)/2$.
5. Check that $a_n = 2n + 1$ is a solution to the recurrence relation $a_n = 2a_{n-1} - 1$ with $a_1 = 3$.
6. State and prove principle of mathematical induction.
7. Define Euler graph.
8. Define Spanning tree in weighted graphs.
9. Define summation operator.
10. Define semigroup. Give an example of semigroup but not a monoid.
11. If A and B are ideals in a ring R such that $A \cap B = (0)$. Prove that for every $a \in A, b \in B, ab = 0$.
12. How many finite fields with 10 elements are there ?
13. Define ring isomerism with example.
14. When do you call a homomorphism of a semigroup into itself ?
15. Show that semigroup homomorphism preserves the property of idempotency.

(10 × 5 = 50 marks)

Turn over

Part B

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

16. (a) (i) Is an implication equivalent to its converse ? Verify your answer using a truth table.

(5 marks)

- (ii) Show that $(\exists x)(F(x) \rightarrow \neg s(x))$ follows logically from :

(1) $(\exists x)(F(x) \wedge s(x)) \rightarrow (y)(M(y) \rightarrow w(y)).$

(2) $\exists y(M(y) \wedge \neg w(y)).$

(5 marks)

Or

- (b) Prove that if n is an integer then $n^2 + n$ is an even integer by the method of exhaustion of use cases.

17. (a) Using the principle of Mathematical induction, prove that $(7n - 3n)$ is divisible by 4 for all $n \in \mathbb{N}$.

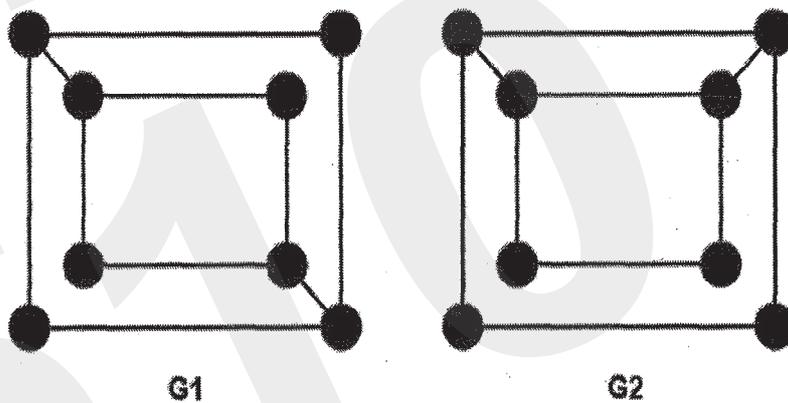
Or

- (b) Find the recurrence relation of Fibonacci sequence using generating function and solve it.

18. (a) Prove that a graph is bipartite if and only if it contains no odd cycle.

Or

- (b) Are the following graphs isomorphic ? State the properties of isomorphism :



19. (a) Prove that dihedral group is abelian.

Or

(b) Let $(m, *)$ be a monoid, then there exists a subset $T \subseteq M^{m.s.t}(M, +)$ is isomorphic to the monoid $(T, 0)$ where M^m is the set of all functions from M to M and 0 is the operation composition of function.

20. (a) Prove if R is unique factorization domain, so is $R[X]$.

Or

(b) (i) Is every proper ideal the kernel of ring homomorphism ? Prove the same.

(5 marks)

(ii) State and prove remainder theorem.

(5 marks)

[5 × 10 = 50 marks]

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electronics and Communication Engineering

EC 19 302—ELECTRONIC CIRCUITS

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Explain the general concept of hybrid model.
2. How do you provide short circuit protection in series voltage regulator ?
3. Define and explain the term voltage stability factor of voltage regulator.
4. List the uses of FET CD amplifier.
5. Compare the performance of CS and CD amplifier.
6. Compare the performance of FET and BJT amplifiers.
7. How high pass RC circuit be used as a differentiator ?
8. Discuss on the classification of multivibrators.
9. Define UTP and LTP of Schmitt trigger.
10. Discuss various feedback topologies.
11. Explain the term pole splitting.
12. Explain Barkhausen criterion.
13. Explain Darlington configuration.
14. List the applications of Class C amplifier.
15. How the rise time and bandwidth are interrelated ?

(10 × 5 = 50 marks)

Part B

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

Module I

16. (a) Draw the circuit of Zener shunt regulator and explain. Discuss the design criteria of such a regulator.

Or

- (b) Draw the h parameter equivalent circuit of BJT in CE configuration.

Turn over

Module II

17. (a) Explain the frequency response of a CS amplifier.

Or

(b) Draw the FET amplifier circuit and discuss the functions of each components.

Module III

18. (a) With relevant waveform, explain the working of astable multivibrator.

Or

(b) Design a differentiator circuit to differentiate a square wave of 10 V pp amplitude and 1 kHz frequency.

Module IV

19. (a) Discuss the generalized concept of feedback system.

Or

(b) Draw the circuit of BJT phase shift oscillator and derive the expression for its frequency of oscillation.

Module V

20. (a) For a series fed class A amplifier, derive an expression for conversion efficiency and figure of merit.

Or

(b) Discuss the effect of gain, phase and bandwidth on cascading.

(5 × 10 = 50 marks)

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electrical and Electronics Engineering

EE 19 302—ELECTRICAL CIRCUIT ANALYSIS

Time : Three Hours

Maximum : 100 Marks

Part A

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

- I. 1 Define dependent and independent sources.
- 2 Examine the efficiency value of three resistances having value of 'R' ohms connected in (i) Series ; (ii) Parallel.
- 3 Define quality factor of a series resonant circuit.
- 4 Derive relationship between line voltage and phase voltages in star connected system.
- 5 The power measurement in a 3-phase circuit is made by using two wattmeter's and their readings are (i) $W_1 = 1.5 \text{ kW}$ and $W_2 = 2 \text{ kW}$; (ii) $W_1 = 2 \text{ kW}$ and $W_2 = 2 \text{ kW}$ after reversal of current coil connection. Find power factor in each case.
- 6 Explain how the active power and reactive power is measured in a 3-phase balanced system.
- 7 Illustrate the circuit for the measurement of reactive power by one watt meter method.
- 8 Point out why star connection three phase system is preferred at the point of power utilization.
- 9 Define Laplace Transform.
- 10 Derive transient response for R-L circuit using AC excitation.
- 11 Illustrate the time constant of RL circuit having the resistance $R = 10 \text{ Ohm}$ and $L = 0.1 \text{ mH}$.
- 12 Define (i) Transient response ; (ii) Exponential decay response. Write the formulae for RL Transient Response.
- 13 Derive expressions for transmission parameters of two two-port networks connected in cascade.
- 14 Give the expressions for symmetry and reciprocity in case of Z-parameters.
- 15 Write the properties of a positive real function.

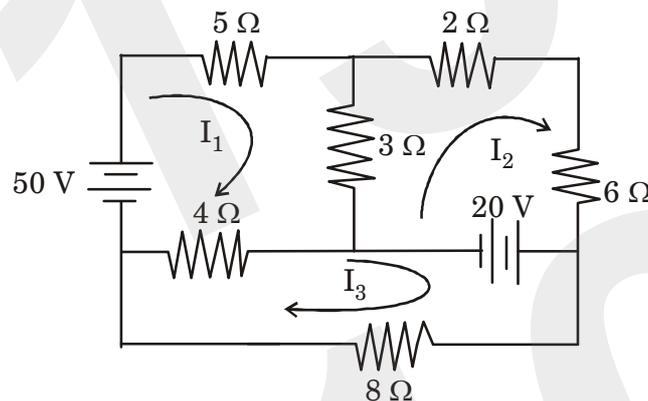
(10 × 5 = 50 marks)

Turn over

Part B

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

- II. 1 Calculate the loop currents I_1 , I_2 and I_3 by Mesh loop analysis as shown in figure :



Or

- 2 A series RLC circuit has a quality factor of 5 at 50 rad/s. The current flowing through the circuit at resonance is 10 A and the supply voltage is 100 V. Find the circuit constants R, L and C.
- 3 A balanced three-phase load of $(2 + j 10\Omega)$ per phase is connected in delta across 440 V, 3 phase supply. Determine line currents, phase currents and total active power. Also draw the phasor diagram.

Or

- 4 Explain the following types of loads (i) Balanced loads ; (ii) Unbalanced loads for the following three-phase system (a) Star connected system ; (b) Delta connected system.
- 5 The two watt meter produces wattmeter readings $P_1 = 1500$ W and $P_2 = 1800$ W. When connected to delta connected load. If the line voltage is 220 V, calculate (i) the per phase average power ; (ii) total reactive power ; (iii) power factor ; (iv) the phasor impedance.

Or

- 6 Evaluate the Laplace Transform for the following functions (i) Step function ; (ii) Exponential function ; (iii) Sine function ; (iv) Cosine function ; (v) Power of t .

- 7 A series RLC circuit with $R = 300$ ohms, $L = 1$ Henry and $C = 100 \mu\text{F}$ has a constant voltage of 50 V applied to it at $t = 0$. Find the maximum current and Assume initial condition zero.

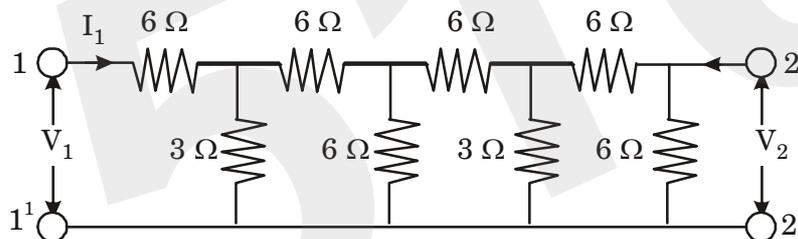
Or

- 8 A series RC circuit with $R = 100$ ohms, $C = 25 \mu\text{ Farads}$ has a AC voltage of $200 \sin 500 t$ applied through the $t = 0$ through switch. Find the transient current. Assume initial relaxed circuit conditions.
- 9 For the given network function, draw the pole zero diagram and hence obtain the time domain response $i(t)$:

$$I(s) = \frac{10s}{(s+1)(s+3)}$$

Or

- 10 Determine the Z and Y-parameters of the network shown in figure :



(5 × 10 = 50 marks)

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Mechanical Engineering
ME 19 302—FLUID MECHANICS

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Explain on pressure variation in a fluid at rest.
2. Calculate the density, specific weight and specific gravity of one liter of a liquid which weighs 7N.
3. Define the following : Kinematic viscosity, Compressibility and Surface tension.
4. Brief on types of fluid flow by Eulerian method.
5. A 25 cm. diameter pipe carries oil of sp.gr. 0.9 at a velocity of 3 m/s. At another section the diameter is 20 cm. Find the velocity at this section and also the mass rate of flow of oil 169.
6. Define the following : path line stream line and streak line.
7. Water is flowing through a pipe of 5 cm. diameter under a pressure of 29.43 N/cm^2 and with a mean velocity of 2.0 m/s. find the total head or total energy per unit weight of the water at a cross-section, which is 5 m. above the datum line.
8. Discuss some practical application of Bernoulli's equation.
9. A pitot static tube placed in the center of a 300 mm. pipe line has one orifice pointing upstream and other perpendicular to it. The mean velocity in the pipe is 0.80 of the central velocity. Find the discharge through the pipe if the pressure difference between the two orifices is 60 mm. of water. Take the coefficient of pitot tube as $C_v = 0.98$.
10. Explain kinetic energy and momentum correction factors.
11. Obtain an equation for velocity distribution in turbulent flow in pipes.

Turn over

12. Determine the wall shearing stress in a pipe of diameter 100 mm. which carries water. The velocities at the pipe centre and 30 mm. from the pipe centre are 2 m/s. and 1.5 m/s respectively. The flow in pipe is given as turbulent.
13. How will you find the drag on a flat plate due to laminar and turbulent boundary layers.
14. Brief on the different methods of preventing the separation of boundary layer.
15. What do you mean by separation of boundary layer ? What is the effect of pressure gradient on boundary layer separation ?

(10 × 5 = 50 marks)

Part B

Answer all questions.

Each question carries 10 marks.

16. Determine the intensity of shear of an oil having viscosity 1 poise. The oil is used for lubricating the clearance between a shaft of diameter 10 cm. and its journal bearing. The clearance is 1.5 mm. and the shaft rotates at 150 r.p.m.

Or

17. An oil of viscosity 5 poise is used for lubrication between a shaft and sleeve. The diameter of the shaft is 0.5 m. and it rotates at 200 r.p.m. Calculate the power lost in oil for a sleeve length of 100 mm., the thickness of oil film is 1.0 mm.
18. Elaborate with suitable example in detail the different types of fluid flow in fluid kinematics.

Or

19. A 30 cm. diameter pipe, conveying water, branches into two pipes of diameter 20 cm. and 15 cm. respectively. If the average velocity in the 30 cm. pipe is 2.5 m/s. find the discharge in this pipe. Also determine the velocity in 15 cm. pipe if the average velocity in 20 cm. diameter pipe is 2 m/s.
20. Water is flowing through a pipe having diameter 300 mm. and 200 mm. at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm^2 and the pressure at the upper end is 9.81 N/cm^2 . Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.

Or

21. Derive the Bernoulli's equation of motion in dynamics of fluid flow with suitable assumptions.

22. An oil of viscosity 0.1 Ns/m^2 and relative density 0.9 is flowing through a circular pipe of diameter 50 mm. and of length 30 mm. the rate of flow of fluid through the pipe is 3.5 lit/s. find the pressure drop in a length of 300 m. and also the shear stress at the pipe wall.

Or

23. A pipe of diameter 20 cm. and length 10000 m. is laid at a slope of 1 in 200. An oil of sp.gr. 0.9 and viscosity 1.5 poise is pumped up at the rate of 20 liters per second. Find the head lost due to friction and also calculate the power required to pump the oil.
24. Find the displacement thickness, the momentum thickness and energy thickness for the velocity distribution in the boundary layer given by $u/U = 2(\gamma/\delta) - (\gamma/\delta)^2$, where u is the velocity at a distance from the plate and $u = U$ at $\gamma = \delta$, where $\delta =$ boundary layer thickness.

Or

25. For the velocity profile $u/U = 2(\gamma/\delta) - (\gamma/\delta)^2$, find the thickness of boundary layer at the end of the plate and the drag force on one side of a plate 1 m. long and 0.8 m. wide when placed in water flowing with a velocity of 150 mm. per second. Calculate the value of coefficient of drag also. Take μ for water = 0.01 poise.

(5 × 10 = 50 marks)

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Printing Technology

PT 19 302—COMPUTER PROGRAMMING IN C

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Explain any four differences between main memory and secondary storage.
2. Draw a flowchart to convert the given binary number into decimal number.
3. Describe all the phases of a typical C program development environment.
4. What are pre-processor directives ? Explain with examples.
5. Explain “else-if ladder” statement with proper syntax and flowchart.
6. Explain switch statement with suitable example.
7. Write a C program to convert a given decimal number to an Octal number using “for” loop.
8. Differentiate between arrays and structures in C. Give suitable examples.
9. What are the different ways of initializing 2-D arrays in C ?
10. Write a program to find the sum of the series $1/1 + 1/2 + 1/3 + \dots 1/n$.
11. Illustrate passing a 2D array to a function as parameter.
12. Explain any two string handling functions with suitable example.
13. What do you mean by modularization ? Write the advantages of modularization.
14. Write a C program to read the size and elements of a 1D array in main() and define a function with the prototype : void Compute(int *, int, float *, float *); to compute sum and average of elements in 1D integer array. Display sum and average in main(). Use pointer to 1D array in function.
15. With an example, write and explain the general format for opening and closing a file using file pointers.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full question from each section.

Each question carries 10 marks.

16. (a) What is an Operating System ? Explain the functions of an operating system.

Or

(b) What are the different components of the computer system ? Explain their functionalities in detail.

17. (a) What is operator precedence and associativity ? Explain with suitable examples. Resolve the expression stepwise to obtain the final value of x . Show all intermediate steps :

$$\text{int } x = (-10 * (2 - 3) / 15 \% (5 + 7) + 8 * 6 / 12).$$

Or

(b) Explain three loop control structure in C. Give suitable examples.

18. (a) Explain the different categories of functions in C with examples.

Or

(b) Explain the four storage classes in C. Give example for each of them.

19. (a) Write a C program to read two matrices and multiply them. Store the results in a third matrix. Display the resulting matrix.

Or

(b) What is a structure variable ? Explain how you define and manipulate structure variables in C. Create a structure called time with hours, minutes and seconds as its member and write a C program to read start and end times.

20. (a) What is a pointer ? How it is declared and initialized ? Illustrate the use of pointers with arrays. Mention the advantages of pointers.

Or

(b) Write a C program to create a file called book.txt and store information about a book, such as title, author name, ISBN and price. Store the data into the file book.txt in text format with relevant messages.

(5 × 10 = 50 marks)

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Name.....

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electrical and Electronics Engineering

EE 19 303—ELECTRONIC DEVICES AND CIRCUITS

Time : Three Hours

Maximum : 100 Marks

Part A

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

- I.
- 1 Explain the concept of biasing.
 - 2 Describe in detail about Thermal runaway.
 - 3 State the purpose of capacitors in amplifiers.
 - 4 Why FET is called voltage controlled device ?
 - 5 Recall the expression for the voltage gain of JFET common source amplifier.
 - 6 Define the impact of temperature on drain current of MOSFET.
 - 7 Write about amplifiers and mention its applications.
 - 8 State the considerations in cascading transistor amplifiers.
 - 9 Explain Barkhausen's criterion.
 - 10 Explain the properties of ideal amplifier.
 - 11 Write the concept of virtual short and its relation to negative feedback.
 - 12 Write short note on voltage controlled oscillator.
 - 13 Categorize the types of active filters.
 - 14 Explain the pin details of 555 Timer.
 - 15 State the principle of PLL.

(10 × 5 = 50 marks)

Part B

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

- II.
- 1 (a) Describe the factors affecting stability of Q point.
(b) Explain about the voltage division bias with suitable diagram.

Or

Turn over

- 2 (a) Bring out 'h' parameter model of a BJT.
- (b) Discuss the operation of cascaded amplifier.
- 3 With a neat diagram, explain the source and drain resistance biasing of MOSFET.

Or

- 4 With neat diagram, explain the working of Enhancement MOSFET and Depletion MOSFET with its necessary characteristics curve.
- 5 Discuss Class AB amplifier in detail using BJT.

Or

- 6 (a) Explain the advantages of negative feedback.
- (b) Explain in detail about the Wein bridge oscillator with neat diagram.
- 7 (a) Draw the inverting amplifier circuit and non-inverting amplifier circuit of an op-amp in closed loop configuration. Obtain the expression for the closed loop gain for both amplifiers.
- (b) For a non-inverting amplifier using an op-amp assume $R_1 = 470 \text{ ohm}$ and $R_2 = 4.7 \text{ k}\Omega$. Calculate the closed loop voltage gain of the amplifier.

Or

- 8 Explain a ramp generator with neat diagram using operational amplifier.
- 9 Design a second order Butterworth low-pass filter having upper cut-off frequency of 1 kHz.

Or

- 10 Explain in detail of the operation of 555 timer IC in mono stable mode with suitable diagram.

(5 × 10 = 50 marks)

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Information Technology

IT 19 303—PROGRAMMING IN C

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Write a C program to check string is a palindrome or not.
2. What is the use of header files in C programming language ?
3. List the different types of operators in C.
4. How to declare and initialize arrays ?
5. Write a simple program to access the elements in array and sort it in ascending order.
6. Write a program to find the average of n number using arrays.
7. How will you declare and initialize a string ? Give an example.
8. Write a simple C program to print a string and reverse the same.
9. Discuss the significance of typedef with an example.
10. What is the use of Null pointers ? Explain.
11. Explain in brief dereferencing pointer in C.
12. What is the use of Dot (.) operator ? Give an example.
13. What is the use of freeing used memory ? How is memory freed in C ?
14. List few file handling operations.
15. What is the use of calloc() ? Give its syntax.

(10 × 5 = 50 marks)

Part B

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

16. (a) List the precedence table of operators and explain the order of evaluation operators in C.

Or

- (b) What is the purpose of looping statement ? Explain in detail in various looping statement in C with suitable examples.

Turn over

17. (a) (i) Write an algorithm and program to print an array in reverse order. (5 marks)
(ii) Write an algorithm and program to find the largest number of an array. (5 marks)

Or

- (b) (i) Write a C program to declare functions with no arguments and no return values. (5 marks)
(ii) Write a C program to declare functions with arguments and return values. (5 marks)
18. (a) Explain the functionality of Union. Write a C program to access the Union members and display the same.

Or

- (b) Write a C program using typedef to simulate a library management system.
19. (a) How are pointers initialized and declared? Discuss pointer arithmetic in brief.

Or

- (b) Write a program to demonstrate the access of the array of pointers of type integer and character.
20. (a) (i) Write a program in C to create and store information in a text file. (5 marks)
(ii) Write a program in C to read an existing file in 3 different modes. (5 marks)

Or

- (b) Explain in detail dynamic memory allocation in C and illustrate the same with an example program.

[5 × 10 = 50 marks]

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**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, NOVEMBER 2021**

Mechanical Engineering

ME 19 303—MECHANICS OF SOLIDS

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Draw and compare the stress strain diagrams for a ductile material and a brittle material.
2. A bar of 30 mm diameter is subjected to a pull of 100kN. The measured extension on a gauge length of 250 mm is 0.17 mm and the change in diameter is 0.00375 mm. Calculate : (i) Young's modulus ; and (ii) Poisson's ratio.
3. Prove that the maximum stress induced in a body due to suddenly applied load is twice the stress induced when the same load is applied gradually.
4. A solid shaft is subjected to a torque of 1.6 kNm. Find the necessary diameter of the shaft, if the allowable shear stress is 50 MPa. The allowable twist is 1° for every 20 diameters length of the shaft. Take $C = 80$ GPa.
5. A cantilever of 10 m span carries loads of 4kN and 6 kN at 2 m and 6 m respectively from the fixed end along with another load of 6 kN at the free end. Draw the shear force and bending moment diagrams.
6. Draw the S.F. and B.M. diagrams for a simply supported beam carrying a uniformly distributed load of 'w' per unit length over the entire span. Also calculate the maximum B.M.
7. What do you mean by 'simple bending' ? What are the assumptions made in the theory of simple bending ?
8. A rectangular beam 200 mm deep and 300 mm wide is simply supported over a span of 8 m. What uniformly distributed load per metre the beam may carry, if the bending stress is not to exceed 120 N/mm^2 ?
9. A 120 mm wide and 10 mm thick steel plate is bent into a circular arc of 8 m radius. Determine the maximum value of stress produced. Take $E = 200$ GPa.
10. A beam 4 metre long, simply supported at its ends, carries a point load W at its centre. If the slope at the ends of the beam is not to exceed 1° , find the deflection at the centre of the beam.
11. State Mohr's theorems which are applied in moment-area method.
12. A 250 mm long cantilever of rectangular section 40 mm wide and 30 mm deep carries a uniformly distributed load. Calculate the value of load 'w' if the maximum deflection in the cantilever is not to exceed 0.5 mm. Take $E = 70 \text{ GN/m}^2$.
13. Define the following terms :
 - (i) Principal planes.
 - (ii) Principal stresses

Turn over

14. A body is subjected to direct stresses in two mutually perpendicular directions. How will you determine graphically the resultant stress on an oblique plane when the stresses are unequal and unlike ?
15. Explain how the failure of a short and of a long column takes place.

(10 × 5 = 50 marks)

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

16. a) A circular steel bar having three segments is subjected to various forces at different cross-sections as shown in Fig. 1. Determine the necessary force to be applied at section C for the equilibrium of the bar. Also, find the total elongation of the bar. Take $E = 202 \text{ GPa}$.

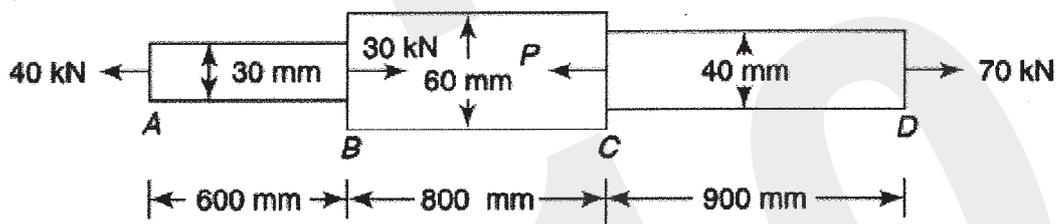


Fig.1

Or

- b) A steel rod 3 cm diameter and 5 m long is connected to two grips and the rod is maintained at a temperature of 95°C . Determine the stress and pull exerted when the temperature falls to 30°C , if: (i) The ends do not yield; and (ii) The ends yield by 0.12 cm. Take $E = 2 \times 10^5 \text{ N/mm}^2$ and $\alpha = 12 \times 10^{-6} \text{ per } ^\circ\text{C}$.
17. a) A solid circular shaft is to transmit 400 kW at 150 r.p.m.
- Find the diameter of the shaft if the shear stress is not to exceed 60 N/mm^2 .
 - What percent saving in weight would be obtained if this shaft is replaced by a hollow shaft whose internal diameter equal to $2/3$ rd of its external diameter, the length, the material and maximum shear stress being the same?

Or

- b) Draw bending moment and shear force diagrams for the beam loaded as shown in Fig.2 :

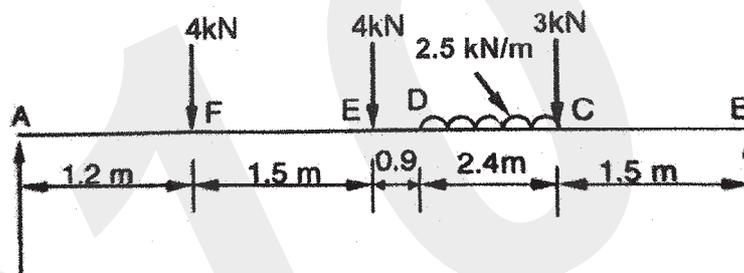


Fig.2

18. a) A 300 mm × 160 mm rolled steel joist of I-section has flanges 11 mm thick and web 8 mm thick. Find the uniformly distributed load 'w'/unit length that the above section will carry over a span of 4.5 m if the permissible bending stress is limited to 125 N/mm².

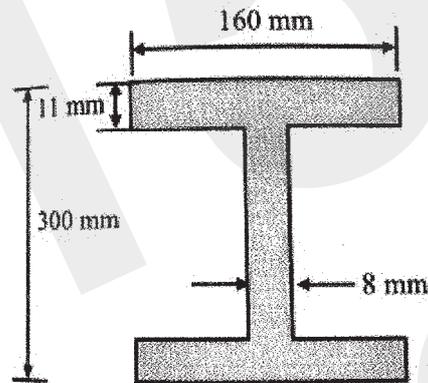


Fig.3

Or

- b) A cast iron beam is of T-section as shown in Fig.4. The beam is simply supported on a span of 8 m. The beam carries a uniformly distributed load of 1.5 kN/m on the entire span. Determine the maximum tensile and maximum compressive stresses.

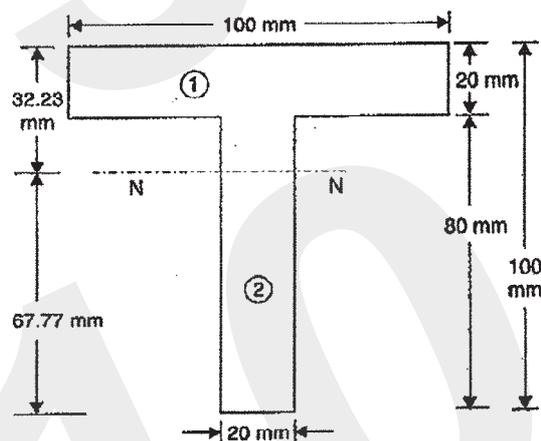


Fig.4

Turn over

19. a) Derive the expressions for the maximum deflection and slope in a simply supported beam carrying a point load at the centre using moment - area method.

Or

- b) A beam AB, 10 m long, has supports at its ends A and B. It carries two point loads each of magnitude 50 kN, one at 3 m from A and another at 7 m from A. If $E = 2 \times 10^5 \text{ N/mm}^2$ and $I = 64 \times 10^8 \text{ mm}^4$, find, using Macaulay's method, the deflection of the beam under the two loads.
20. a) An element in a stressed material has tensile stress of 500 MN/m^2 and a compressive stress of 350 MN/m^2 acting on two mutually perpendicular planes and equal shear stresses of 100 MN/m^2 on these planes. Determine the magnitude and directions of principal stresses and maximum shear stress.

Or

- b) A C-frame subjected to a force of 15 kN is shown in Fig. 5. It is made of grey cast iron FG 300 ($\sigma_u = 300 \text{ N/mm}^2$) and the factor of safety is 2.5. Determine the dimensions of the cross section of the frame.

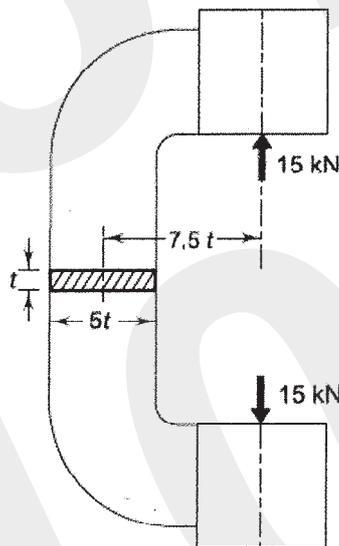


Fig.5

(5 × 10 = 50 marks)

D 14148

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Printing Technology
PT 19 303—PAPER AND INK

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Discuss various finishing operations done after paper manufacturing.
2. Discuss various parts of paper manufacturing machine.
3. Explain sulphite process of chip manufacture.
4. Write notes on paper manufacturing machines.
5. Explain the methods of testing water absorbency of a paper.
6. Write notes on properties required by papers used for screen printing.
7. Explain the features of black pigments.
8. Write notes on fluorescent dyes.
9. Discuss anti-skinning agents.
10. What are the factors to be considered while designing a printing ink plant ?
11. Explain precipitation drying mechanism.
12. Write notes on types of viscometers.
13. Discuss the features of invisible inks.
14. Write notes on anti-alteration security inks with examples.
15. Explain about water-based and vegetable oil based inks.

(10 × 5 = 50 marks)

Part B

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

16. (a) Explain various additives used in paper manufacturing.

Or

- (b) What are the components that constitute the wet end of the paper making machine ?
Brief with a neat sketch.

Turn over

17. (a) Explain various stages of paper deinking process.

Or

(b) Discuss various chemicals used in paper recycling.

18. (a) Discuss different types of solvents used in the manufacturing of printing inks.

Or

(b) Discuss various colored inorganic pigments.

19. (a) With neat diagram, explain the manufacturing process of printing inks.

Or

(b) With neat diagram, discuss the features, working, advantages and disadvantages of ball mill.

20. (a) Discuss the following ink properties and their testing :—

- | | |
|--------------|----------------------|
| (i) Color. | (ii) Color strength. |
| (iii) Gloss. | (iv) Smoothness. |

Or

(b) Discuss the following paper properties :—

- | | |
|------------------------------|-----------------------|
| (i) Blister resistance. | (ii) Compressibility. |
| (iii) Dimensional stability. | (iv) Opacity. |
| (v) Grain direction. | |

(5 × 10 = 50 marks)

D 14133

(Pages : 4)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electronics and Communication Engineering
EC 19 303—NETWORK THEORY

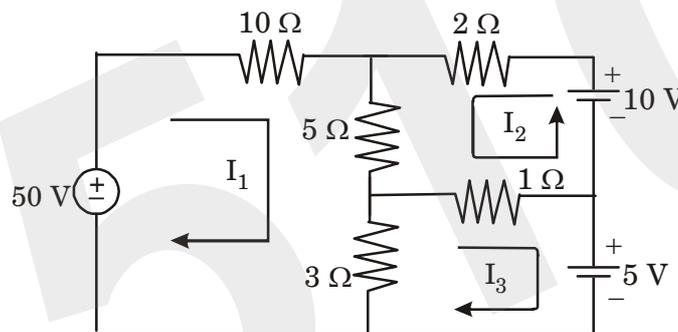
Time : Three Hours

Maximum : 100 Marks

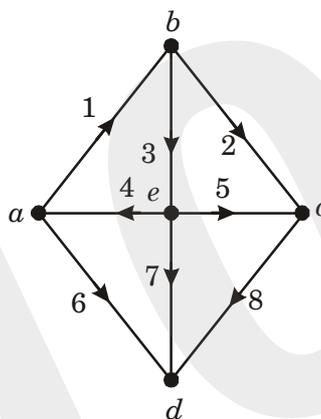
Part A

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

1. With an example each, state and explain KVL and KCL.
2. Determine all mesh currents in the circuit shown in figure :



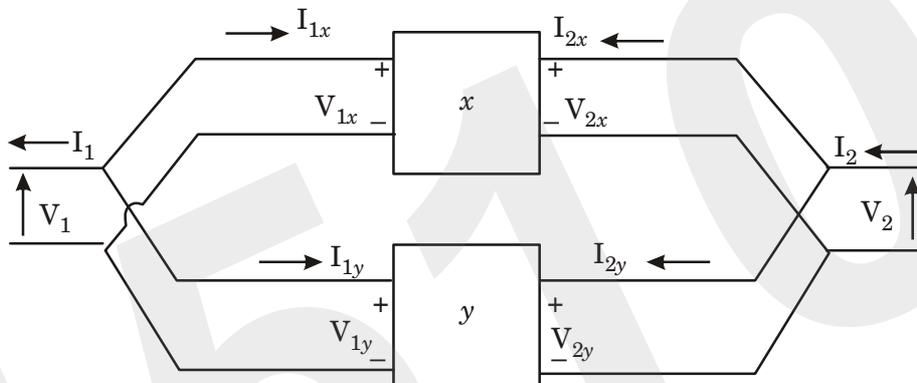
3. For the network graph shown in figure with given orientation, obtain the all cut sets. Mark them on the network graph :



4. Derive the step response of an RL circuit in time domain.

Turn over

5. State and explain Final Value Theorem. Illustrate with an example.
6. Determine the Inverse Laplace Transform of $F(s) = \frac{s}{(s+1)^2(s+4)}$.
7. List the properties of Transfer Functions.
8. Draw the pole-zero diagram for the function $I(s) = \frac{4(s+2)s}{(s+1)(s+3)}$.
9. Derive the describing equations of the following interconnection in terms of the Y-parameters of the component 2-port networks :



10. Explain about the following with relevant circuit diagram and design equation :
 - (i) T attenuator.
 - (ii) Bridged-T attenuator.
11. Design a symmetrical bridged-T attenuator with an attenuation of 20 dB and terminated into a load of 500Ω .
12. Design a low-pass p -section filter with a cut-off frequency of 2 kHz to operate with a load resistance of 400Ω .
13. List the properties of R-C driving point impedance.
14. Show that the polynomial $P(s) = s^4 + 3s^2 + 2$ is Hurwitz.
15. List the properties of positive real functions.

(10 × 5 = 50 marks)

Part B

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

Each question carries 10 marks.

16. (a) (i) Derive the condition for maximum power transfer to a purely resistive variable load.

(5 marks)

- (ii) State and explain the following :—

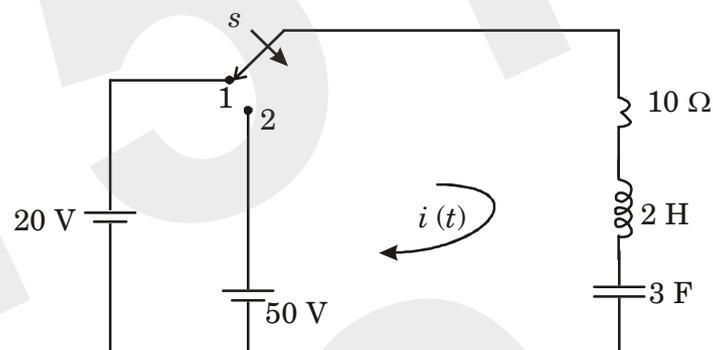
- (a) Reciprocity theorem.
(b) Millman's theorem.

(5 marks)

Or

- (b) With an example show that Thevenin equivalent circuit can be obtained from the Norton equivalent circuit and vice versa.

17. (a) In the network shown in figure, the switch is moved from the position 1 to the position 2 at $t = 0$. The switch is in position 1 for a long time. Determine the current expression $i(t)$ using time domain analysis.

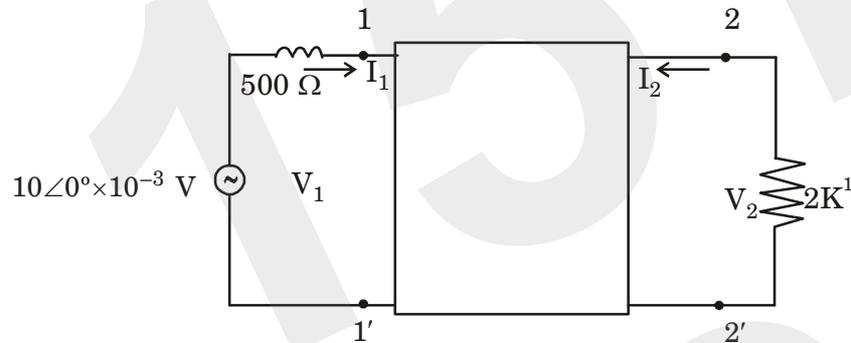


Or

- (b) Derive the Laplace transform for the following signals :

- (i) $f(t) = u(t)$.
(ii) $f(t) = e^{-at}$.
(iii) $f(t) = \cos(\omega t)$.
(iv) $f(t) = t^n$.

18. (a) The hybrid parameters of a two-port network shown in figure. 16.51 are $h_{11} = 1 \text{ K}$; $h_{12} = 0.003$, $h_{21} = 100$; $h_{22} = 50 \mu\Omega^{-1}$. Find V_2 and Z-parameters of the network.



Or

- (b) For the given network function, draw the pole zero diagram and hence obtain the time domain response.

$$I(s) = \frac{3s}{(s+1)(s+3)}$$

Verify this result analytically.

19. (a) Design an m -derived high-pass filter with a cut-off frequency of 10 kHz; design impedance of 5Ω and $m = 0.4$.

Or

- (b) With proper examples, explain what is frequency transformation.
20. (a) With proper examples explain about the following :
- Casuality of a system.
 - Stability of a system.

Or

- (b) Realise the network function $Y(s) = \frac{s(s^2 + 9)}{s(s^2 + 1)(s^2 + 16)}$.

[5 × 10 = 50 marks]

D 14134

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electronics and Communication Engineering

EC 19 304—DIGITAL ELECTRONICS

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Prove the following using Boolean Theorem :

$$(A + B)(A + \bar{B}) = A.$$

2. Realize the following using logic gates :

$$F = (A + B + C)(\bar{A} + \bar{B} + \bar{C})(A + BC).$$

3. Design a single bit adder.

4. Add, subtract and multiply the binary numbers :

1111 and 1010.

5. Provide the binary coded decimal representation of 937.25.

6. With a schematic diagram, explain the working of a 4 to 1 multiplexer.

7. With a truth table, explain the function of SR Latch.

8. What do you mean by Universal Shift Registers ? Explain with a suitable diagram.

9. What are registers ? What for registers are used ? Briefly explain.

10. Explain step-by-step design process of a sequence detector.

11. Define the concept of sequential circuits. How a sequential circuit differ from combinational circuits ?

12. Explain the principle involved in design a sequential circuit using ROMs and PLA.

13. Draw the circuit of a TTL NAND gate.

14. Differentiate between SRAM and DRAM.

15. Explain the use and ease of using FPGA in digital system design.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full question from each section.

Each question carries 10 marks.

16. (a) Prove algebraically that the following equation is valid :

$$(\overline{A}C\overline{D}E) + \overline{A}B\overline{D} + ABCE + ABD = \overline{A}B\overline{D} + ABD + BC\overline{D}E.$$

Or

- (b) Simplify the function $F(A, B, C, D) = \Sigma(0, 1, 2, 3, 8, 9, 10, 11)$ using K-map.

17. (a) Design a BCD to Excess-3 code converter.

Or

- (b) Design a full adder using multiplexers.

18. (a) Illustrate the design process of a 4 bit synchronous counter.

Or

- (b) With suitable diagram, explain the working of a Universal Shift Register.

19. (a) Illustrate briefly about State Machine Chart and the process involved in the design process.

Or

- (b) What are asynchronous sequential circuits ? Draw the timing diagram of 3-bit asynchronous counter.

20. (a) Compare the performance parameters of Logic gate family with a table.

Or

- (b) With a suitable diagram, explain the working of a Programmable Logic Array.

(5 × 10 = 50 marks)

D 14138

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electrical and Electronics Engineering

EE 19 304—ELECTRICAL MEASUREMENTS AND INSTRUMENTATION SYSTEMS

Time : Three Hours

Maximum : 100 Marks

Part A

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

- I.
- 1 Give the classification of secondary instruments.
 - 2 Describe errors in measuring instruments.
 - 3 For moving iron type instruments, give the expression for the deflecting torque.
 - 4 How does one extend the range of Ammeter and Voltmeter ?
 - 5 Point out any two applications of CT and of PT.
 - 6 Explain the term “loading” in voltmeter.
 - 7 What is a Trivector meter ?
 - 8 Why the ordinary Watt-meters are not suitable for low power factor circuits ?
 - 9 List out the various causes which occur errors in a Dynamometer Wattmeter.
 - 10 With the neat circuit diagram, illustrate the balanced equation of Wheatstone bridge.
 - 11 Evaluate why there are two conditions of balance in AC bridges.
 - 12 What is a potentiometer ? List its application.
 - 13 List out the methods used for measurement of iron loss in Ferromagnetic materials.
 - 14 What are advantages of electrical transducers ?
 - 15 Mention the use of Lissajous patterns.

(10 × 5 = 50 marks)

Part B

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

- II.
- 1 (a) Explain deflecting, control and damping torques.
(b) Describe the principle of PMMC meters.

Or

- 2 Discuss the working principle of operation of Electrodynamometer type of instruments with its constructional diagram.

Turn over

- 3 Describe how high currents and voltages are measured with the help of instrument transformers. Draw diagrams to illustrate your answer. Describe the advantages of instrument transformers as regards extension of range of current and voltage on high voltage a.c. systems.

Or

- 4 A current transformer with 5 primary turns has a secondary burden consisting of a resistance of $0.16\ \Omega$ and an inductive reactance of $0.12\ \Omega$, when the primary current is 200 A, the magnetizing current is 1.5A and the iron loss current is 0.4A. Determine any expressions used, the number of secondary turns needed to make the current ratio 100 : 1 and also the phase angle under those conditions.

- 5 (a) Describe the construction of single-phase dynamometer wattmeter.
(b) The total resistance of pressure circuit of a watt-meter is $4000\ \Omega$ and the inductance of the pressure coil circuit is 6.5 mH. Give the shunted capacitor method of compensating the inductance error and determine across what portion of the series resistance a $0.1\ \mu\text{F}$ capacitor should be shunted to effective compensation.

Or

- 6 (a) Explain the operation of single-phase induction type energy meter.
(b) A 50A, 230 V meter on full-load test makes 61 revolutions in 37s. If the normal disc speed is 520 revolutions per kWh, find the percentage error.
- 7 Evaluate the expression for the current through the galvanometer in case of unbalanced Wheatstone bridge. And also state its application.

Or

- 8 Explain the construction of Anderson's bridge. Derive the unknown quantities at balance condition. Also write its advantages and disadvantages.
- 9 (a) Explain the theory of seven segment display. Draw the circuit diagram of a common anode display.
(b) What is data logger ? What are its components ? What are the functions of data logger ?

Or

- 10 (a) Explain the force transducer with neat block diagram.
(b) A transducer that measures force has a normal resistance of $300\ \Omega$, forms a four arm strain gauge bridge and is excited by 7.5 V DC. When the force of 0.1 N is applied, all the four strain gauge resistances are changed by $5.2\ \Omega$. Find the output voltage and determine its sensitivity.

(5 × 10 = 50 marks)

D 14141

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Information Technology

IT 19 304—COMPUTER ORGANIZATION AND DESIGN

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. Explain the importance of memory operations in computer organizations.
2. Draw the structure of a bus.
3. Explain the instruction execution procedure with suitable example.
4. Define the following terms :
(a) Cache hit ; (b) Cache miss ; (c) Hit ratio ; (d) Miss ratio ; and (e) Cache hit time.
5. Draw the flow chart for booth algorithm for multiplication of signed two number.
6. Write short notes on CISC scalar processor.
7. List the merits and demerits of RAM and ROM.
8. Discuss the floating point representations with suitable examples.
9. Discuss different techniques for enhancing the mapping process.
10. Explain the concept of virtual memory and their types.
11. Write short notes on address translation in virtual memory.
12. Discuss the functionalities of ALU.
13. Discuss the merits of pipelining.
14. What is DMA ? Explain.
15. Describe bus arbitration with an example.

(10 × 5 = 50 marks)

Part B

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

16. (a) What is Addressing Mode ? Explain the different types of addressing modes.

*Or***Turn over**

(b) Write short notes on : (2.5 marks each)

- (i) MAR.
- (ii) Interrupt.
- (iii) Pipelining and superscalar operation.
- (iv) Performance measurement.

17. (a) Perform the division operation of $0000\ 0111 \div 0000\ 0010$ using Booth's algorithm.

Or

(b) Explain in detail the functionality of CISC and RISC processors.

18. (a) Describe the memory hierarchy and memory organization in computer architecture.

Or

(b) Give the structure of semiconductor RAM memory. Explain read and write operation in detail.

19. (a) Explain in detail the characteristics of different secondary memory devices.

Or

(b) Discuss in detail the virtual memory organization.

20. (a) Describe the techniques for handling control hazards in pipelining.

Or

(b) Explain in detail various interrupt handling techniques.

(5 × 10 = 50 marks)

D 14145

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, NOVEMBER 2021**

Mechanical Engineering

ME 19 304—METALLURGY AND MATERIAL SCIENCE

Time : Three Hours

Maximum : 100 Marks

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

1. Sketch the unit cell for FCC crystal structure. Calculate its atomic packing factor.
2. What is meant by crystal imperfections ? Classify the crystal imperfections.
3. What are Miller indices ? Explain the procedure for finding Miller indices of crystal planes.
4. Define the following :
 - (i) Solute ;
 - (ii) Solvent ; and
 - (iii) Degrees of freedom.
5. State Hume Rothery's rules for formation of substitutional solid solutions.
6. Describe Fick's first law of diffusion.
7. Explain the significance of TTT diagram in the heat treatment of steel.
8. Explain the effect of any three alloying elements on properties of steel.
9. Write an engineering brief about tool steels.
10. Distinguish between elastic and plastic deformation of a solid.
11. Compare the deformation by slip and twinning.
12. Draw and explain the different stages of a creep curve.
13. Explain the properties and applications of polymer matrix composites.
14. Describe the properties and applications of ceramics.
15. Write a short note on nuclear materials.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full section from each question.

Each question carries 10 marks.

16. a) What are point defects in solid materials? Discuss the various types of point defects.

Or

- b) Explain with a neat sketch the working principle of a transmission electron microscope (TEM).

17. a) Explain Cu-Ni phase diagram with a neat sketch.

Or

- b) Draw the equilibrium diagram of Iron-Carbon system and discuss transformations that take place from melting point to room temperature at any percentage of carbon.

18. a) Write short notes on the following :

(i) Full annealing. (5 marks)

(ii) Normalizing. (5 marks)

Or

- b) Describe composition, properties, and applications of any five copper alloys.

19. a) Explain the following :

(i) Grain boundary hardening. (5 marks)

(ii) Strain hardening. (5 marks)

- b) What is meant by ductile fracture? Explain the mechanism of it.

20. a) Discuss the structure, properties, and applications of any four polymers.

Or

- b) Write short notes on the following :

(i) Smart materials. (5 marks)

(ii) Shape memory alloys. (5 marks)

[5 × 10 = 50 marks]

D 14149

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Printing Technology

PT 19 304—GRAPHIC ARTS TECHNIQUES

Time : Three Hours

Maximum : 100 Marks

Part A

Answer any ten questions.

Each question carries 5 marks.

1. Explain the features and processing of rapid access film.
2. Discuss the factors to be considered to avoid moire pattern.
3. Explain contact printing with its advantages, disadvantages and applications.
4. Write notes on monotone proofing.
5. Explain the relation between digital photography and color management.
6. Write notes on advantages and disadvantages of digital photography.
7. What are the factors to be considered related to printing press while planning a job ?
8. Explain half-sheetwise imposition with the help of a diagram.
9. Explain the steps involved in preparing 4 page and 8 page portrait sheetwork imposition.
10. Write notes on plastic plates.
11. Discuss about shelf life and corrections in an offset plate.
12. With neat diagram, explain the cross-section of an aluminium plate.
13. Write a notes on contact angle and wet ability of ink on plate using diagrams.
14. Discuss the features of direct image plates.
15. Compare subtractive diazo and photopolymer PS plates.

(10 × 5 = 50 marks)

Part B

Answer one full question from each section.

Each question carries 10 marks.

16. (a) (i) Explain reciprocity law and reciprocity failure. (5 marks)
- (ii) Discuss the ingredients in a photographic developer solution. (5 marks)

Or

- (b) With neat diagram, explain different parts of a vertical process camera.

Turn over

17. (a) Explain the 3 methods of preparing pre-press color proofs.

Or

(b) Explain different types of scanners.

18. (a) Describe layout and with neat diagram, explain various steps involved in planning a layout.

Or

(b) Explain conventional positive assembly method of film planning.

19. (a) Explain 10 constituents of a good platemaking department.

Or

(b) Discuss various light sources used for offset platemaking.

20. (a) Explain the advantages, disadvantages and processing procedure of deep etch plates.

Or

(b) With neat diagram, explain the process of making Kodak relief plate.

(5 × 10 = 50 marks)

D 14135

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electronics and Communication Engineering

EC 19 305—ELECTRONIC DEVICES

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. What are extrinsic semiconductors ? Draw their energy based diagram.
2. A semiconductor is known to have a band gap of 1.25 eV and intrinsic carrier concentration of $1.6 \times 10^{10} \text{ cm}^{-3}$ at room temperature. Estimate N_C and N_V , if $m_n^* : m_p^* = 4 : 1$. Assume $kT = 0.025 \text{ eV}$.
3. Define (a) Diffusion current ; (b) Drift current.
4. What is meant by (a) Zener breakdown ; (b) Avalanche breakdown.
5. What is meant by (a) abrupt junction ; (b) graded junction.
6. Explain briefly about Schottky diodes.
7. What is meant by Kirk effect ?
8. Explain the switching operation of a transistor.
9. The current components in a transistor are $I_{nE} = 2.712 \times 10^{-6}$, $I_{pE} = 0.678 \text{ mA}$, $I_{nC} = 9.4 \times 10^{-15} \text{ A}$ and $I_{pC} = 0.6779 \text{ mA}$. Determine γ , β , α , I_{CBO} .
10. Define (a) Pinch off voltage ; (b) Threshold voltage.
11. What is an ideal MOS capacitor ? Draw the equilibrium energy band diagram.
12. Draw and explain the diagram of an enhancement MOSFET. Draw the transfer characteristics.
13. What are power MOSFETs ? Explain with suitable diagram.
14. Explain the principle and operation of LED.
15. What are power diodes ? What are the different types ?

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full question from each section.

Each question carries 10 marks.

16. (a) Derive the continuity equations.

Or

(b) (i) Fermi level of an n -type Ge film is 0.2 eV above the intrinsic Fermi level. Calculate the conductivity of the film (assume $n_1 = 10^{13} \text{ cm}^{-3}$, $\mu_n = 3500 \text{ cm}^2/\text{Vs}$, $\mu_p = 1500 \text{ cm}^2/\text{Vs}$, $kT = 0.026 \text{ eV}$).

(ii) What are excess carriers and how they are generated.

17. (a) Prove the relation $n_0 p_0 = n_i^2$.

Or

(b) What is meant by built in potential ? Derive the equation for built in potential.

18. (a) Explain Drift in the base region and base narrowing.

Or

(b) Explain the main regions of operation and minority carrier distribution in a BJT.

19. (a) Draw the structure of an n -channel JFET and explain the operation with the drain characteristics.

Or

(b) Explain the accumulation and depletion mode of operation of a MOS capacitor.

20. (a) Explain the working of IGBT with suitable diagram.

Or

(b) List the types of photodiodes. Explain the working of PIN photodiode.

(5 × 10 = 50 marks)

D 14139

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Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Electrical and Electronics Engineering

EE 19 305—FLUID MECHANICS AND POWER PLANT ENGINEERING

Time : Three Hours

Maximum : 100 Marks

Part A

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

- I. 1 Relate the terms absolute pressure, gauge pressure and vacuum pressure.
2 Compare Laminar flow and turbulent flow.
3 What do you understand by continuity equation ?
4 What is meant by NPSH ?
5 What is specific speed of a pump ? How are pumps classified based on this number ?
6 Classify turbines according to flow.
7 Sketch the Otto cycle on P-V and T-S planes and name all the processes.
8 What are the effect of superheat and subcooling in vapour compression cycle ?
9 What are the advantages of vapour compression refrigeration system over air refrigeration system ?
10 State the methods of improvement of thermal efficiency.
11 Give the limitations of first law of thermodynamics.
12 Give triple point represented in P-V diagram.
13 Differentiate between steady and transient heat conduction.
14 Define critical Reynolds number. What is its typical value for flow over a flat plate and flow through a pipe ?
15 Explain intensity of radiation.

(10 × 5 = 50 marks)

Part B

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

- II. 1 Obtain the Euler's equation of motion and deduce that to Bernoulli's equation.

Or

Turn over

- 2 Water flows through a pipe AB 1.2 diameter at 3 m/s. and then passes through a pipe BC 1.5 m. diameter. At C, the pipe branches. Branch CD is 0.8 m. in diameter and carries one third of flow in AB. The flow velocity in branch CE is 2.5 m/s. Find the volume rate of flow in AB, the velocity in BC, the velocity in CD and the diameter of CE.
- 3 (a) Discuss the need of draft tube for turbine.
(b) Explain various types of draft tube with neat sketch.

Or

- 4 Explain about the working principle of centrifugal pump with neat sketch.
- 5 A stationary mass of gas is compressed without friction from an initial state of 0.3 m.³ and 0.015 MPa to the final state of 0.15 m.³ and 0.105 MPa, the pressure remaining constant during the process. There is a transfer of 37.6 kJ of heat from the gas during the process. How much does the internal energy of the gas change ?

Or

- 6 The steam conditions at inlet to the turbine are 42 bar and 500° C. and the condenser pressure is 0.035 bar. Assume that the steam is just dry saturated on leaving the first turbine, and is reheated to its initial temperature. Calculate the Rankine cycle efficiency and specific steam consumption with reheating by neglecting the pump work using Mollier chart.
- 7 Derive an expression for air standard efficiency of an Otto cycle. Obtain an expression for mean effective pressure on an Otto cycle.

Or

- 8 With a neat sketch, explain a vapour compression refrigeration system.
- 9 Considering the heating surface of a steam boiler to be a plane wall of thickness 1.2 cm. and having $k = 50 \text{ W/mK}$, determine the rate of heat flow and surface temperature for the following data flue gas temperature = 1000° C. boiling water temperature = 200° C. Heat transfer coefficient on the flue gas side = 100 W/m.²K, Heat transfer coefficient on boiling water side = 5000 W/m.²K.

Or

- 10 Atmospheric air at 275 K and a free stream velocity of 20 m/s flows over a flat plate 1.5 m. long that is maintained at a uniform temperature of 325 K. Calculate the average heat transfer coefficient over the region where the boundary layer is laminar, the average heat transfer coefficient over the entire length of the plate and the total heat transfer rate from the plate to the air over the length 1.5 m. and width 1 m. Assume transition occurs at $Re = 2 \times 10^5$.

(5 × 10 = 50 marks)

D 14142

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**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Information Technology

IT 19 305—SWITCHING THEORY AND LOGIC DESIGN

Time : Three Hours

Maximum : 100 Marks

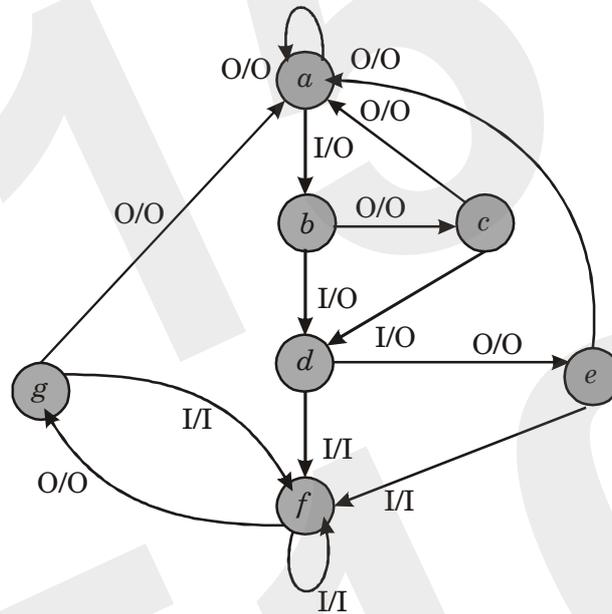
Part A

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

- (a) Convert $(756.603)_8$ to hexadecimal.
(b) Convert $(B9F.AE)_{16}$ to Octal.
- Convert the following :—
 - $(317547)_{10}$ to hexadecimal.
 - $(100111.110)_2$ to decimal.
- Perform the following operation :—
 - Multiply $(111)_2$ and $(101)_2$.
 - Add 10101010 and 11001100 .
- Simplify the following Boolean function $(A, B, C, D) = \sum m(0, 1, 2, 4, 5, 7, 8, 9, 10, 12, 13)$.
- Obtain the canonical sum of product form of the following function :—
 $F(A, B, C) = A + BC$.
- Convert the following expression into standard SOP form :—
 $AB'C + A'B' + ABC'D$.
- Design a 4-bit gray to Binary code converter.
- Implement the Boolean function using 8 : 1 multiplexer :
 $F(A, B, C, D) = A'BD' + ACD + B'CD + A'C'D$.
- Design a binary adder.
- Compare synchronous counter and asynchronous counter.
- Design a mod-10 asynchronous counter using T-flip-flops.

Turn over

12. Design the state table specified by the following state diagram :



13. Explain in detail about ROM.
 14. Explain in detail about error correcting codes.
 15. Design a PAL for the following functions :

$$X = AB + AC'$$

$$Y = AB' + BC'$$

(10 × 5 = 50 marks)

Part B

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

Each question carries 10 marks.

16. (a) Perform the following operations :

- (i) Convert $(EF.B1)_{16} = (?)_{10}$.
- (ii) Convert $(6.74)_2$ to binary.
- (iii) Convert $(206.104)_8$ to decimal.
- (iv) Add the following binary numbers $1010110.1110101.1001010$.
- (v) Convert binary number 110110.011 to Octal number.

(5 × 2 = 10 marks)

Or

(b) Perform the following operations :

- (i) Multiply 1010×101 .
- (ii) Convert the following Octal number to their decimal equivalent : $(0.254)_8$.
- (iii) Convert the following Octal number to their binary equivalent : $(271.436)_8$.
- (iv) Divide the binary numbers $10002 \div 100_2$.
- (v) Convert $(1A.2B)_{16}$ to $(?)_8$.

(5 × 2 = 10 marks)

17. (a) Minimize the following Boolean function using sum of products (SOP) :

$$f(a, b, c, d) = \Sigma m(3, 7, 11, 12, 13, 14, 15).$$

Or

(b) Minimize the function f given below by Quine-McClusky method using decimal notation :

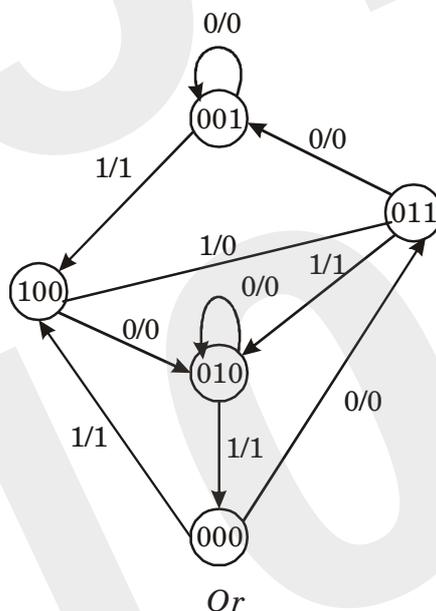
$$f(A, B, C, D) A'B'C'D' + A'BC'D + A'BCD' + A'BCD + AB'C'D + ABC'D + ABCD' + ABC.$$

18. (a) Design a 1 : 8 demultiplexer using two 1 : 4 DEMUX.

Or

(b) Design a SOP circuit to detect the decimal numbers 0, 2, 4, 6, 8 using a 4-bit 5211 BCD code input.

19. (a) A sequential circuit has three flip-flops A, B, C; one input x ; and one output, y in the state diagram. The circuit is to be designed by treating the unused states as don't-care conditions. Analyze the circuit obtained from the design to determine the effect of the unused states. Use J-K flip-flops in the design :



(b) Describe about serial in and parallel out and parallel in parallel out shift register.

4

20. (a) Implement the following two Boolean functions with a PLA :

$$F1(A, B, C) = \Sigma(0, 1, 2, 4).$$

$$F2(A, B, C) = \Sigma(0, 5, 6, 7).$$

Or

(b) Implement the full adder using PROPROM.

(5 × 10 = 50 marks)

D 14146

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Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) DEGREE [2019 SCHEME]
EXAMINATION, NOVEMBER 2021**

Mechanical Engineering

ME 19 305—ELECTRICAL TECHNOLOGY

Time : Three Hours

Maximum : 100 Marks

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

1. Explain how will you classify DC generators in detail and also explain the types of DC. generators.
2. A 6-pole wave-connected DC generator having 60 slots on its armature with 6 conductors per slot, runs at 750 rpm and generates an open circuit voltage of 230 V. Find the useful flux per pole.
3. Derive the torque equation of a DC motor.
4. Derive an EMF equation of a single-phase transformer.
5. A 1000/200 V transformer takes 0.3 A at p.f of 0.2 on an open circuit. Find the magnetizing, and iron loss component of the no-load primary current.
6. Explain the hysteresis and eddy current losses that occur in a transformer.
7. Explain the Principle of operation of three-phase induction motors.
8. Distinguish the difference between squirrel cage and slip ring induction motor.
9. Explain the Principle of operation of the alternator.
10. Define Electric Drive and list out some advantages.
11. Derive the fundamental torque equation of electrical drives.
12. State the applications where the stator voltage control is employed for three-phase induction motors.
13. Describe the different types of insulators.
14. Explain clearly the skin effect and the proximity effects when referring to overhead lines.
15. Explain the static characteristics of SCR.

(10 × 5 = 50 marks)

Turn over

Part B

Answer one full section from each question.

Each question carries 10 marks.

16. a) A 200 V DC shunt motor takes a total current of 100 A and runs at 750 rpm. The resistance of the armature winding and shunt field winding is 0.1 ohms and 40 ohms respectively. Find the total copper losses.

Or

- b) Discuss the various methods of speed control of a D.C motor.

17. a) A 10 kVA, 1-phase, 50 Hz, 500/250 V transformer gave the following test results :

OC test (LV) side : 250 V, 3.0 A/200 W

SC test (HV) side : 25 V, 20 A, 300 W

Calculate efficiency and regulation at full load, 0.8 p.f lagging.

Or

- b) Explain the current transformer and potential transformer with a neat diagram.

18. a) Explain different starting methods of a 3-phase induction motor.

Or

- b) A 415 V, 50 Hz, 3-phase, delta-connected induction motor gave the following results. No-Load Test : 415 V, 5.8 A, 488 W.

Blocked rotor test : 40 V 18.4 A, 510 W.

For full load conditions, find : i) input current ii) power factor iii) input power iv) slip v) efficiency. Stator resistance per phase is 0.7Ω .

19. a) Explain, the four quadrant operations of the DC drive.

Or

- b) With the necessary block diagram and the equation, explain the operation of v/f control of three-phase Induction motor drive.

20. a) With a neat sketch, explain the structure of a general transmission and distribution system.

Or

- b) Explain in detail the theory of corona formation and its advantages in the power system. Also, give the expression for corona power loss.

(5 × 10 = 50 marks)

D 14150

(Pages : 2)

Name.....

Reg. No.....

**THIRD SEMESTER B.TECH. (ENGINEERING) [2019 SCHEME]
DEGREE EXAMINATION, NOVEMBER 2021**

Printing Technology

PT 19 305—GRAPHIC DESIGN AND ELECTRONICS COMPOSITION

Time : Three Hours

Maximum : 100 Marks

Part A

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

1. What is visual color ? Explain.
2. Explain the different methods of color measurement.
3. What is electromagnetic response ?
4. Give the importance of word spacing.
5. Why letter spacing is required ?
6. What is storing the form ?
7. Why balance and contrast is required in design ?
8. What are the elements of design ? Explain.
9. What are trademarks ? Explain.
10. What is verbal copy ?
11. Give the advantages of 'Shrink the page to fit'.
12. Why space between the paragraph is required ?
13. Give the importance of page display.
14. Explain Text and graphics integration.
15. Give the fundamental structure of Post Script.

(10 × 5 = 50 marks)

Part B

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

16. (a) Explain the colour separation techniques.

Or

- (b) Explain the structure and functioning of human eye.

Turn over

17. (a) What is Casting up ? Explain with example.

Or

(b) What is Casting off ? Explain with example.

18. (a) Explain with example, the principles of design.

Or

(b) Explain the role and function of color in design.

19. (a) With an example explain digital and traditional copy fitting.

Or

(b) With example, explain the rules for page makeup.

20. (a) Explain Graphic programs optical character recognition software.

Or

(b) Give the applications of PageMaker and Photoshop software.

(5 × 10 = 50 marks)