

Code No: 131AK

R16

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year I Semester Examinations, May/June - 2019

BASIC ELECTRICAL AND ELECTRONICS ENGINEERING

(Common to EEE, ECE, CSE, EIE, IT, ETM)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.

Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART-A

(25 Marks)

- 1.a) Determine v_o and i in the circuit shown in figure 1.

[2]

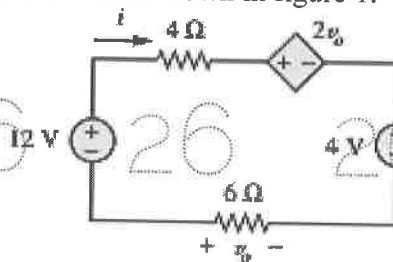


Figure: 1

- b) Write the expressions for a delta-to-wye transformation. [3]
- c) State the principle of superposition. [2]
- d) What is the resonant frequency of a series RLC circuit where $R = 10\Omega$, $L = 25\text{ mH}$ and $C = 100\text{ }\mu\text{F}$? Evaluate the Q factor. [3]
- e) What is the current equation of diode? [2]
- f) What is a junction capacitance of a diode? [3]
- g) What is a bipolar junction transistor? [2]
- h) What are the three types of configuration in transistors? [3]
- i) Define pinch off voltage in FET. [2]
- j) Sketch the basic structure of an N-Channel JFET. [3]

PART-B

- 2.a) State and explain Kirchhoff's laws.

(50 Marks)

- b) Calculate the equivalent resistance of the circuit shown in the figure 2.

[4+6]

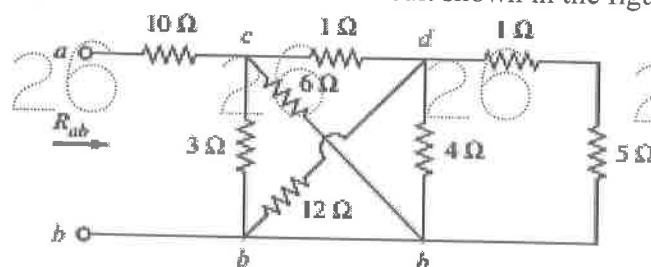


Figure: 2

OR

- 3.a) Define average and effective value, RMS value for voltage signal with an example.
 b) Use source transformation to determine the current and power absorbed by the 8Ω resistor as shown in figure 3. [5+5]

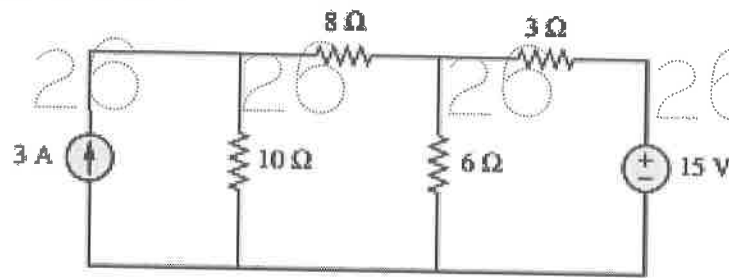


Figure: 3

- 4.a) Derive the condition for resonant frequency of the given parallel circuit and define the band width and quality factor of a resonant circuit figure 4.

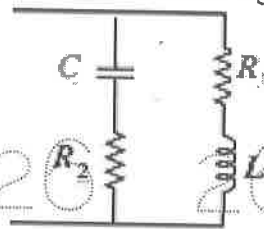


Figure: 4

- b) Find the Thevenin's equivalent looking into terminals $a-b$ of the circuit in figure 5 and solve for i_x . [5+5]

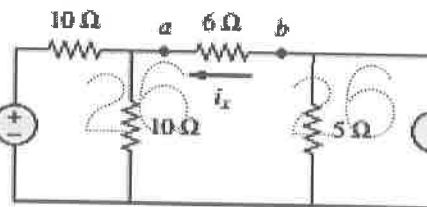


Figure: 5

OR

- 5.a) Verify Reciprocity theorem of the given circuit shown in figure 6.

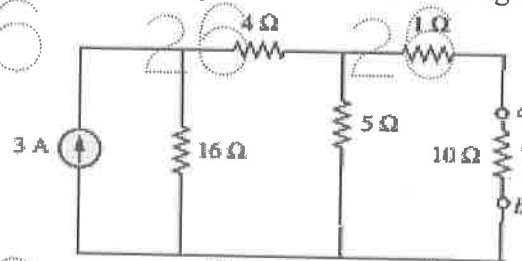


Figure: 6

- b) Find the Norton equivalent with respect to terminals $a-b$ in the circuit shown in figure 7. [5+5]

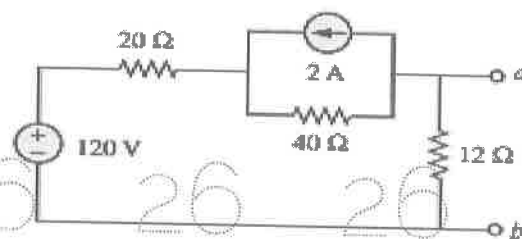


Figure: 7

- 6.a) Discuss the phenomenon of diffusion of charge carriers in semiconductors.
b) How does a capacitor filter improve the response of a rectifier circuit? [5+5]

OR

- 7.a) Explain about Zener diode and its $V - I$ characteristics.
b) Derive an expression for the rectification efficiency of a full-wave rectifier. [5+5]
- 8.a) Discuss about different operating regions of transistor.
b) Explain the input and output characteristics of a transistor in CE configuration. [5+5]

OR

- 9.a) Explain the two types of breakdown in transistors.
b) Explain the input and output characteristics of a transistor in CB configuration. [5+5]
- 10.a) Explain the phenomenon of pinch off voltage in a FET with a neat diagram and write the expression for I_{DS} with respect to pinch off voltage.
b) Two identical FETs are connected in parallel. Derive an expression for its overall μ factor. [5+5]

OR

- 11.a) Write a note on biasing schemes of JFET.
b) Give the small signal equivalent circuit of a FET amplifier in CG configuration and derive the equation for voltage gain. [5+5]

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Code No: 121AB

R15

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

MATHEMATICS-I

(Common to CE, EEE, ME, ECE, CSE, EIE, IT, MCT, AE, AME, MIE, PTM, MSNT)

Time: 3 hours

Max. Marks: 75

Note: This question paper contains two parts A and B.

Part A is compulsory which carries 25 marks. Answer all questions in Part A.
Part B consists of 5 Units. Answer any one full question from each unit. Each question carries 10 marks and may have a, b, c as sub questions.

PART- A

(25 Marks)

- 1.a) Find the matrix of the quadratic form $Q = 2x^2 + 3y^2 + z^2 - 2xy - 4yz + 6zx$. [2]
- b) Determine the values of λ and μ such that the system of equations $x + 2y + 3z = 6$, $x + 3y + 5z = 9$, $2x + 5y + \lambda z = \mu$ has unique solution. [3]
- c) Show that the functions $u = xe^y \sin z$, $v = xe^y \cos z$, $w = x^2 e^{2y}$ are functionally dependent. [2]
- d) Write the geometrical interpretation of Rolle's theorem. [3]
- e) Find the value of the integral $\int_0^{\pi} \int_0^x x \sin y \, dy \, dx$. [2]
- f) Evaluate $\Gamma\left(\frac{-5}{2}\right)$. [3]
- g) Find the complementary function of $\frac{d^3 y}{dx^3} + 8y = 0$. [2]
- h) State Newton's law of cooling. [3]
- i) Express $f(t) = \begin{cases} t^2, & 0 < t < 2 \\ 4t, & t > 2 \end{cases}$ in terms of unit step function. [2]
- j) Find $L^{-1}\left\{\frac{1}{s^2 + 2s + 2}\right\}$. [3]

PART-B

(50 Marks)

- 2.a) Show that every square matrix A can be written as the sum of a Hermitian matrix and a Skew-Hermitian matrix.
- b) Reduce the matrix $A = \begin{pmatrix} 1 & -1 & -1 \\ 1 & 1 & 1 \\ 3 & 1 & 1 \end{pmatrix}$ to normal form and hence find its rank. [5+5]

OR

3. Reduce the quadratic form $Q = x^2 + 2y^2 + 3z^2 + 2yz - 2zx + 2xy$ to its canonical form. [10]

4.a) Using Lagrange's mean value theorem, prove that

$$\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}, \quad 0 < a < b < 1.$$

b) Verify Cauchy's mean value theorem for $f(x) = x^3 - 3x^2 + 2x$ and $g(x) = x^3 - 5x^2 + 6x$ in $\left[0, \frac{1}{2}\right]$ [5+5]

OR

5.a) Verify $J\left(\frac{x, y, z}{u, v, w}\right) \cdot J'\left(\frac{u, v, w}{x, y, z}\right) = 1$, for $x = u$, $y = u \tan v$, $z = w$.

b) Find the maximum and minimum values of the function $f(x, y) = x^4 + y^4 - x^2 - y^2 + 1$. [5+5]

6.a) Prove that $\beta(m, n) = \int_0^1 \frac{x^{m-1} + x^{n-1}}{(1+x)^{m+n}} dx$.

b) Evaluate $\int_0^\infty \frac{x^a}{a^x} dx$, where $a > -1$. [5+5]

OR

7.a) Change the order of integration in $\int_0^1 \int_x^{\sqrt{x}} xy \, dy \, dx$ and hence evaluate the integral.

b) Find volume of the ellipsoid $\frac{x^2}{4} + \frac{y^2}{9} + \frac{z^2}{16} = 1$. [5+5]

8.a) Solve $(D^2 - 5D + 6)y = e^{2x} + \sin 3x$.

b) A radioactive substance disintegrates at a rate proportional to its mass. When the mass is 10 mgm, the rate of disintegration is 0.051 per day. How long will it take for the mass to reduce from 10 to 5 mgm? [5+5]

OR

9.a) Show that the family of curves $y^2 = 4c(c+x)$ is self orthogonal.

b) Solve $y'' + y = x^2 e^x + 2x + \sin x$. [5+5]

10.a) Find the Laplace transform of $f(t) = t e^{-t} \sin t + (\sin t - \cos t)^2$.

b) Find $L\left\{\frac{\cos 4t - \cos 2t}{t}\right\}$. [5+5]

OR

11.a) Apply convolution theorem to find $L^{-1}\left\{\frac{s}{(s^2+1)^2}\right\}$.

b) Solve $y'' + 4y' + 3y = e^{-t}$, $y(0) = 1$, $y'(0) = 1$ using Laplace transforms. [5+5]

Code No: 111AB

R13

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

MATHEMATICS-I

(Common to CE, EEE, ME, ECE, CSE, EIE, BME, IT, MCT, MMT, AE, AME, MIE, PTM, AGE)

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b) Find $L\left\{\frac{\cos 4t - \cos 2t}{t}\right\}$. [5+5]

OR

11.a) Apply convolution theorem to find $L^{-1}\left\{\frac{s}{(s^2+1)^2}\right\}$.

b) Solve $y'' + 4y' + 3y = e^{-t}, y(0) = 1, y'(0) = 1$ using Laplace transforms. [5+5]

Code No: 51006

R09

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD

B.Tech I Year Examinations, May/June - 2019

COMPUTER PROGRAMMING AND DATA STRUCTURES

(Common to CE, EEE, ME, ECE, CSE, CHEM, IT, AE, BT, AME, MIE)

Time: 3 hours

Max. Marks: 75

Answer any five questions
All questions carry equal marks

- 1.a) What is an algorithm? Write an algorithm for finding biggest number among three numbers.
- b) Explain about software development method. [8+7]
- 2.a) What is a Variable? Explain the rules for declaring a variable.
- b) Explain the selection statements if and switch with example. [7+8]
3. What is a function? Discuss user defined functions with example. [15]
- 4.a) Explain call by value and pass by reference with suitable example.
- b) What is String? Explain string handling functions with example. [7+8]
- 5.a) Explain enumerated types.
- b) What is a Union? Explain the differences between Structures and Unions. [7+8]
- 6.a) What is a file? Explain different file operation with syntax.
- b) Write a C program to open a pre-existing file and add information at the end of the file. Display the contents of the file before and after appending. [7+8]
- 7.a) What is sorting? Explain Quick sort algorithm with example.
- b) What is a linear search? Write a C program to find an element using linear search. [8+7]
- 8.a) Explain the role of stack in expression evaluation.
- b) Give the linked list representation of queue data structure. [7+8]

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