Student Id

No. of Pages:2

B Tech

2^{nd} Semester (Mid Sem) Examination Feb 2019

Subject: Basic Electrical Technology (EE101)

Branch: ETC/CE/CSE/IT

Time 1.5 Hours

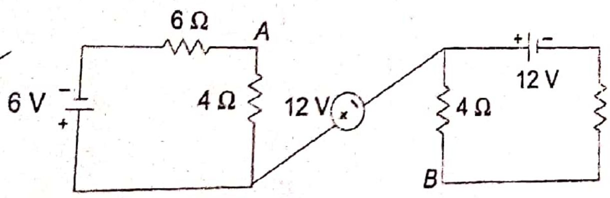
Max Marks: 30

Answer any three questions including question no 1.

The figures in the right-hand margin indicate marks

1. Answer all the questions: **[2x5]**

a) What is the voltage across A & B in the given circuit?



rms = $\sqrt{(20)^2 + (20)^2}$

b) Define controlled source. What are the different types of controlled sources?

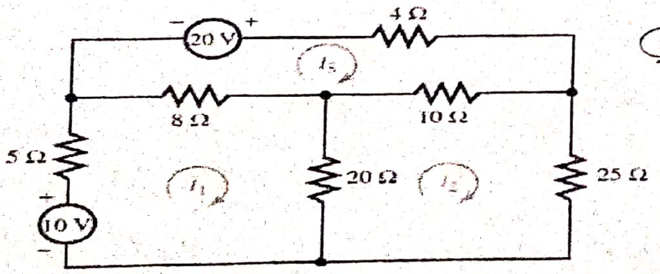
c) A wire is carrying a direct current of 20A and a sinusoidal alternating current of peak value 20A. Find the R.M.S value of the resultant current in the wire.

d) A mild steel ring having a cross-sectional area of 5 cm^2 and a mean circumference of 40cm has a coil of 200 turns wound uniformly around it. Calculate (i) the reluctance of the ring (ii) the current required to produce a flux of 800μwb in the ring. Assume relative permeability of mild steel to be 380 at the flux density developed in the core.

e) Define form factor and peak factor.

$R = \frac{l}{\mu A}$ $\phi = BA = \frac{\mu N I A}{l}$ $\mu_r = 380$

2. a) Using loop analysis determine I_1, I_2 & I_3 of the given circuit. **[5]**

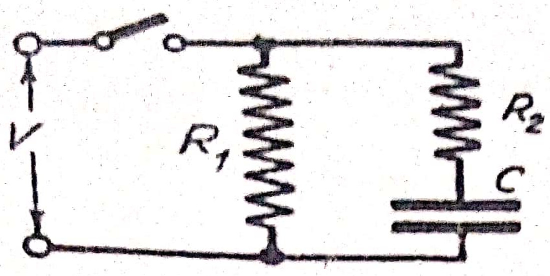


$\mu = \frac{B}{H}$

$\Rightarrow B = \mu H = \frac{\mu N I}{l}$

$\phi = BA$

b) Find how long it takes after the key is closed before the total current from the supply reaches 25mA, when V=10V,R_1=500Ω,R_2=700Ω and C=100μF. [5]



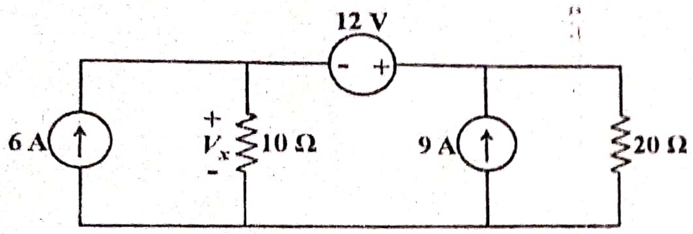
$i_T = i(1-e^{-t/\tau})$

$25\times10^{-3} = \frac{10}{291.67}$

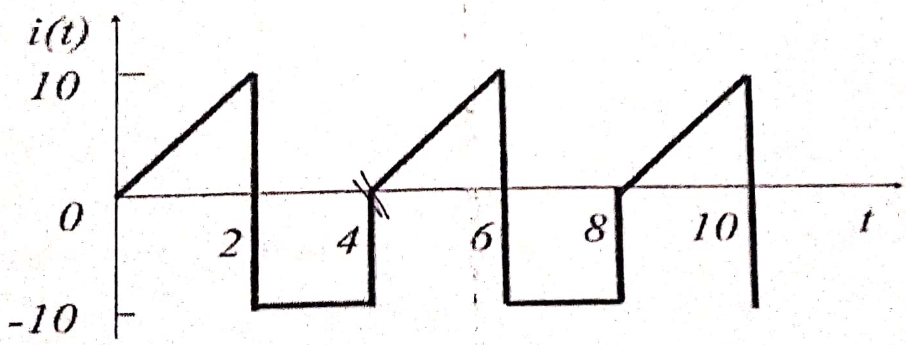
100×10^{-6}

2.618 | 2.078

3.a) Use Superposition theorem, evaluate 'Vx' in the given circuit. [5]

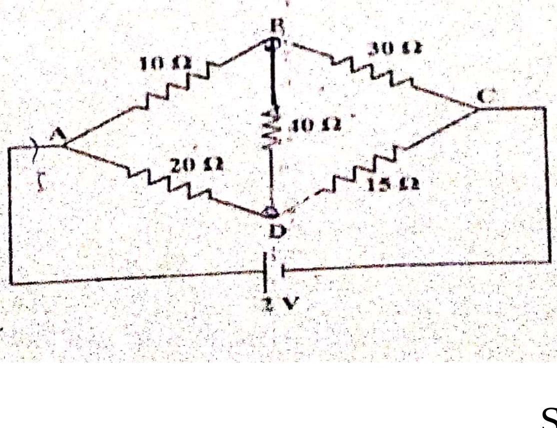


b)Determine the RMS and average value of the following wave form. [5]



4.a)A 230V, 50Hz ac supply is applied to a coil of 0.06H inductance and 2.5Ω resistance connected in series with a 6.8 μF capacitor. Calculate (i) Impedance (ii) Current (iii) Phase angle between current and voltage (iv) power factor (v) power consumed. [5]

b) Use Thevenin's theorem to find the current in the 40 Ω resistance connected between 'B' and 'D'. [5]



International Institute of Information Technology (IIIT), Bhubaneswar

Mid Semester Examination-February 2019

Subject: **Data Structure and Algorithm**

Branch: **IT**, Semester: 2nd

Full Marks: 30 **Duration: 90 Minutes**

Answer any five questions.

1. State and formulate different memory efficient strategies of storing lower triangular and upper triangular matrices. Find the address of an arbitrary element of the above efficient representations. **[6]**

2. Consider a Towers of Hanoi problem with 3 disks. Initially, the left peg contains all 3 disks, middle and right pegs are empty. Construct a recursion tree and answer the followings: **[6]**

   (a) After how many invocations, the first move takes place? 2

   (b) After how many invocations, the last move takes place? 4

   (c) After how many invocations, you have a move from right-peg to middle-peg? 3

   (d) What is the total number of moves? 5

   (e) What is the total number of invocations? 4

3. Using a stack convert the following expression into its equivalent postfix expression:

   #A $ B $ C * D * E * A @ log B ! / log # C

   where # : unary minus operator, $: exponential operator, * : multiplication operator, log : logarithm operator, ! : factorial operator, / : division operator, and @ is a right associative operator having highest priority among other operators. Show the configuration of stack and postfix expression at each step of the conversion process. **[6]**

4. Write C functions to perform insertion and deletion operation of a circular queue without and with sacrificing any memory location of an array. Demonstrate it with suitable examples. **[6]**

5. Write a C function to add two bivariant polynomials using linear linked list. **Note:** A bivariant polynomial is polynomial associated with two variables. **[6]**

6. Write a C function to add two long integers using circular queue. Assume that the circular queue is represented using linked list. **[6]**

CG-04

Mid Semester Examinations 2019, 2nd Semester

SUB: Communication Skills-II (WBC)

F.M- 30

Duration: 1Hr 30 Minutes

Q.1. Answer the following questions in a sentence or two. Each question carries one mark. (5)

A. Deleting the redundancies comes under which phase of the writing process?

B. What are the features of a good paragraph?

C. Why is it advisable for the writer to take a break before starting to edit after he finishes writing the first draft?

D. What is a topic Sentence? Where is it located inside a paragraph? Describe its importance.

E. What role does brainstorming and mind mapping play in the process of writing?

Q.2. Answer the following questions. Each question carries two marks. (8)

A. State two important features of written Communication? Justify.

B. Written communication is more effective in the business world. Do you agree? Justify your answer.

C. Prepare a map and an outline for a presentation on 'Corporate Social Responsibility' (CSR)

D. State two limitations of written communication.

Q.3. Answer the question in 100 words.

Catherine booked a hotel through a local travel agency. Her accommodation was not satisfactory as the agent promised. She decided to complain against this. Draft the letter. (Invent details) **(5)**

Q.4. Write a short paragraph on 'Internet of Things' **(5)**

Q.5. How can I know what I think, unless I see what I say? Explain. **(2)**

Q.6. Why written communication is more clear and precise as compared to spoken communication? **(3)**

Q.7. What is the importance of presentation? Why a writer does needs to make a presentation before a selected audience before proceeding for publication.

or

Q.8. What is the use of Transitional words in writing paragraph? Explain with examples. **(2)**

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Mid Semester Examination February 2019

Mathematics-II

Branch : CSE, CE, IT, EEE & ETC

Time : 1 : 30 Hours

Max Marks : 30

Question No.1 is compulsory, and answer any **four** from the rest.

The figures in the right hand margin indicate marks.

1. (a) Which of the following statements is/are true? (2)
   P: The set of vectors $S = \{(1,1,1), (i,i,i), (1+i, -1-i, i)\}$ in $\mathbb{C}^3(\mathbb{C})$ is linearly dependent.
   Q: The set of vectors $S = \{(2,2,1), (1,-1,1), (1,0,1)\}$ in $\mathbb{R}^3(\mathbb{R})$ is linearly independent.

   (b) Let $P_1(x) = x^2 - 4x - 6$, $P_2(x) = 2x^2 - 7x - 8$ and $P_3(x) = 2x - 3$. Write $P(x) = 1 - x^2$ as a linear combination of $P_i(x), i = 1, 2, 3$. (2)

   (c) Find the rank of the following matrix using elementary row operations. (2)

$$M = \begin{bmatrix} 1 & -2 & 3 \\ 2 & 1 & 2 \\ 5 & -5 & 11 \end{bmatrix}$$

   (d). Let A be a 3×3 matrix with $determinant(A + I) = 0$. If $trace(A) = 0$ and $determinant(A) = 42$, then find the sum of squares of all eigenvalues of A. (2)

   (e) Let M be a 3×3 matrix such that $MX = Y$, where $X = (2, -1, 0)^T$ and $Y = (-8, 4, 0)$. Suppose that $M^4 X' = Y'$ for $X' = (-1, \frac{1}{2}, 0)^T$ and $Y' = (\alpha, \beta, \gamma)^T$, where $\alpha, \beta, \gamma \in \mathbb{R}$. Determine the value of β. (2)

2. Consider the following matrix (5)

$$A = \begin{bmatrix} 3 & -1 & -1 \\ 1 & 1 & -1 \\ 1 & -1 & 1 \end{bmatrix}$$

Find a matrix P for which $P^{-1}AP = D$, where D is a diagonal matrix containing eigenvalues of A.

$(-2+i) - i(i - (-1-i))$
$- i(2i+1)$

$\Rightarrow 1(-1-((-1)-i)i)$
$1 - 5 + 8 - 4$
$8 - 20 + 16 - 4 = 0$
$1(-1+i-1)$

3. Determine the conditions for which the following system (5)

$$x_1 + x_2 + x_3 = 1$$
$$x_1 + 2x_2 - x_3 = b$$
$$5x_1 + 7x_2 + ax_3 = b^2$$

admits

i) No solution

ii) Only one solution

iii) Infinitely many solutions

4. (a) Determine the matrix A whose eigenvalues and the corresponding eigenvectors respectively are as follows: (3)
Eigenvalues: $0, 0, 3$; Eigenvectors: $(1, 2, -1)^T$, $(-2, 1, 0)^T$, $(3, 0, 1)^T$.

(b) Find the total number of linearly independent eigenvectors of the following matrix (2)

$$M = \begin{bmatrix} 1-\lambda & 1 \\ 2 & 2-\lambda \end{bmatrix} \Rightarrow \begin{array}{l} (1-\lambda)(2-\lambda) - 2 \\ 2 - \lambda - 2\lambda + \lambda^2 - 2 \\ \Rightarrow \lambda^2 - 3\lambda = 0 \\ \lambda(\lambda - 3) = 0 \end{array} \quad \lambda = 0, \lambda = 3$$

5. Solve the following system of equations using Gauss elimination method. (5)

$$x_1 + 2x_2 - 2x_3 = 1$$
$$2x_1 - 3x_2 + x_3 = 0$$
$$5x_1 + x_2 - 5x_3 = 1$$
$$3x_1 + 14x_2 - 12x_3 = 5$$

6. For the following matrix A, show that $A^n = A^{n-2} + A^2 - I, \forall n \geq 3$, using Cayley-Hamilton theorem. Also find A^{50}. (5)

$$A = \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \begin{bmatrix} 1 & 0 & 0 \\ 1 & 0 & 1 \\ 0 & 1 & 0 \end{bmatrix} \Rightarrow \begin{bmatrix} 25 & 0 & 0 \\ 25 & 25 & 0 \\ 25 & 0 & 25 \end{bmatrix}$$

$b + 2b^2 - 1 - 5b - 5 = 0$

$2b^2 - 4b - 6 = 0$

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B.Tech

Second Semester (Mid Sem) Examination Feb 2018

Mathematics - II (MA102)

Branch : All

Time 90 Minutes

Max Marks : 30

Answer **Question No. 1** which is compulsory and any **four** from the rest.

The figures in the right hand margin indicate marks.

1. Answer the following questions. **(5 × 2 each)**

(a) Find $L\{f(t)\}$ where

$$f(t) = \begin{cases} 3t & 0 < t < 2 \\ 6 & 2 < t < 4 \end{cases} \quad \text{and} \quad f(t+4) = f(t)$$

(b) If

$$f(t) = \begin{cases} 1 & 0 < t < 2 \\ t^2 & t > 2 \end{cases}$$

Find $L\{f(t)\}$.

(c) Find the value of $L^{-1}\left\{\dfrac{1}{s^2(s^2+1)}\right\}$.

(d) Find the value of convolution of $1 * \cos(\omega t)$, where ω is a constant.

(e) Show that $L\left\{\int_0^t \delta(t-a)\, dt\right\} = L\{u(t-a)\}$.

2. (a) Find the Laplace transform of $\displaystyle\int_0^t \frac{e^t \sin t}{t}\, dt$. (2

(b) Find $L^{-1}\left\{\tan^{-1}\left(\dfrac{2}{s}\right)\right\}$. (

3. Find the solution of the following ODE using Laplace transformation (5)

$$y'' - 6y' + 8y = r(t)$$

where

$$y(0) = y'(0) = 0 \quad \text{and} \quad r(t) = \begin{cases} 4e^t & \text{if } 0 < t < 2, \\ 0 & \text{if } t \geq 2. \end{cases}$$

4. Find the solution of the following integral equation using Laplace transformation (5)

$$y(t) = te^t - 2e^t \int_0^t e^{-\tau} y(\tau)\, d\tau$$

5. Using Laplace transformation show that the value of the integral (5

$$\int_0^\infty e^{-at} \frac{\sin(bt)}{t}\, dt = \frac{\pi}{2} - \tan^{-1}\frac{a}{b}$$

Then show that $\displaystyle\int_0^\infty \frac{\sin t}{t} = \frac{\pi}{2}$.

6. Find $L^{-1}\{F(s)\}$ using convolution where $F(s) = \dfrac{5s}{(s^2+1)(s^2+25)}$. (

* * * * * * * * * * * * * **All the Best** * * * * * * * * * * * * *

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