CBCS SCHEME

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18MAT31

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Transform Calculus, Fourier Series and Numerical Techniques

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Find the Laplace transform of:

(i) $\left(\frac{4t+5}{e^{2t}}\right)^2$ (ii) $\left(\frac{\sin 2t}{\sqrt{t}}\right)^2$ (iii) $t\cos at$. **(10 Marks)**

b. The square wave function f(t) with period 2a defined by $f(t)=\begin{cases}1 & 0\le t<a\\ -1 & a\le t<2a\end{cases}$. Show that $\left(\frac{1}{s}\right)\tanh\left(\frac{as}{2}\right)$. **(05 Marks)**

c. Employ Laplace transform to solve $\frac{d^2y}{dt^2}-\frac{dy}{dt}=0$, $y(0)=y_1(0)=3$. **(05 Marks)**

OR

2 a. Find (i) $L^{-1}\left\{\frac{s^2-3s+4}{s^3}\right\}$ (ii) $\cot^{-1}\left(\frac{s}{2}\right)$ (iii) $L^{-1}\left\{\frac{s}{(s+2)(s+3)}\right\}$ **(10 Marks)**

b. Find the inverse Laplace transform of, $\frac{1}{s(s^2+1)}$ using convolution theorem. **(05 Marks)**

c. Express $f(t)=\begin{cases}2 & \text{if } 0<t<1\\ \frac{t^2}{2} & \text{if } 1<t<\frac{\pi}{2}\\ \cos t & t>\frac{\pi}{2}\end{cases}$ in terms of unit step function and hence find its Laplace transformation. **(05 Marks)**

Module-2

3 a. Obtain the Fourier series of $f(x)=\begin{cases}2 & -2<x<0\\ x & 0<x<2\end{cases}$. **(08 Marks)**

b. Find the half range cosine series of, $f(x)=(x+1)$ in the interval $0\le x\le 1$. **(06 Marks)**

c. Express $f(x)=x^2$ as a Fourier series of period 2π in the interval $0<x<2\pi$. **(06 Marks)**

OR

4 a. Compute the first two harmonics of the Fourier Series of f(x) given the following table :

x°	0	60°	120°	180°	240°	300°
y	7.9	7.2	3.6	0.5	0.9	6.8

(08 Marks)

b. Find the half range size series of e^x in the interval $0 \le x \le 1$. **(06 Marks)**

c. Obtain the Fourier series of $f(x) = \frac{\pi^2}{12} - \frac{x^2}{4}$ valid in the interval $(-\pi \quad \pi)$ **(06 Marks)**

Module-3

5 a. Find the Infinite Fourier transform of $e^{-|x|}$. **(07 Marks)**

b. Find the Fourier cosine transform of $f(x) = e^{-2x} + 4e^{-3x}$. **(06 Marks)**

c. Solve $u_{n+2} - 3u_{n+1} + 2u_n = 3^n$, given $u_0 = u_1 = 0$. **(07 Marks)**

OR

6 a. If $f(x) = \begin{cases} 1 & \text{for } |x| \le a \\ 0 & \text{for } |x| > a \end{cases}$, find the infinite transform of f(x) and hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$. **(07 Marks)**

b. Obtain the Z-transform of $\cosh n\theta$ and $\sinh n\theta$. **(06 Marks)**

c. Find the inverse Z-transform of $\frac{4z^2 - 2z}{z^3 - 5z^2 + 8z - 4}$ **(07 Marks)**

Module-4

7 a. Solve $\frac{dy}{dx} = e^x - y$, $y(0) = 2$ using Taylor's Series method upto 4th degree terms and find the value of y(1.1). **(07 Marks)**

b. Use Runge-Kutta method of fourth order to solve $\frac{dy}{dx} + y = 2x$ at x = 1.1 given $y(1) = 3$ (Take h = 0.1) **(06 Marks)**

c. Apply Milne's predictor-corrector formulae to compute y(0.4) given $\frac{dy}{dx} = 2e^x y$, with **(07 Marks)**

x	0	0.1	0.2	0.3
y	2.4	2.473	3.129	4.059

OR

8 a. Given $\frac{dy}{dx} = x + \sin y$; $y(0) = 1$. Compute y(0.4) with h = 0.2 using Euler's modified method. **(07 Marks)**

b. Apply Runge-Kutta fourth order method, to find y(0.1) with h = 0.1 given $\frac{dy}{dx} + y + xy^2 = 0$; $y(0) = 1$. **(06 Marks)**

c. Using Adams-Bashforth method, find y(4.4) given $5x\left(\frac{dy}{dx}\right) + y^2 = 2$ with

x	4	4.1	4.2	4.3
y	1	1.0049	1.0097	1.0143

(07 Marks)

Module-5

9 a. Solve by Runge Kutta method $\frac{d^2y}{dx^2} = x\left(\frac{dy}{dx}\right)^2 - y^2$ for x = 0.2 correct 4 decimal places, using initial conditions $y(0) = 1$, $y'(0) = 0$, $h = 0.2$. **(07 Marks)**

b. Derive Euler's equation in the standard form, $\frac{\partial f}{\partial y} - \frac{d}{dx}\left[\frac{\partial f}{\partial y'}\right] = 0$. **(06 Marks)**

c. Find the extramal of the functional, $\int_{x_1}^{x_2} y^2 + (y')^2 + 2ye^x dx$. **(07 Marks)**

OR

10 a. Apply Milne's predictor corrector method to compute $\frac{d^2y}{dx^2} = 1 + \frac{dy}{dx}$ and the following table of initial values:

x	0	0.1	0.2	0.3
y	1	1.1103	1.2427	1.3990
y'	1	1.2103	1.4427	1.6990

(07 Marks)

b. Find the extramal for the functional, $\int_0^{\frac{\pi}{2}} [y^2 - y'^2 - 2y\sin x]dx$; $y(0) = 0$; $y\left(\frac{\pi}{2}\right) = 1$. **(06 Marks)**

c. Prove that geodesics of a plane surface are straight lines. **(07 Marks)**

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18MATDIP31

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Additional Mathematics – I

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Express the following complex number in the form of $x+iy: \frac{(1+i)(1+3i)}{1+5i}$. **(06 Marks)**

b. Prove that $\left(\frac{\cos\theta+i\sin\theta}{\sin\theta+i\cos\theta}\right)^4 = \cos 8\theta + i\sin 8\theta$. **(07 Marks)**

c. If $\vec{a}=(3,-1,4)$, $\vec{b}=(1,2,3)$ and $\vec{c}=(4,2,-1)$, find $\vec{a}\times\left(\vec{b}\times\vec{c}\right)$. **(07 Marks)**

OR

2 a. Find the angle between the vectors, $\vec{a}=5\hat{i}-\hat{j}+\hat{k}$ and $\vec{b}=2\hat{i}-3\hat{j}+6\hat{k}$. **(06 Marks)**

b. Prove that $\left[\vec{a}\times\vec{b}, \vec{b}\times\vec{c}, \vec{c}\times\vec{a}\right] = \left[\vec{a},\vec{b},\vec{c}\right]^2$ **(07 Marks)**

c. Find the fourth roots of $-1+i\sqrt{3}$ and represent them on the argand diagram. **(07 Marks)**

Module-2

3 a. Obtain the Maclaurin's expansion of $\log_e(1+x)$. **(06 Marks)**

b. If $u=\sin^{-1}\left[\frac{x^3+y^3}{x+y}\right]$, prove that $x\frac{\partial u}{\partial x}+y\frac{\partial u}{\partial y}=2\tan u$. **(07 Marks)**

c. If $u=x(1-y)$, $v=xy$, find $\frac{\partial(u,v)}{\partial(x,y)}$. **(07 Marks)**

OR

4 a. Obtain the Maclauvin's series expansion of the function $\log_e \sec x$. **(06 Marks)**

b. If $u=x^2-2y$; $v=x+y$ find $\frac{\partial(u,v)}{\partial(x,y)}$. **(07 Marks)**

c. If $u=f(x-y, y-z, z-x)$, prove that $\frac{\partial u}{\partial x}+\frac{\partial u}{\partial y}+\frac{\partial u}{\partial z}=0$. **(07 Marks)**

Module-3

5 a. Find the velocity and acceleration of a particle moves along the curve, $\vec{r}=e^{-2t}\hat{i}+2\cos 5t\hat{j}+5\sin 2t\hat{k}$ at any time t. **(06 Marks)**

b. Find $\operatorname{div}\vec{F}$ and $\operatorname{curl}\vec{F}$, where $\vec{F}=\nabla\left(x^3+y^3+z^3-3xyz\right)$. **(07 Marks)**

c. Show that $\vec{F}=(2xy+z^2)\hat{i}+\left(x^2+2yz\right)\hat{j}+\left(y^2+2xz\right)\hat{k}$ is conservative force field and find the scalar potential. **(07 Marks)**

OR

6 a. Show that the vector field, $\vec{F} = (3x+3y+4z)\hat{i} + (x-2y+3z)\hat{j} + (3x+2y-z)\hat{k}$ is solenoidal. **(06 Marks)**

b. Find the directional derivative of $\phi = \frac{xz}{x^2+y^2}$ at (1, −1, 1) in the direction of $\vec{A} = \hat{i} - 2\hat{j} + \hat{k}$. **(07 Marks)**

c. Find the constant 'a' such that the vector field $\vec{F} = 2xy^2z^2\hat{i} + 2x^2yz^2\hat{j} + ax^2y^2z\hat{k}$ is irrotational. **(07 Marks)**

Module-4

7 a. Find the reduction formula for $\int_0^{\frac{\pi}{2}} \sin^n x dx$. **(06 Marks)**

b. Evaluate $\int_0^1 \int_0^3 x^3y^3 dxdy$. **(07 Marks)**

c. Evaluate $\int_0^3 \int_0^2 \int_0^1 (x+y+z) dzdxdy$. **(07 Marks)**

OR

8 a. Evaluate : $\int_0^{\frac{\pi}{6}} \sin^6(3x) dx$. **(06 Marks)**

b. Evaluate : $\int_0^1 \int_x^{\sqrt{x}} xy\, dydx$. **(07 Marks)**

c. Evaluate : $\int_0^1 \int_0^{1-x} \int_0^{1-x-y} xyz dzdydx$. **(07 Marks)**

Module-5

9 a. Solve : $\frac{dy}{dx} + y\cot x = \sin x$. **(06 Marks)**

b. Solve : $(2x^3 - xy^2 - 2y + 3)dx - (x^2y + 2x)dy = 0$. **(07 Marks)**

c. Solve : $3x(x + y^2)dy + (x^3 - 3xy - 2y^3)dx = 0$. **(07 Marks)**

OR

10 a. Solve : $(5x^4 + 3x^2y^2 - 2xy^3)dx + (2x^3y - 3x^2y^2 - 5y^4)dy = 0$. **(06 Marks)**

b. Solve : $\frac{dy}{dx} + x\sin 2y = x^3\cos^2 y$. **(07 Marks)**

c. Solve : $[1 + (x+y)\tan y]\frac{dy}{dx} + 1 = 0$. **(07 Marks)**

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18EC32

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Network Theory

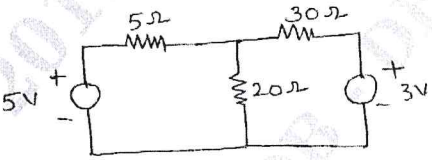
Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

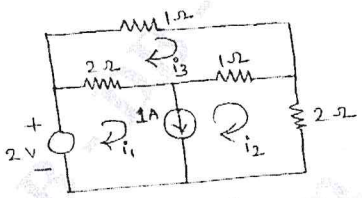
1 a. Using source transformation technique find the current through 5Ω resistor for the circuit shown in Fig.Q.1(a) **(06 Marks)**

Fig.Q.1(a)



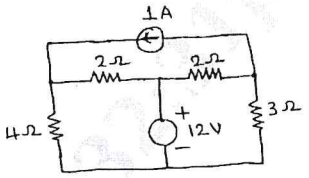
b. Use Mesh Analysis to determine the Mesh currents i_1, i_2 and i_3 for the network shown in Fig.Q.1(b). **(06 Marks)**

Fig.Q.1(b)



c. Find the power delivered by 1A current source using nodal analysis for the circuit shown in Fig.Q.1(c). **(08 Marks)**

Fig.Q.1(c)

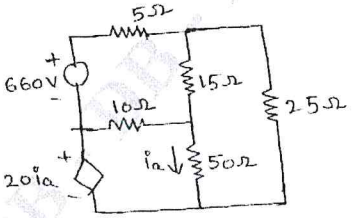


OR

2 a. Three Impedances are connected in delta, obtain the star equivalent of the network. **(06 Marks)**

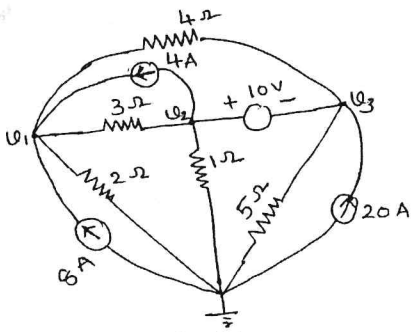
b. Use Mesh Analysis to find the power delivered by the dependent voltage source in the circuit shown in Fig.Q.2(b). **(06 Marks)**

Fig.Q.2(b)



c. Determine all the node voltages for the circuit shown in Fig.Q.2(c) using nodal analysis. **(08 Marks)**

Fig.Q.2(c)



Module-2

3 a. State and explain superposition theorem **(06 Marks)**

b. Use Millman's Theorem to find the current flowing through $(2 + j3)\Omega$ impedance for the circuit shown in Fig.Q.3(b). **(08 Marks)**

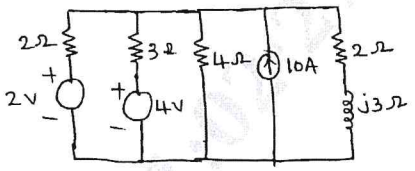


Fig.Q.3(b)

c. State and prove Norton's theorem. **(06 Marks)**

OR

4 a. Find the Thevenin's equivalent for the circuit shown in Fig.Q.4(a) with respect to terminals X-Y. **(08 Marks)**

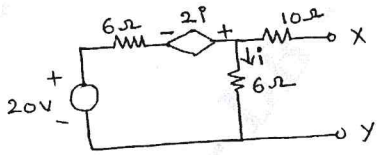


Fig.Q.4(a)

b. Find the condition for maximum power transfer in the AC circuit, where both R_L and X_L are varying. **(06 Marks)**

c. Determine the current through the load resistance using Norton's Theorem for the circuit shown in Fig.Q.4(c). **(06 Marks)**

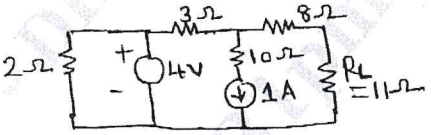


Fig.Q.4(c)

Module-3

5 a. Explain the behavior of R, L, C elements at the time of switching at $t = 0$, at $t = 0^+$ and $t = \infty$. **(07 Marks)**

b. In the network shown in Fig.Q.5(b). Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume that the capacitor is initially uncharged. **(07 Marks)**

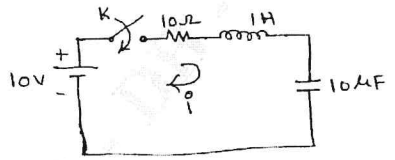


Fig.Q.5(b)

c. In the network shown in Fig.Q.5(c) find, i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. The swich k is closed at $t = 0$ with zero current in the inductor. **(06 Marks)**

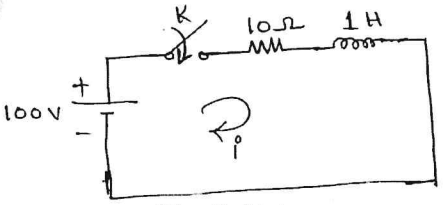


Fig.Q.5(c)

OR

6 a. In the network shown in Fig.Q.6(a). The switch k is changed from position a to b at t = 0, the steady state is reached at position a. Find i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. Assume that the capacitor is initially uncharged. **(10 Marks)**

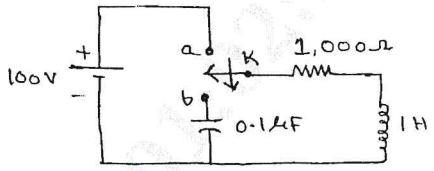


Fig.Q.6(a)

b. For the network shown in Fig.Q.6(b). The network is in steady state with switch k is closed. At t = 0, the switch is opened. Determine the voltage across the switch V_k and $\frac{d}{dt}V_k$ at $t = 0^+$. **(10 Marks)**

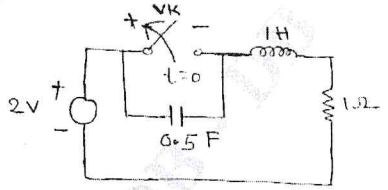


Fig.Q.6(b)

Module-4

7 a. Obtain Laplace transform of
i) Step function
ii) Ramp function
iii) Impulse function. **(09 Marks)**

b. Find the Laplace transform of the periodic signal x(t) as shown in Fig.Q.7(b). **(11 Marks)**

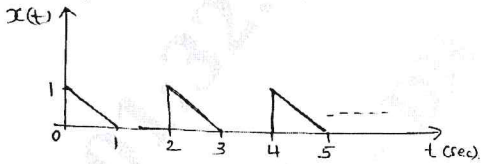


Fig.Q.7(b)

OR

8 a. In the series RL circuit shown in Fig.Q.8(a), the source voltage is v(t) = 50 sin 250tV. Using Laplace transform determine, the current when switch K is closed at t = 0. **(10 Marks)**

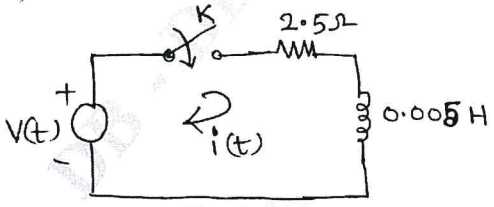


Fig.Q.8(a)

b. Find the Laplace transform of the non-sinusoidal periodic waveform shown in Fig.Q.8(b)

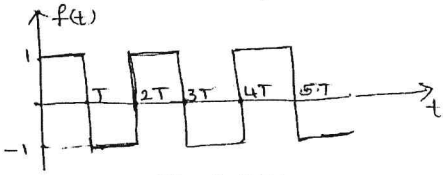


Fig.Q.8(b) **(10 Marks)**

Module-5

9 a. Define Z parameters. Determine Z parameters interms of Y parameters. **(06 Marks)**

b. Determine h parameters of the circuit shown in Fig.Q.9(b) **(07 Marks)**

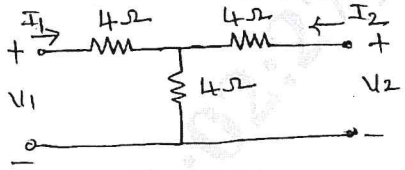


Fig.Q.9(b)

c. For the network shown in Fig.Q.9(c). Find the transmission parameters. **(07 Marks)**

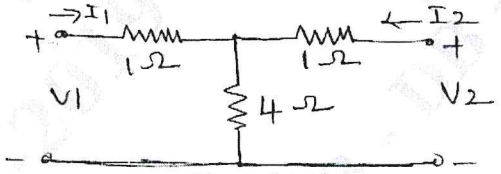


Fig.Q.9(c)

OR

10 a. Define Q-factor, selectivity and Band width. **(03 Marks)**

b. A series RLC circuit has a resistance of 10Ω, an inductance of 0.3H and a capacitance of 100μF. The applied voltage is 230V. Find: i) The resonant frequency ii) lower and upper cut off frequencies iii) current at resonance iv) currents at f_1 and f_2 v) Voltage across. the inductance at resonance. **(07 Marks)**

c. Derive the expression for the resonant frequency of the circuit shown in Fig.Q.10(c). Also show that the circuit will resonate at all frequency if $R_L = R_C = \sqrt{\frac{L}{C}}$. **(10 Marks)**

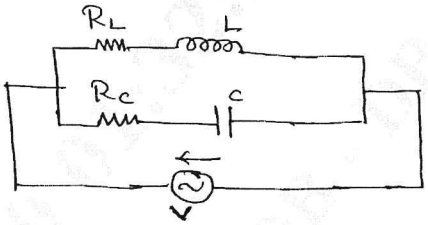


Fig.Q.10(c)

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18EC33

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Electronic Devices

Time: 3 hrs. Max. Marks: 100

Note: *Answer FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. What are the types of Bonding forceses in solids? Explain. **(06 Marks)**

b. Explain the classification of material based on conductivity and energy band diagram. **(08 Marks)**

c. Find the conductivity of the intrinsic germanium at 300 K. If a donar type impurity is added to the extent of 1 atom/10^7 germanium atom assume $\mu_n = 3800$, $\mu_p = 1800$, $n_i = 2.5 \times 10^3$, $Q = 1.602 \times 10^{-19}$. **(06 Marks)**

OR

2 a. What are Direct and Indirect band gap semiconductor? Explain with examples. **(08 Marks)**

b. Explain the concentration of electron-hole pair in Intrinsic semiconductor with energy band diagram. **(06 Marks)**

c. Calculate the Intrinsic carrier concentration in Silicon at room temperature T = 300 K, where B is the material dependent parameter 5.4×10^{31} and E_G as the bandgap energy 1.12 eV, where K is the Boltzman constant = 8.62×10^{-5} eV/K. **(06 Marks)**

Module-2

3 a. With energy band diagram, explain the doping level in extrinsic semiconductor at 0 K and at 50 K. **(09 Marks)**

b. What is the magnitude of HALL voltage in a N-Type germanium bar having an majority carrier concentration $N_D = 10^{17}$ cm^3. Assume B = 0.2 Wb/m^2, d = 2 mm, E = 10 V/cm. **(05 Marks)**

c. Explain the effect of temperature on semiconductor. **(06 Marks)**

OR

4 a. Explain the qualitative description of current flow at P-N junction under equilibrium and biased condition. **(08 Marks)**

b. Explain zener breakdown and avalanche breakdown under reverse biased P-N junction. **(06 Marks)**

c. Discuss the piece-wise linear approximations of junction diode under ideal condition. **(06 Marks)**

Module-3

5 a. Explain the optical generation of carrier in a P-N junction. **(08 Marks)**

b. Discuss the configuration of a solar cell in enlarged view of the planar junction. **(06 Marks)**

c. What is injection-electroluminiscence and what are its applications? **(06 Marks)**

OR

6 a. Explain I-V characteristics of n-p junction as a function of emitter current. **(08 Marks)**

b. Discuss switching operation in common-emitter transistor. **(06 Marks)**

c. Figure Q6 (c) shows the common emitter amplifier circuit. Calculate I_B and I_C assume $\tau_p = 10\,\mu s$, $\tau_t = 0.1\ \mu s$ **(06 Marks)**

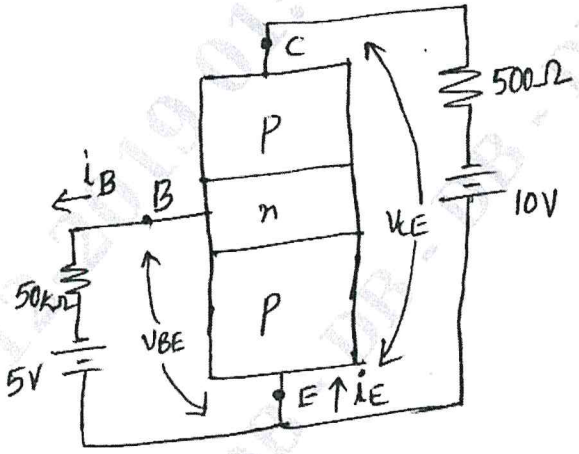

Fig. Q6 (c)

Module-4

7 a. Draw and explain the I-V characteristics of n-channel PNJFET for different biasing voltages. **(07 Marks)**

b. Draw and explain the small signal equivalent circuit of n-channel PNJFET. **(07 Marks)**

c. Explain the MOS structure with the aid of parallel-plate capacitor. **(06 Marks)**

OR

8 a. Explain the effect of frequency on gate voltage of a MOS capacitor with a P-type substrate. **(10 Marks)**

b. Explain P-channel enhancement and depletion type MOSFET with their circuit symbols. **(10 Marks)**

Module-5

9 a. With schematic diagram, explain ION-implantation system. **(07 Marks)**

b. Explain low pressure chemical vapour deposition reactor. **(07 Marks)**

c. Discuss photolithography. **(06 Marks)**

OR

10 a. What are the different types of integrated circuits and its advantages? **(10 Marks)**

b. Explain the process of Integration. **(10 Marks)**

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CBCS SCHEME

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18EC34

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Digital System Design

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Design a combinational circuit to output the 2's complement of a 4-bit binary number. **(07 Marks)**

b. Identify all prime implicants and essential prime implicants of following function using K-map:
$f(a, b, c, d) = \sum m + (6, 7, 9, 10, 13) + dc(1, 4, 5, 11, 15)$. Draw the diagram using NAND gates. **(07 Marks)**

c. Expand the following in to canonical form and represent in decimal form:
i) $f_1 = a + bc + ac'd$ in to min-terms
ii) $f_2 = a(b + c)(a + c + d)$ into max terms. **(06 Marks)**

OR

2 a. Find the minimal sum of the following Boolean function using Quine-McClusky method:
$f(a, b, c, d) = \sum m(7, 9, 12, 13, 14, 15) + dc(4, 11)$. **(07 Marks)**

b. Using K-map determine minimal product of sum expressions an implement the simplified equation using only NOR gates:
$f(w, x, y, z) = \pi(1, 2, 3, 4, 9, 10) + d(0, 14, 15)$. **(07 Marks)**

c. Explain briefly K-map, Incompletely specified functions, essential prime implicants and Gray code. **(06 Marks)**

Module-2

3 a. Implement the following using 3 to 8 decoder with active low enable and active HIGH outputs:
i) $f_1(a, b, c, d) = \sum m(0, 1, 5, 6, 7, 9, 10, 15)$
ii) $f_2(a, b, c) = \pi(1, 3, 6, 7)$ **(06 Marks)**

b. Explain 4-bit carry look-ahead adder with necessary diagram and relevant expressions. **(08 Marks)**

c. Design 4 line to 2 line priority encoder which gives MSB the highest priority and LSB least priority. **(06 Marks)**

OR

4 a. Implement $f(a, b, c, d) = \sum(0, 4, 8, 10, 14, 15)$ using
i) 8:1 MUX with a, b, c as select lines
ii) 4:1 MUX with a, b as select lines. **(06 Marks)**

b. Design a two bit magnitude comparator and draw the neat diagram. **(08 Marks)**

c. Explain the structure of programmable logic arrays (PLA) with an example. **(06 Marks)**

Module-3

5 a. Explain clocked SR flip flop using NAND gates with necessary truth table and waveform. **(06 Marks)**

b. Explain with a neat diagram and truth table, a 4-bit SIPO shift register to store binary number 1011. **(07 Marks)**

c. What is race around condition? Explain JK master slave flip flop with a diagram, function table and timing diagram. **(07 Marks)**

OR

6 a. Explain with an excitation table, the conversion of SR flip flop in to JK and D flip flop. **(06 Marks)**

b. Explain the working of 4-bit Twisted Ring counter using necessary diagram and waveform. **(07 Marks)**

c. Explain the working of 3-bit Asynchronous up-down counter with necessary waveform and truth table. **(07 Marks)**

Module-4

7 a. Design a self correcting synchronous counter using positive edge triggered JK flip flop to count 0, 1, 2, 4, 5, 6, 0, 1, 2.... Use the state table and state diagram. **(10 Marks)**

b. Design a clocked sequential circuit which operates according to the state diagram shown in Fig.Q.7(b). Implement the circuit using negative edge triggered JK flip-flop. **(10 Marks)**

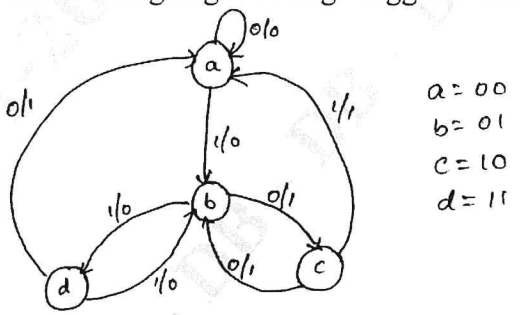

Fig.Q.7(b)

OR

8 a. Construct the excitation table, transition table, state table and state diagram for the sequential circuit shown in Fig.Q.8(a). **(10 Marks)**

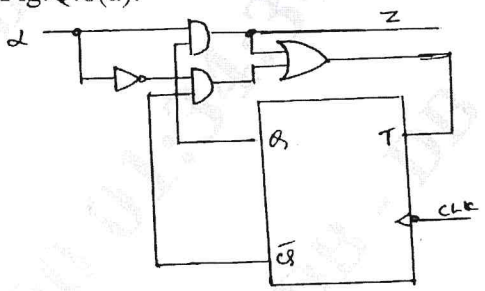

Fig.Q.8(a)

b. Realize synchronous decade counter using T-flip-flop and draw the neat diagram. **(10 Marks)**

Module-5

9 a. Design a Melay type sequence detector to detect the sequence of 101 in the given sequence of 001101100101011. **(10 Marks)**

b. With necessary diagram, explain the concept of serial adder with accumulators. **(10 Marks)**

OR

10 a. Design a sequential circuit to convert BCD to Excess-3 code with state table, state graph and transition table. **(10 Marks)**

b. Explain the design of sequential circuit using CPLDs and give CPLD implementation of a shift register and parallel adder with accumulator. **(10 Marks)**

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CBCS SCHEME

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18EC35

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Computer Organization and Architecture

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With a neat diagram, explain basic operational concept of computer. **(10 Marks)**
b. Explain in brief different types of key parameters that affect the processor performance. **(05 Marks)**
c. Explain the Bus Structures. **(05 Marks)**

OR

2 a. Illustrate Instruction and Instruction sequencing with an example. **(10 Marks)**
b. Define Byte Addressability, Big-endian and Little-endian assignment. **(06 Marks)**
c. Represent 85.125 in IEEE floating point using single precision. **(04 Marks)**

Module-2

3 a. What is an addressing mode? Explain any five types of addressing modes with example. **(10 Marks)**
b. Write a program to add 'n' number using indirect addressing mode. **(06 Marks)**
c. Explain various assembler directives used in assembly language program. **(04 Marks)**

OR

4 a. Explain stack operation with an example **(10 Marks)**
b. Explain subroutine linkage with an example using linkage register. **(06 Marks)**
c. Explain the shift and rotate operations with example. **(04 Marks)**

Module-3

5 a. Showing the possible register configuration in I/O interface, explain program controlled input/output. **(10 Marks)**
b. What is an interrupt? With an example illustrate the concept of interrupt. **(10 Marks)**

OR

6 a. Explain in detail, the situations where a number of devices capable of initiating interrupts are connected to processor. How to resolve the problems? **(10 Marks)**
b. Explain the registers involved in a DMA interface, to illustrate DMA. **(06 Marks)**
c. Explain the concept of Vectored Interrupt. **(04 Marks)**

Module-4

7 a. With figure, explain Internal Organization of 2M×8 dynamic memory chip. **(10 Marks)**
b. Illustrate Internal structure of static memories. **(10 Marks)**

OR

8 a. With a neat diagram, explain virtual memory organization. **(10 Marks)**
b. Briefly explain any four non-volatile memory concepts. **(05 Marks)**
c. Briefly explain secondary storage devices. **(05 Marks)**

Module-5

9 a. Explain the three-bus organization of the processor and its advantages. **(10 Marks)**

b. Discuss the organization of hardwired control unit. **(05 Marks)**

c. Discuss the control sequence for execution of instruction ADD(R_3), R_1 **(05 Marks)**

OR

10 a. With a block diagram, describe the organization of a micro programmed control unit. **(10 Marks)**

b. Describe the sequence of control signals to be generated to fetch an instruction from memory in a single bus organization. **(10 Marks)**

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CBCS SCHEME

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18EC36

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Power Electronics and Instrumentation

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Name the power semiconductor devices along their circuit symbols and maximum Ratings. **(04 Marks)**

b. Explain the operation of SCR, interms of two transistor model and derive anode current and gate currents relation. Discuss how a small gate current can trigger the device into condition. **(08 Marks)**

c. The latching current of a thyristor circuit is 60m Amp. The duration of the firing pulse is 50μsec. Given $V_s = 100V$, $R = 20\Omega$ and $L = 0.5H$ are connected in series.
i) Derive the expression for circuit current i(t)
ii) Draw variation of current i(t) with reference to time
iii) Will the thyristor device gets turned ON? **(08 Marks)**

OR

2 a. Enumerate the applications of power electronics. **(04 Marks)**

b. Explain the operation of self commutation by resonating load [class A] with relevant circuit and waveforms. **(08 Marks)**

c. What are the gate triggering schemes? Explain with circuit diagram and wave forms, now RC triggering circuit turns ON (triggers) SCRs. **(08 Marks)**

Module-2

3 a. Explain the control strategies used to operate choppers. **(06 Marks)**

b. Explain with the help of neat circuit diagram and waveforms, the operation of a single phase half wave controlled rectifiers with resistive load. Derive an expression for the :
i) Average load voltage ii) RMS load voltage. **(08 Marks)**

c. For the ideal type A [step down] chopper circuit, following conditions are given : $V = 220V$, Duty cycle = 0.3, Chopping frequency $f = 500Hz$, $R = 1\Omega$, $L = 3mH$ and $E_b = 23$ volts. Determine the following :
i) Minimum value of output current (load)
ii) Maximum value of output current (load)
iii) Average output (load) current. **(06 Marks)**

OR

4 a. Explain the effect of free wheeling diode used in controlled rectifiers. **(04 Marks)**

b. With the circuit diagram and circuit waveforms, explain the principle of operation of step-up chopper. **(08 Marks)**

c. A single phase fully controlled bridge rectifier is feeding to a RL load, to obtain a regulated DC output voltage. The RMS value of the AC voltage is 230V, at 50Hz and the firing angle is maintained at $\pi/3$, so that the load current is 4Amp.
i) Calculate the DC average output voltage
ii) Active power and reactive power input
iii) Assuming the load resistance remains the same, determine DC average output voltage. If a freewheeling diode is used at output with all the conditions remains same. **(08 Marks)**

Module-3

5 a. Define the terms : i) instrument ii) Accuracy iii) Absolute error iv) Relative errors? **(04 Marks)**

b. Explain the operation of single – phase half bridge inverter connected to RL load, with the help of circuit and waveforms. **(08 Marks)**

c. A basic D′ arsonval movement with a null scale deflection of 2mAmp and having an internal resistance of 50Ω is available. It is to be converted into a 0–10V, 0–1000V, 0–100V and 0–250V multi range voltmeter. Determine the value of resistance to extend? **(08 Marks)**

OR

6 a. What are inverters? Classify the inverters according to commutation and connections? **(04 Marks)**

b. What are the static errors? Explain them in detail with examples. **(08 Marks)**

c. A single phase half bridge inverter, has resistive load of R = 3Ω and DC input voltage V_{dc} = 50 volts. Calculate :

i) RMS output voltage at fundamental frequency
ii) The output power (P_0)
iii) The average and peak current of each thyristor
iv) The peak – reverse blocking voltage of each thyristor. **(08 Marks)**

Module-4

7 a. Explain how a simple AC bridge circuit operates and derive an expression for the unknown parameters. **(04 Marks)**

b. With the aid of diagram, explain the working of unbalanced wheat stone bridge and derive for a galvanometer current expression. **(08 Marks)**

c. Explain the principle of operation of digital time measurement with basic block diagram. **(08 Marks)**

OR

8 a. What are the advantages of digital instruments over analog instruments? **(04 Marks)**

b. Determine the equivalent parallel resistance and capacitance that causes a Wein's bridge to null condition with the following values : R_1 = 3.1KΩ, C_1 = 5.2μF, R_2= 55KΩ, R_4 = 100KΩ, ff = 2.5KHz. Derive the balanced expressions. **(08 Marks)**

c. With neat block diagram, explain the operating principle of a Ramp type DVM. **(08 Marks)**

Module-5

9 a. Define transducers. What are advantages of electrical transducers? **(04 Marks)**

b. Explain instrumentation Amplifier using transducer bridge with the help of circuit diagram. **(08 Marks)**

c. Explain with neat diagram the PLC structure. **(08 Marks)**

OR

10 a. What are features of instrumentation Amplifiers? How it differs from the ordinary opAmp. **(04 Marks)**

b. Describe the operation of resistive position transducer with constructional diagram and typical circuit used. **(08 Marks)**

c. With the aid of Bridge circuit, explain the working of resistance thermometer. Mention limitations of it. **(08 Marks)**

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CBCS SCHEME

18CPC39

USN | | | | | | | | | |

Question Paper Version : D

Third Semester B.E. Degree Examination, Dec.2019/Jan.2020
Constitution of India and Professional Ethics and Cyber Law

(COMMON TO ALL BRANCHES)

Time: 2 hrs.] [Max. Marks: 100

INSTRUCTIONS TO THE CANDIDATES

1. Answer all the Hundred questions, each question carries **ONE mark**.
2. Use only **Black ball point pen** for writing / darkening the circles.
3. For each question, after selecting your answer, darken the appropriate circle corresponding to the same question number on the OMR sheet.
4. Darkening two circles for the same question makes the answer invalid.
5. **Damaging/overwriting, using whiteners** on the **OMR** sheets are strictly prohibited.

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1. Which is the landmark Judgment passed by the Supreme Court in respect to Preamble of Constitution
   a) Beur beri b) Keshavananda Bharathi
   c) Menaka Gandhi d) Sonia Gandhi

2. Who is the neutral person in the affairs of party politics
   a) C.M b) Home Minister c) Finance Minister d) Speaker

3. Indian Constitution guarantees reservation of seats to SC & ST in
   a) Lok Sabha and Assembly b) Lok Sabha only
   c) Lok Sabha and Rajya Sabha d) Rajya Sabha

4. Who will preside over the joint session of both the houses of the Parliament
   a) President b) Prime Minister c) Speaker d) Law Minister

5. What is the minimum age for becoming M.P in Rajya Sabha and Lok Sabha
   a) 18 and 25 b) 25 and 18 c) 25 and 30 d) 30 and 25

6. India is referred to as _____ under the Indian Constitution
   a) Country b) Hindustan c) India d) Bharat

7. The citizens can enforce their Fundamental Rights before SC under
   a) Article 31 b) Article 32 c) Article 33 d) Article 34

8. Who quoted "Child of Today is Citizen of Tomorrow"?
   a) L. Tilak b) Jawaharlal Nehru c) B.R. Ambedkar d) Gandhiji

9. What is the minimum age required for casting of Vote
   a) 18 b) 19 c) 20 d) 21

10. Who quoted "Freedom is my birth right"?
    a) L. Tilak b) Jawaharlal Nehru c) Sardar Patel d) Gandhiji

11. One of the salient features of our constitution in
    a) It is fully rigid b) It is fully flexible
    c) It is partly rigid and partly flexible d) None of these

12. A person to be appointed as a Governor of a State must have completed the age of
    a) 30 years b) 35 years c) 45 years d) 50 years

13. The Chief Election Commission holds office for a period of
    a) 3 years b) 6 years
    c) 5 years d) 6 years or till he attains age of 65 years

14. The procedure for amending the constitution is detailed under
    a) Article 360 b) Article 368 c) Article 352 d) Article 301

15. Writ of Mandamus can be issued on the ground of
    a) Non – performance of public duties b) Unlawful Detention
    c) Unlawful occupation of public office d) None of these

16. Who acted as the Chairman of the drafting committee of the Constitution of India?
    a) Dr. B.R. Ambedkar b) B.C. Rajgopalanchari
    c) Dr. Rajendra Prasad d) Jawaharlal Nehru

17. Engineering Ethics is
    a) A macro Ethics b) Business Ethics
    c) A developing Ethics d) A code of Scientific rules based on Ethics

18. The use of intellectual property of others without permission or credit is referred as
    a) Cooking b) Stealing c) Plagiarism d) Trimming.

19. Who is the chair person of Parliament
    a) CM b) PM c) FM d) Speaker

20. Who will impeach the Chief Justice of India
    a) Supreme Court b) Law Minister
    c) 2/3rd Majority of Parliament d) By Rajya Sabha

21. The Chief Justice of High – Court is appointed by
    a) President b) Chief Minister c) Prime Minister d) Governor

22. Which is Not a Fundamental right
    a) Right to freedom b) Right to Constitutional remedy
    c) Right to property d) Right to equality

23. The tenure of Vice – President
a) 2 years b) 5 years c) 3 years d) 1 year

24. How many Schedules are there in Indian Constitution?
a) 7 b) 5 c) 12 d) 6

25. The membership of Legislative Assembly of State varies between
a) 60 & 500 b) 100 & 300 c) 150 & 450 d) 100 & 400

26. According to Indian Constitution, the power of amending the Constitution is vested with
a) Parliament b) President
c) People d) The Prime Minister of India

27. Engineers can use code of ethics as guidelines to
a) Resolve the conflicts b) Formulate the problem
c) Shift of Responsibility d) Overcome the work pressure

28. What is the maximum strength of Lok Sabha
a) 500 b) 545 c) 552 d) 550

29. Union list has
a) 95 subjects b) 97 subjects c) 105 subjects d) 66 subjects

30. The Fundamental Rights of Indian citizen are contained in
a) Part – III of Constitution b) Part – IV of Constitution
c) The 7th Schedule of Constitution d) None of these

31. Uniform Civil code means
a) A code related to individuals public life b) A code meant for Hindu only
c) A Civil procedure code
d) A Codified Law applicable to all person of India irrespective of their religion

32. The Vice – President has power
a) To sign bills passed by Rajya Sabha b) To preside over Rajya Sabha
c) To nominate two members for Rajya Sabha d) To propagate ordinance

33. Parliament of India consists of
a) Lok Sabha b) Lok Sabha & Rajya Sabha
c) Only Rajya Sabha d) None of these

34. A National emergency can remain in operation with the approval of Parliament for
a) An indefinite period b) A maximum period of 6 months
c) A maximum period of 1 year d) A maximum period of 3 years

35. In Engineering research and testing, retaining the contradictory statement, discarding the rest is called
a) Trimming b) Scanning c) Cooking d) Skimming

36. The Chief Justice and other Judges of High Court are appointed by
a) President b) Chief Minister c) Prime Minister d) Governor

37. The terms 'Ethics' is derived from
a) Ethical in English b) Ethic in Latin c) Custom d) Ethicos in Greek

38. The aim of the Directive Principles of State Policy is to establish
a) Capitalist State in Our Country b) Communist State in Our Country
c) Welfare State in the Country d) All of these

39. Special majority means more than
a) 50% majority b) Two – third majority c) 75% majority d) 60 - majority

40. One way of misusing the truth is
a) Exaggerating the truth b) Making wrong statement
c) Making confused statement d) Failure to seek out the truth

41. Salaries and other emoluments of the High Court Judges shall be determined by the
a) Governor b) Parliament c) Chief Minister d) State Legislature

42. According to 74th Amendment Act of 1993, which subject has been incorporated?
a) Municipalities b) Co-operative Society
c) Gram Panchayat d) Taluk Panchayat

43. IP Sec is designed to withstand replay attacks through the use of
a) Sequence numbers b) Nonces
c) Nonces + Sequence numbers d) Timestamps

44. The Key Confirmation Key [KCK] is used to
a) Integrity – protect data between the station and the AP
b) Integrity – protect messages in the four – way hand shake
c) Encrypt data between the station and the AP
d) Encrypt the message containing the group key.

45. Which of the following is true in a Smurf Attack?
a) The Victim receives large number of UDP packers to non – listening ports
b) The Victim receives large number of TCP SYN – ACK packers
c) The Victim receives large number of ICMP "Echo Request" messages
d) The Victim receives large number of ICMP "Echo Reply" messages.

46. A persistent cross – site scripting attack saves malicious code on
a) The client b) The server c) Both client & server d) Neither (a) & (b)

47. The possible goal of an attacker is sending packets with invalid combinations of TCP header flag is to
a) Launch a SYN flood attack b) Find which services are open
c) Perform OS finger printing
d) Determine the addressing schema within an organisation

48. The SOAP binding refers to
a) The object bound to a SOAP message b) The XML schema of a SOAP message
c) The mapping between a SOAP message underlying transport protocol
d) The headers in a SOAP message

49. The EKE protocol is resistant to
a) Replay attacks
b) Man – in – the middle attacks
c) Dictionary attacks
d) Reflection attacks

50. The SIM authenticates itself to the MSC/HLR using
a) A user password
b) A digital certificate
c) A response to a challenge
d) An encrypted signaling message.

51. When the Indian Constitution enacted and adopted?
a) 26/10/1949 b) 26/12/1949 c) 26/11/1949 d) 26/01/1949

52. When the Indian Constitution gives effect
a) 26/10/1949 b) 26/12/1949 c) 26/01/1950 d) 26/01/1949

53. Which of the following word was added in the Preamble of the Constitution by 42nd Amendment Act 1976
a) Socialist b) Sovereign c) Federal d) Republic

54. The President power to suspend death sentence temporarily is called
a) Respite b) Reprieve c) Remission d) Constitution

55. The Preamble of the Constitution has been amended so far
a) 4 times b) 3 times c) twice d) Once

56. Who are not entitled to form Union
a) Students b) Police c) Teachers d) Entrepreneurs

57. Which is not a Fundamental Right
a) Right against exploitation
b) Right to freedom of religion
c) Right to strike
d) Right to equality

58. Which of the following is not one of the 3 organs of state / Union
a) Executive b) Press c) Judiciary d) Legislation

59. How many Anglo Indians and others can be nominated by the President to the Lok Sabha and Rajyasabha
a) 2 & 12 b) 2 & 10 c) 1 & 12 d) 1 & 10

60. Which state Constitution has removed by the Parliament of India?
a) West Bengal b) Nagaland c) Sikkim d) Jammu & Kashmir

61. When the office of the President falls vacant , the same must be filled up within
a) 4 months b) 6 months c) 12 months d) 18 months

62. The Preamble of the Constitution indicates
a) Power to make laws
b) The sovereign of Indian Constitution
c) Power of Parliament to amend the Constitution
d) Sources of Constitution.

63. Which important human right is protected under Article 21
a) Right to Equality
b) Right to life and liberty
c) Right to freedom of speech
d) Right to religion

64. Right to Equality is guaranteed under Article
a) 13 b) 15 c) 16 d) 14

65. No person shall be punished for same offence more than once
a) Jeopardy
b) Double Jeopardy
c) Ex-post facto law
d) Testimonial compulsion

66. The Rajya Sabha
a) Is a Permanent House
b) Has a life of 6 years
c) Has a life of 5 years
d) Has a life of 7 years

67. The Quorum or minimum number of members required to hold the meetings of either houses of the Parliament is
a) One - tenth b) One - fifth c) One - third d) One - fourth

68. The Advice of Supreme Court is
a) Binding on the President
b) Not binding on the President
c) Binding on the President if it is tendered unanimously
d) None of these

69. Article 19 provides
a) 6 freedoms b) 7 freedoms c) 8 freedoms d) 5 freedoms

70. Who is the present speaker of Lok Sabha
a) Sumithra Mahajan b) K.S Hegde c) Om Birla d) Venkiah Naidu

71. Who appoints Lieutenant Governor General to Delhi
a) PM b) Law Minister c) President d) Vice - President

72. Who acts as a President when neither the President not the Vice – President is available
a) Speaker of Lok Sabha
b) Attorney General of India
c) Chief Justice of India
d) Speaker of Rajya Sabha

73. How many judges are there in the SC including Chief Justice of India?
a) 15 b) 19 c) 25 d) 31

74. The Parliamentary system of the Indian Constitution is borrowed from
a) Britain Constitution
b) Objective Constitution
c) Canada Constitution
d) Australian Constitution

75. The final interpreter to the Indian Constitution is
a) Speaker of LS b) Parliament c) President d) Supreme Court

76. The person arrested has to be produced before Magistrate within
a) 1 week b) 24 hours c) 72 hours d) 2 months

77. Which is the language to be used in Parliament
a) Kannada b) Hindi c) English d) Both (b) & (c)

78. President made Proclamation of emergency on the grounds of internal disturbance for first time in
a) 1975 b) 1965 c) 1962 d) 1950

79. Who will impeach Chief Election Commissioner of India
a) President b) Vice President
c) Prime Minister d) By 2/3rd majority of Parliament

80. Which is the highest Court of the Country
a) High Court b) Supreme Court c) District Court d) CET

81. India has
a) Democracy b) Presidental system
c) Direct Democracy d) Parliamentary Democracy

82. What is the punishment given , if computer source documents are tampared
a) Imprisonment of 2 years with fine of Rs 2 lakhs
b) Imprisonment of 3 years with fine of Rs 2 lakhs
c) Imprisonment of 4 years with fine of Rs 2 lakhs
d) Imprisonment of 5 years with fine of Rs 2 lakhs

83. What is the punishment given , if computer has been hacked under Section 43
a) Imprisonment of 1 year with fine upto Rs 2 lakhs
b) Imprisonment of 3 years with fine upto Rs 5 lakhs
c) Imprisonment of 3 years with fine upto Rs 4 lakhs
d) Imprisonment of 4 years with fine upto Rs 5 lakhs

84. Who appoints Prime Minister
a) The President of India b) Lok Sabha
c) The majority party is Lok Sabha d) Rajya Sabha

85. How much time was taken for framing Constitution?
a) 2 years 11 months and 18 days b) 13 years 11 months and 18 days
c) 4 years 11 months and 18 days d) 1 year 11 months and 18 days

86. The President of India is
a) The real ruler of India b) Head of the Government
c) Constitution Head of Country d) Head of the State

87. Which of the State has highest members in Lok Sabha
a) Andra Pradesh b) Uttar Pradesh c) Madhya Pradesh d) Karnataka

88. The Council of Ministers and Prime Minister shall not exceed total strength of the LokSabha
a) 5 % b) 10 % c) 12 % d) 15 %

89. The total number of seats in Legislative Assembly of Karnataka is
a) 200 b) 224 c) 240 d) 250

90. The basic feature of the Indian Constitution is found in
a) Fundamental duties
b) Fundamental Rights
c) Preamble
d) Directive Principle of State Policy

91. To became a Judge of High Court, one must be practicing Advocate of High Court for a period of atleast _____ years
a) 20 b) 10 c) 15 d) 5

92. The Constitution empowers State Government to make Special Law for
a) Workers b) Teachers c) Women & Children d) Farmers

93. Directive principles come under _____ of the Constitution
a) Part - II b) Part - III c) Part - IV d) Part – I

94. The system of Legislature in the State of Karnataka is
a) Bicameral b) Unicameral c) Cameral d) Multi cameral

95. The Mandal Commission, was Constituted relating to
a) Reservation of SCs
b) Reservation to STs
c) Reservation
d) Reservation to Backward classes

96. Who is appointing Chief Election Commissioner?
a) Prime Minister b) Law Minister c) President d) Vice - President

97. Who is the Ex – Officio Chairman of Rajya Sabha?
a) President b) Vice - President c) Prime Minister d) Governor

98. Vice – President of India is elected
a) By the people
b) By the members of State Legislature Assembly
c) By the members of Rajya Sabha
d) By the members of both the houses of Parliament at a joint sitting.

99. Which Amendment deals with the establishment of Municipalities a part of Constitution system?
a) 44^{th} b) 74^{th} c) 76^{th} d) 86^{th}

100. Who appoints the Governor of the State?
a) Chief Justice of India
b) Chief Justice of State
c) Chief Minister
d) President

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CBCS SCHEME

USN | | | | | | | | | | |

15EC32

Third Semester B.E. Degree Examination, July/August 2021
Analog Electronics

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions.***

1 a. Derive an expression for input impedance, output impedance, voltage gain for common-emitter fixed bias amplifier using re model. **(08 Marks)**

b. Calculate r_e, z_i, z_o, A_v for the network shown in Fig.Q.1(b) for un bypassed circuit. **(08 Marks)**

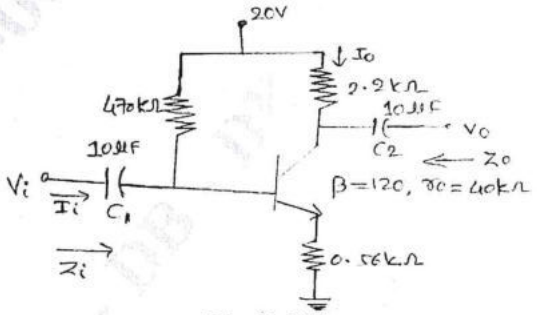

Fig.Q.1(b)

2 a. List the advantages of darlington transistor, calculate the dc bias voltages and currents for the circuit shown in Fig.Q.2(a). **(06 Marks)**

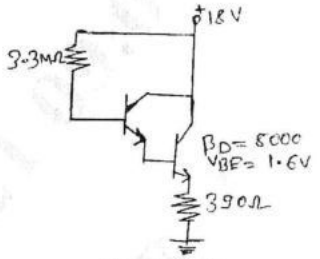

Fig.Q.2(a)

b. Derive an expression for Z_i, Z_o, A_v and A_i of two port system with hybrid equivalent circuit. **(10 Marks)**

3 a. Explain with characteristics working principle of JFET n-channel. **(06 Marks)**

b. Explain n-channel MOSFET operation. **(05 Marks)**

c. Explain enhancement type MOSFET n-channel. **(05 Marks)**

4 a. Derive Z_i, Z_o, A_v for small signal fixed bias JFET amplifier AC analysis. **(10 Marks)**

b. Derive Z_i for JFET common gate configuration circuit. **(06 Marks)**

5 a. Derive an expression for low frequency response of BJT amplifier to determine the effect of C_S, C_C and C_E. **(12 Marks)**

b. The input power to a device is 10,000W at a voltage of 1000V. The output power is 500W and the output impedance is 20Ω. Calculate power gain, voltage gain in decibels. **(04 Marks)**

6 a. Describe the effect of Miller's capacitance and derive input and output Miller capacitance. **(08 Marks)**

b. Derive an expression of low frequency FET response amplifier circuit for effect of C_G and C_C. **(08 Marks)**

7 a. List the advantage of negative feedback. **(04 Marks)**

b. Explain effect of negative feed back on bandwidth. **(04 Marks)**

c. Derive Z_{if}, A_f for the general voltage-series feedback connection type. **(08 Marks)**

8 a. Explain Wein bridge oscillator with circuit diagram. **(06 Marks)**

b. Explain UJT oscillator circuit operation. **(08 Marks)**

c. Define Barkhausen criterion. **(02 Marks)**

9 a. Explain types of power amplifiers. **(06 Marks)**

b. Explain with circuit diagram operation of push-pull amplifier. **(08 Marks)**

c. Define distortion in amplifier. **(02 Marks)**

10 a. Define voltage regulation. **(02 Marks)**

b. Explain shunt connected transistor voltage regulator circuit. **(06 Marks)**

c. Calculate the output voltage and zener current for the circuit shown in Fig.Q.10(c) with $R_L = 1K\Omega$. **(08 Marks)**

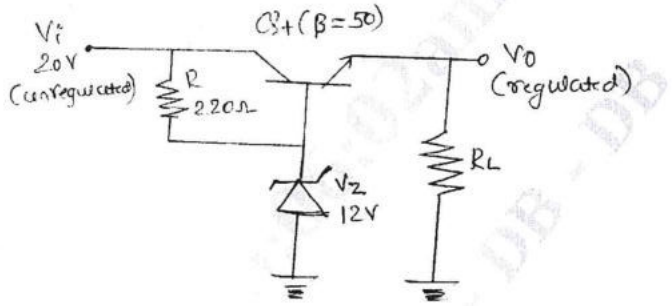

Fig.Q.10(c)

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CBCS SCHEME

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15EC33

Third Semester B.E. Degree Examination, July/August 2021
Digital Electronics

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. Convert the given Boolean function into
   i) $Y = f(a, b, c) = (a + b)(b + c)$ minterm canonical form.
   ii) $P = f(a, b, c) = a + ac(b + c)$ maxterm canonical form. **(08 Marks)**

b. Determine the prime implicants and essential prime implicants and also simplify the given boolean function using K-map method.
$N = f(a, b, c, d) = \pi M(0, 1, 4, 5, 8, 9, 11) + dc(2, 10)$. **(08 Marks)**

2 a. Simplify the given function in POS form using K-map method and implement using NOR gates. $P = f(a, b, c, d) = \pi M(1,3, 8, 10, 12, 13, 14, 15)$. **(08 Marks)**

b. Simplify using QM minimization technique.
$V = f(a, b, c, d) = \pi m(1, 5, 7, 9, 13, 15) + \Sigma d(8, 10, 11, 14)$ **(08 Marks)**

3 a. Explain carry look ahead adder with neat diagram and relevant expressions. **(08 Marks)**

b. Implement the following multiple output functions using 3:8 decoders (IC-74138).
   i) $f_1(a, b, c, d) = \pi M(2, 4, 5, 7, 9, 10, 13, 14)$
   ii) $f_2(a, b, c, d) = \Sigma m(1, 3, 5, 8, 12, 14, 15)$. **(08 Marks)**

4 a. Design 2-bit comparator and briefly explain. **(08 Marks)**

b. Implement $f(a, b, c, d) = \Sigma m(0, 1, 5, 6, 10, 12, 14, 15)$
Using : i) 8:1 MUX with a, b, c as select lines
ii) 4:1 MUX with c, d as select lines. **(08 Marks)**

5 a. Design SR latch and also apply it in switch debouncer circuit, explain the operations using suitable waveforms. **(08 Marks)**

b. Explain the working of Master-Slave JK flip-flop with the help of logic diagram, function table, logic symbol and timing diagram. **(08 Marks)**

6 a. With a neat logic diagram, explain the working of positive edge triggered D-flip-flop, also draw the timing diagram. **(08 Marks)**

b. Obtain the characteristics equations of JK flip-flop, SR flip-flop and T flip-flop. **(08 Marks)**

7 a. Describe the working principle of universal shift register with the help of logic diagram and mode control table. **(08 Marks)**

b. Illustrate the operation of 4-bit binary ripple counter using logic diagram and timing diagram. **(08 Marks)**

8 a. Explain the working of 4-bit Johnson counter using positive edge triggered D flip-flop, also draw the timing diagram. What is the modulus of this counter? **(08 Marks)**

b. Design a Mod-6 synchronous counter using JK flip-flop. **(08 Marks)**

9 a. Explain Mealy and Moore model of clocked synchronous sequential circuit with the block diagram. **(08 Marks)**

b. Design a cyclic mod – 8 synchronous binary counter using JK flip – flop. Give state diagram, transition table and excitation table. **(08 Marks)**

10 a. Construct a Mealy state diagram that will detect input sequence 10110, when input pattern is detected Z is asserted high. Write the state diagram. **(08 Marks)**

b. Analyze the following sequential circuit shown in Fig Q10(b) and obtain

i) Flip – Flop input and output equation
ii) Transition equation (ch.equ)
iii) Transition table
iv) State table
v) Draw state diagram.

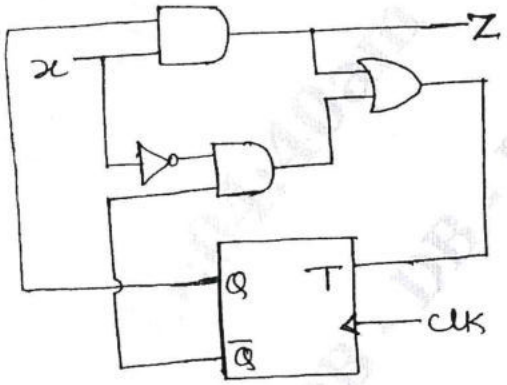

Fig Q10(b) **(08 Marks)**

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15EC34

Third Semester B.E. Degree Examination, July/August 2021
Network Analysis

Time: 3 hrs. Max. Marks:80

Note: ***Answer any FIVE full questions.***

1 a. Calculate the voltage 'V' across 20Ω resistor for the circuit shown in Fig.Q1(a) using source transformation.

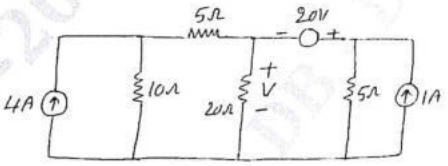

Fig.Q1(a) **(08 Marks)**

b. Find the value of a single resistor to replace the network between terminals A and B of the network shown in Fig.Q1(b) using star-delta transformation.

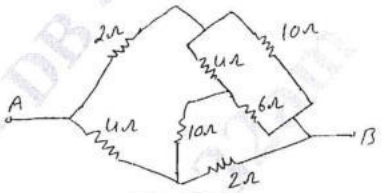

Fig.Q1(b) **(08 Marks)**

2 a. Determine the nodal voltages V_1, V_2, V_3 for the networks shown in Fig.Q2(a).

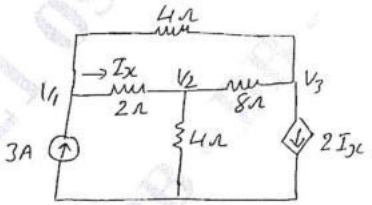

Fig.Q2(a) **(08 Marks)**

b. In the circuit shown in Fig.Q2(b), determine V_2, which results zero current through 4Ω resistor using Mesh analysis.

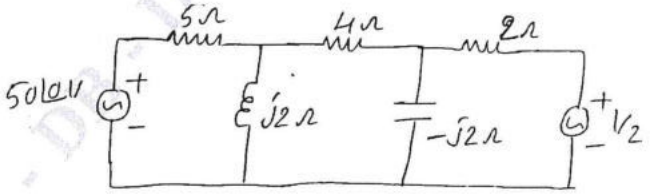

Fig.Q2(b) **(08 Marks)**

3 a. Using Millman's theorem find the current through $(2 + j3)\Omega$ impedance for the circuit shown in Fig.Q3(a).

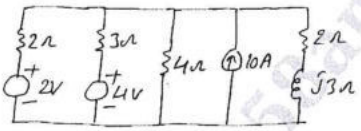

Fig.Q3(a) **(07 Marks)**

b. In the network shown in Fig.Q3(b), determine current in 5Ω resistor and then verify reciprocity theorem.

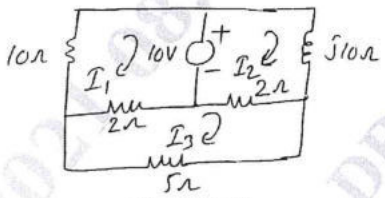

Fig.Q3(b) **(09 Marks)**

4 a. Find the current following through 7.5Ω resistor using superposition theorem in the networks shown in Fig.Q4(a).

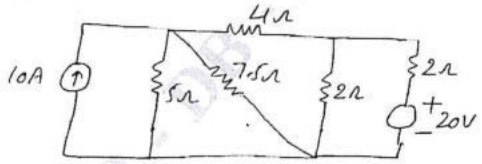

Fig.Q4(a) **(08 Marks)**

b. State Norton's theorem and find the current flowing through $Z_L = 10 - j7.5$ connected across AB in the circuit shown in Fig.Q4(b) using North's theorem.

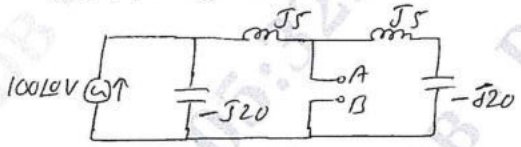

Fig.Q4(b) **(08 Marks)**

5 a. In the circuit shown in Fig.Q5(a) switch 'K' is changed from position 1 to 2 at t = 0. Steady state condition having reached before switching. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$.

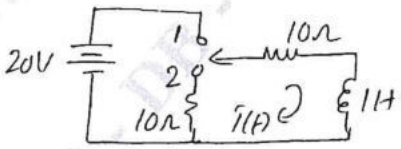

Fig.Q5(a) **(08 Marks)**

b. For the circuit given in Fig.Q5(b) steady state is reached with switch 'K' open and at t = 0 switch is closed. Find the values of $i_1, i_2, \frac{di_1}{dt}$ and $\frac{di_2}{dt^2}$ at $t = 0^+$.

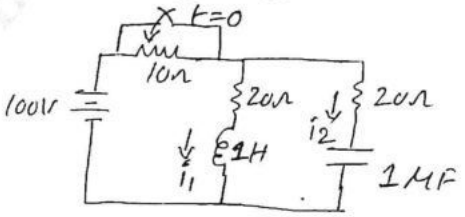

Fig.Q5(b) **(08 Marks)**

6 a. For the circuit shown in Fig.Q6(a) obtain the equation for $i_1(t)$ and $i_2(t)$ when the switch is closed at t = 0. Use Laplace transforms.

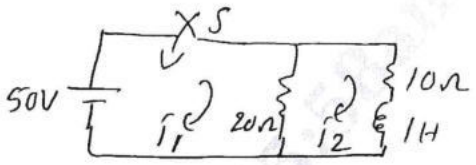

Fig.Q6(a) **(08 Marks)**

b. Obtain the Laplace transform of the function shown in Fig.Q6(b).

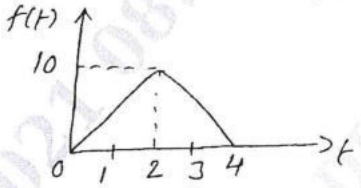

Fig.Q6(b) **(08 Marks)**

7 a. Define the following terms : i) Resonance ii) Q – Factor
iii) Selectivity of series RLC circuit iv) Band width. **(08 Marks)**

b. A series RLC circuit consists of a 50Ω resistance, 0.2H inductance and 10μF capacitor with an applied voltage of 20V. Determine the resonant frequencies. Find the Q – factor of the circuit. Compute the lower and upper frequencies limit and also the Band width of the circuit. **(08 Marks)**

8 a. For the circuit shown in Fig.Q8(a). Find the two values of capacitor for the resonance. Derive the formula used consider f = 50Hz.

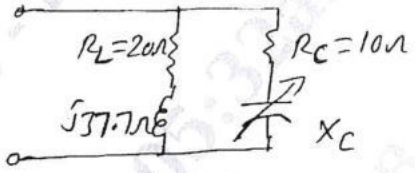

Fig.Q8(a) **(08 Marks)**

b. Determine the value of RC in the network shown in Fig.Q8(b).

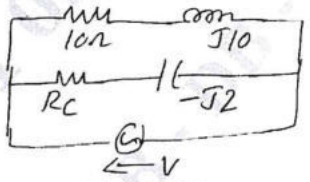

Fig.Q8(b) **(08 Marks)**

9 a. Derive the Y-parameters in terms Z – parameters. **(08 Marks)**

b. Determine the admittance parameters of the 'T' networks shown in Fig.Q9(b).

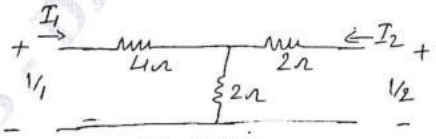

Fig.Q9(b) **(08 Marks)**

10 a. Obtain the expression of Z-parameters in terms of transmission parameters. **(08 Marks)**

b. Determine T – parameters interms of Z – parameters and hence show that AD – BC = 1. **(08 Marks)**

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CBCS SCHEME

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15EC35

Third Semester B.E. Degree Examination, July/August 2021
Electronic Instrumentation

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions.

1 a. Define the following terms with respect to electronic instrument:
(i) Significant figure (ii) Accuracy (iii) Absolute error **(06 Marks)**

b. The output voltage from a precision 12V power supply, monitored at intervals over a period of time produced. The following readings:
$V_1 = 12.001V$, $V_2 = 11.999V$, $V_3 = 11.998V$, $V_4 = 12.003V$, $V_5 = 12.002V$, $V_6 = 11.997V$, $V_7 = 12.002V$, $V_8 = 12.003V$, $V_9 = 11.998V$ and $V_{10} = 11.997V$. Calculate:
(i) The average voltage level
(ii) Mean deviation
(iii) Standard deviation **(06 Marks)**

c. With neat diagram, explain the working of universal shunt. **(04 Marks)**

2 a. With relevant diagram, convert a basic meter can be used as DC ammeter. **(04 Marks)**

b. A Permanent Magnet Moving Coil instrument (PMMC) with Full Scale Deflection (FDS) of 100 μA and coil resistance of 1 KΩ is to be connected into a voltmeter. Determine the required multiplier resistance if the voltmeter is to be measure 50 V at full scale. Also calculate the applied voltage when the instrument indicates 0.8, 0.5 and 0.2 of FSD. **(04 Marks)**

c. Explain the principle and operation of a true rms voltmeter using thermocouple. **(08 Marks)**

3 a. Mention any four general specifications of DVM. **(04 Marks)**

b. With neat diagram, explain the working of capacitance meter. **(06 Marks)**

c. With neat diagram, explain the working of frequency meter using gate control flipflop. **(06 Marks)**

4 a. Explain the working of successive approximation type digital voltmeter. Draw the table of comparison with $V_{in} = 1V$ and $V_{out} = 5V$. Using 8 bit DAC. **(08 Marks)**

b. Explain the working of dual slope integrating type DVM for voltage to frequency conversion. **(05 Marks)**

c. A 3½ digit voltmeter is used for measuring voltage; find:
(i) The resolution of the instrument.
(ii) How would be a reading 15.53 be displayed on 100V range? **(03 Marks)**

5 a. Explain any two features of CRT. **(04 Marks)**

b. With neat diagram, explain the working oscilloscope. **(08 Marks)**

c. In the CRO, the horizontal signal has frequency of f_h and the vertical signal has a frequency of f_v. Draw the Lissajous figures for :
(i) $f_v = f_h$ (ii) $f_v = 2f_h$ (iii) $f_v = 0.5f_h$ (iv) $f_v = 0.25\ f_h$ **(04 Marks)**

6 a. With neat diagram, explain standard signal generator. Mention the advantages, disadvantages and applications of it. **(06 Marks)**

b. With neat diagram, explain digital storage oscilloscope. **(06 Marks)**

c. Explain sweep or time base generator circuit for a continuous sweep CRO. **(04 Marks)**

7 a. Define Q factor. Explain the working of Q-meter. **(08 Marks)**

b. Draw a circuit diagram of Wheatstone's bridge and derive an expression for unknown element at balance. **(08 Marks)**

8 a. Find the equivalent parallel resistance and capacitance that causes the Wein bridge to null with the following component values:
$R_1 = 3.1\ K\Omega$, $C_1 = 5.2\ \mu F$, $R_2 = 25\ K\Omega$, $f = 2.5$ kHz and $R_4 = 100\ K\Omega$. **(04 Marks)**

b. Explain the working of a measuring instrument phase sensitive detector with neat diagram. **(06 Marks)**

c. Explain the working of Wein's bridge for the measurement of frequency. **(06 Marks)**

9 a. What are thermistors? Explain brush type thermistor with neat diagram. Mention the advantages and disadvantages of it. **(08 Marks)**

b. Explain the construction and working of LVDT with neat diagram. Mention the advantages and disadvantages of it. **(08 Marks)**

10 a. Explain the following strain gauges:
(i) Bonded resistance wire strain gauges
(ii) Semiconductor strain gauge **(10 Marks)**

b. A resistance strain gauge with a gauge factor of 2 is cemented to a steel member which is applied to a strain of 1×10^{-6}. If the original resistance value of gauge is 130 Ω. Calculate the change in resistance. **(06 Marks)**

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15EC36

Third Semester B.E. Degree Examination, July/August 2021
Engineering Electromagnetics

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions.*

1 a. State and explain Coulomb's law of force between two point charges and mention the units of quantities in the force equation. **(06 Marks)**

b. Three equal charges of 1 μC each are located at the three corners of a square of 10 cm side. Find the electric field intensity at the forth vaccent point of the square. **(10 Marks)**

2 a. A line charge $\rho_L = 50\,nC/m$ is located along the line x = 2, y = 5 in free space. Find $\vec{E}$ at P(1, 3, -4). **(06 Marks)**

b. Derive the expression of electric field intensity due to infinite line charge. **(10 Marks)**

3 a. State and prove the Gauss's law. **(10 Marks)**

b. Given the flux density $\vec{D} = \frac{5\sin\theta.\cos\phi}{r}\hat{a}_r\ C/m^2$. Find (i) Volume charge density

(ii) Total flux leaving the surface of spherical volume of radius 2 m. **(06 Marks)**

4 a. State and derive the expression of law of continuity of current. **(07 Marks)**

b. An electric potential is given by,

$V = \frac{60\sin\theta}{r^2}$ volt. Find V and E at point P(3, 60°, 25°). **(06 Marks)**

c. Express $\vec{\nabla}.\vec{D}$ in three coordinate systems. **(03 Marks)**

5 a. Starting from Gauss's law in integral form, derive Laplace's and Poisson's equations. Write the Laplace equation in all the coordinate systems. **(06 Marks)**

b. Determine whether or not the following vectors represent a possible electric field:

$\vec{E} = (12yx^2 - 6z^2x)\hat{a}_x + (4x^3 + 18zy^2)\hat{a}_y + (6y^3 - 6zx^2)\hat{a}_z$ **(03 Marks)**

c. State and prove uniqueness theorem. **(07 Marks)**

6 a. State Biot-Savart law. Obtain an expression for magnetic field intensity for current element. **(08 Marks)**

b. Explain the concept of scalar and vector magnetic potential and show that

$\vec{A} = \frac{\mu_0}{4\pi}\int\frac{\vec{J}}{r}dV$. where $\vec{A}$ = Vector magnetic potential and J = current density **(08 Marks)**

7 a. Write short notes on force between two differential current elements. **(08 Marks)**

b. A point charge $\theta = -60\,nC$, is moving with a velocity $6\times10^6\,m/s$ in the direction specified by unit vector $(-0.48\hat{a}_x - 0.6\hat{a}_y + 0.64\hat{a}_z)$. Find the magnitude of the force on a moving charge in the magnetic field

$\vec{B} = (2\hat{a}_x - 6\hat{a}_y + 5\hat{a}_z)\,mT.$ **(08 Marks)**

8 a. Derive the expression for the boundary condition for the tangential component at the interface between two media with different permeabilities. **(06 Marks)**

b. If $\vec{B} = 0.5x\hat{a}_y T$ in a material for which $\chi_m = 2.5$ find,

(i) μ_r (ii) μ (iii) $\vec{H}$ (iv) $\vec{M}$ (v) $\vec{J}$. **(10 Marks)**

9 a. Write Maxwell equations in points form and integral form. **(06 Marks)**

b. State and prove Faraday's law. **(05 Marks)**

c. Given $\vec{H} = H_m e^{j(\omega t + \beta z)}\hat{a}_x$ A/m in free space. Find $\vec{E}$. **(05 Marks)**

10 a. Derive the expression for Poynting's theorem. **(10 Marks)**

b. Write the short notes on skin effect. **(06 Marks)**

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17EC33

Third Semester B.E. Degree Examination, July/August 2021
Analog Electronics

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions.***

1 a. Mention the steps involved for obtaining the AC equivalent of a transistor network. **(04 Marks)**

b. Derive an expressions for input impedance, output impedance and voltage gain for CE fixed bias configuration using re equivalent model. **(08 Marks)**

c. Define hybrid parameters and explain hybrid π model with neat sketch. **(08 Marks)**

2 a. Draw the circuit diagrams, for transistor r_e model in common Emitter and common base configuration. **(04 Marks)**

b. Derive expressions for Z_i, Z_0, A_V and A_i for emitter follower configuration using approximate hybrid equivalent model. **(08 Marks)**

c. For the network shown in Fig.Q2(c), without C_E(unbypassed), determine r_e, Z_i, Z_0 and A_v.

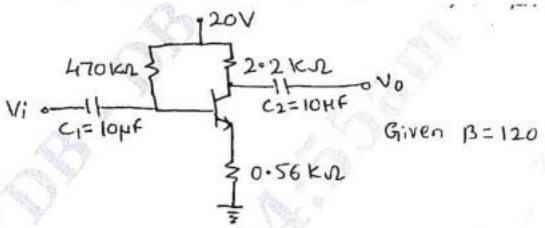

Fig.Q2(c) **(08 Marks)**

3 a. Mention the differences between JFET and MOSFET. **(04 Marks)**

b. Explain with neat sketches operation and characteristics of n-channel enhancement MOSFET. **(08 Marks)**

c. Find r_d, Z_i, Z_0, and A_V for the circuit shown in Fig.Q3(c).

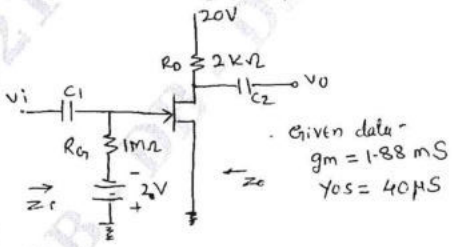

Fig.Q3(c) **(08 Marks)**

4 a. Sketch the following circuit diagrams :
i) JFET AC equivalent model of source follower ii) Cascaded FET amplifier. **(04 Marks)**

b. Derive an expressions for Z_i, Z_0, and A_V using small signal JFET amplifier for self bias configuration (Bypassed Rs). **(08 Marks)**

c. For the source follower network shown in Fig.Q4(c), determine : i) r_d ii) Z_i iii) Z_0 iv) A_V.

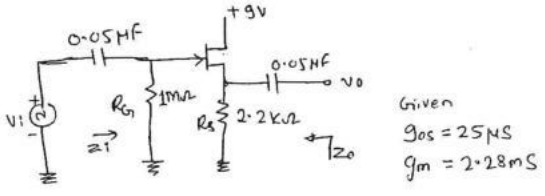

Fig.Q4(c) **(08 Marks)**

5 a. An amplifier rated at a 40W output is connected to a 10 Ω speaker find :
i) Input power required for full output if power gain is 25dB
ii) Input voltage for rated output if the amplifier voltage gain is 40dB. **(06 Marks)**

b. Explain high frequency response of JEFT amplifiers. **(08 Marks)**

c. Explain multistage frequency effects. **(06 Marks)**

6 a. Derive an expressions for Miller input and output capacitors. **(06 Marks)**

b. Determine r_e, A_V and R_i for the low frequency response of BJT amplifier circuit shown in Fig.Q6(b). Assume $r_0 = \infty$.

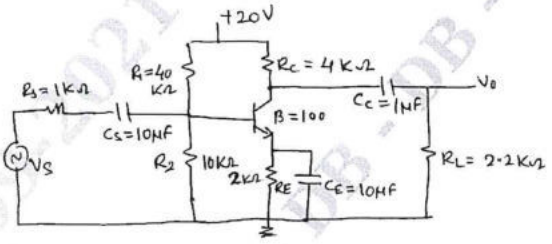

Fig.Q6(b) **(08 Marks)**

c. Draw the circuit diagram of :
i) High frequency response of BJT amplifier in CE mode with capacitances effects
ii) Low frequency response of FET amplifier in common source mode with capacitive elements effects. **(06 Marks)**

7 a. List the conditions for sustained oscillations. **(04 Marks)**

b. Explain with neat circuit diagram, series resonant crystal oscillator using BJT. **(08 Marks)**

c. Design the RC elements of a Wein bridge oscillator for the operation at f = 10KHz and draw the oscillator circuit using op-Amp. **(08 Marks)**

8 a. Explain effect of negative feedback on gain and Bandwidth. **(05 Marks)**

b. Explain with neat circuit diagram, the operation of BJT Colpitt oscillator and mention its advantages over Hartely oscillator. **(08 Marks)**

c. Explain UJT relaxation oscillator with necessary equations and waveforms. **(07 Marks)**

9 a. Classify the power amplifiers and define them with necessary waveforms and 'Q' point. **(06 Marks)**

b. Explain series transistor voltage regulator with neat diagram. **(06 Marks)**

c. Calculate input power, output power and efficiency of the series fed class A power amplifier circuit shown in Fig.Q9(c).

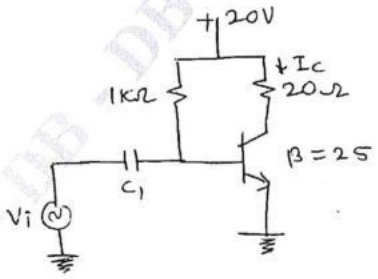

Fig.Q9(c) **(08 Marks)**

10 a. Define : i) Cross over distortion ii) percentage voltage regulation iii) amplifier efficiency iv) harmonic distortion v) voltage regulator. **(10 Marks)**

b. Explain transformer coupled class A power amplifier with necessary equations. **(06 Marks)**

c. For class 'B' amplifier using a supply of V_{CC} = 30V and driving a load of 16Ω, determine maximum input power and output power. **(04 Marks)**

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CBCS SCHEME

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17EC34

Third Semester B.E. Degree Examination, July/August 2021
Digital Electronics

Time: 3 hrs. Max. Marks: 100

Note: *Answer any FIVE full questions.*

1 a. Define the following with an example: (i) Sum of products (ii) Product of sums (iii) Canonical sum of products (iv) Canonical product of sums (v) Minterm. **(10 Marks)**

b. Obtain the minimal logical expression for the given minterm using K-map.

$T = f(a,b,c,d,e) = \sum(0,2,8,10,16,18,24,26)$ **(05 Marks)**

c. Simplify the following maxterm expression using K-map:

$A = f(w, x, y, z) = \pi(2, 3, 8, 9, 10, 11, 12, 13, 14, 15)$ **(05 Marks)**

2 a. Simplify the following using Quine-McClusky minimization technique and also verify the same.

$D = f(a,b,c,d) = \sum(0,1,2,3,6,7,8,9,14,15)$ **(10 Marks)**

b. Express the following SOP equations in the form of minterms:

(i) $G = f(A,B,C) = A'BC + A'B'C + ABC$

(ii) $P = f(w, x, y, z) = wxyz' + wx'yz' + w'xyz' + w'x'yz'$ **(04 Marks)**

c. Place the following equations into proper canonical form:

(i) $P = f(a,b,c) = ab' + ac' + bc$

(ii) $T = f(a,b,c) = (a + b')(b' + c)$ **(06 Marks)**

3 a. Define : (i) Subtractors (ii) Binary comparators (iii) Full Adder **(06 Marks)**

b. Realize the following using 745151 8 : 1 MUX :

(i) $F = f(x,y,z) = \sum(1,2,4,5,7)$

(ii) $T = f(w,x,y,z) = \sum(0,1,2,4,5,7,8,9,12,13)$ **(06 Marks)**

c. Write the truth table of two-bit magnitude comparator. Write the K-map for each. Output of two-bit magnitude comparator and the resulting equation. **(08 Marks)**

4 a. Design a 4-to-16 Decoder using two 74XX138 decoders. **(05 Marks)**

b. With a neat diagram, explain carry look ahead adder. **(10 Marks)**

c. Distinguish between decoder and encoder. Implement full adder using IC74153. **(05 Marks)**

5 a. Explain Master Slave JK flip-flop with the help of timing diagram and waveforms. **(08 Marks)**

b. Find the characteristic equation of T and SR flip-flops with the help of functional tables. **(06 Marks)**

c. With a neat diagram, explain positive edge triggered D-flip flop and explain for different input conditions. **(06 Marks)**

6 a. Explain the operation of switch debouncer built using SR latch with the help of waveforms. **(04 Marks)**

b. What is a flip-flop? Discuss the working principle of Master Slave SR f/f with the help of timing diagram and truth table. **(08 Marks)**

c. Define : (i) Propagation delay (ii) Minimum pulse width (iii) Setup time and (iv) Hold time **(08 Marks)**

7 a. Design a mod-6 synchronous counter using clocked D flip flop. **(08 Marks)**

b. Explain SIPO and SISO using flip flop. **(06 Marks)**

c. Design synchronous mod-6 counter using clocked JK flip flops. **(06 Marks)**

8 a. Explain mod-8 and mod-7 twisted ring counter with a neat diagram and counting sequence. **(08 Marks)**

b. Explain 4-bit binary ripple counter with logic diagram, timing diagram and counting sequence. **(08 Marks)**

c. Explain mod-4 ring counter with logic diagram and counting sequence. **(04 Marks)**

9 a. Explain Kealy and Moore sequential circuit model with neat diagrams. **(06 Marks)**

b. Define : (i) Input variable (ii) Output variable (iii) State variable and (iv) State. **(04 Marks)**

c. Give Mealy state notation, Moore circuit notation and Mealy and Moore mixed circuit diagram notation for JK flip flop. **(10 Marks)**

10 a. Give the steps for analyzing the function of a sequential circuit. **(04 Marks)**

b. Explain JK flip flop characteristic table excitation table with K-maps for excitation variables. **(10 Marks)**

c. Explain the excitation realization for T and D-flip-flops. **(06 Marks)**

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CBCS SCHEME

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17EC35

Third Semester B.E. Degree Examination, July/August 2021
Network Analysis

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Using source transformation techniques, find 'v' for the circuit in Fig.Q1(a).

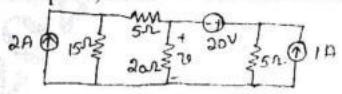

Fig.Q1(a) **(07 Marks)**

b. Obtain equivalent resistance R_{ab} for the circuit in Fig.Q1(b) and hence find 'i'.

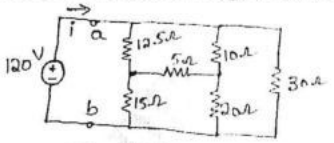

Fig.Q1(b) **(07 Marks)**

c. Explain ideal and practical current sources. **(06 Marks)**

2 a. Determine the current I_0 in the circuit of Fig.Q2(a) using Mesh analysis.

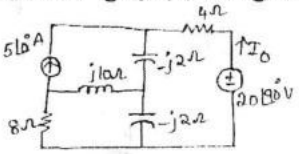

Fig.Q2(a) **(08 Marks)**

b. Use nodal analysis to find v_0 in the network of Fig.Q2(b).

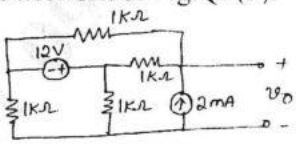

Fig.Q2(b) **(08 Marks)**

c. Explain the concept of super node with an illustration. **(04 Marks)**

3 a. State and prove Reciprocity theorem. **(06 Marks)**

b. Use superposition theorem to find i_0 in the circuit shown in Fig.Q3(b).

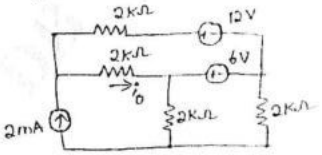

Fig.Q3(b) **(06 Marks)**

c. Find Thevenin's equivalent circuit across the terminals a – b for the circuit shown in Fig.Q3(c). **(08 Marks)**

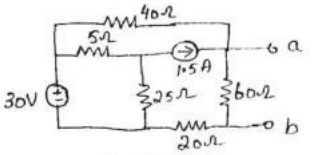

Fig.Q3(c)

4 a. State and prove maximum power transfer theorem for the case of AC source, hence show that $P_{max} = \frac{|V_{TH}|^2}{8R_L}$ **(08 Marks)**

b. Find the current through 16 Ω resistor using Norton's theorem in Fig.Q4(b).

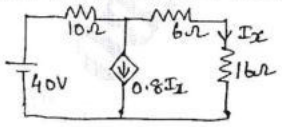

Fig.Q4(b) **(08 Marks)**

c. Find the current through (10 – 3j)Ω using Millman's theorem in Fig.Q4(c). **(04 Marks)**

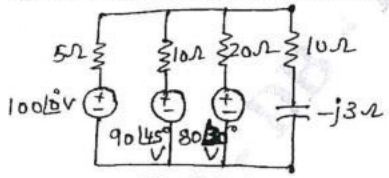

Fig.Q4(c)

5 a. The switch 'K' is changed from position 1 to position 2 at t = 0. Steady state condition having been reached at position 1. Find the values of i, $\frac{di}{dt}$ and $\frac{d^2i}{dt^2}$ at $t = 0^+$. [Refer Fig.Q5(a)] **(06 Marks)**

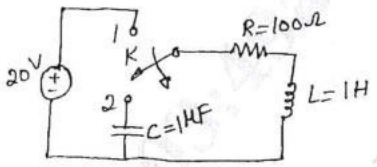

Fig.Q5(a)

b. In the network shown in Fig.Q5(b), $V_1(t) = e^{-t}$ for $t \geq 0$ and is zero for all $t < 0$. If the capacitor is initially uncharged. Determine the value of $\frac{d^2v_2}{dt^2}$ and $\frac{d^3v_2}{dt^3}$ at $t = 0^+$.

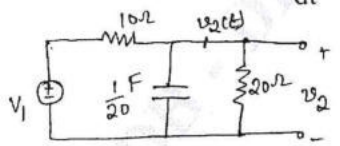

Fig.Q5(b) **(08 Marks)**

c. Explain initial and final conditions in case of a capacitor. **(06 Marks)**

6 a. For the circuit shown in Fig.Q6(a),
(i) Find the differential equation for $i_L(t)$
(ii) Find Laplace transform of $i_L(t)$
(iii) Solve for $i_L(t)$

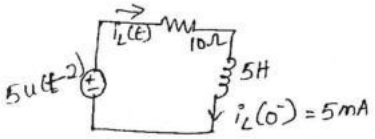

Fig.Q6(a) **(08 Marks)**

b. For the circuit shown in Fig.Q6(b), (i) Find the differential equation for $i_L(t)$. (ii) Find Laplace transform of $i_c(t)$, (iii) Solve for $i_L(t)$. **(08 Marks)**

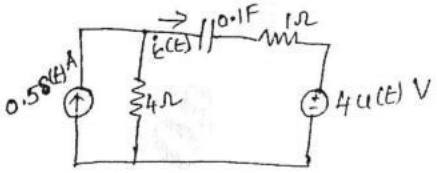

Fig.Q6(b)

c. Obtain Laplace transform for a decaying exponential signal. **(04 Marks)**

7 a. Prove that the resonant frequency is the geometric mean of the two half power frequencies i.e., Show that $\omega_0 = \sqrt{\omega_1 \omega_2}$ **(08 Marks)**

b. Obtain an expression for quality factor of an capacitor. **(07 Marks)**

c. In a series circuit, R = 6 Ω, $\omega_0 = 4.1 \times 10^6$ rad/sec, bandwidth = 10^5 rad/sec. Compute L, C half power frequencies and Q. **(05 Marks)**

8 a. Obtain an expression for the resonant frequency in a parallel resonant circuit. **(08 Marks)**

b. Show that a two branch parallel resonant circuit is resonant at all frequencies when

$$R_L = R_C = \sqrt{\frac{L}{C}}$$ **(07 Marks)**

c. Find the value of R_L for which the circuit is at resonance, as shown in Fig.Q8(c). **(05 Marks)**

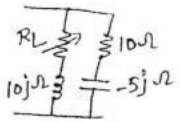

Fig.Q8(c)

9 a. Obtain an expression for h-parameters in terms of Z-parameters. **(08 Marks)**

b. Find Z and Y parameters for the network shown in Fig.Q9(b). **(08 Marks)**

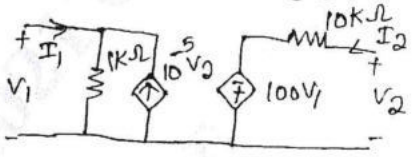

Fig.Q9(b)

c. Explain ABCD parameters. **(04 Marks)**

10 a. Obtain an expression for Y-parameters in terms of ABCD parameters. **(08 Marks)**

b. Find ABCD parameters for the network shown in Fig.Q10(b).

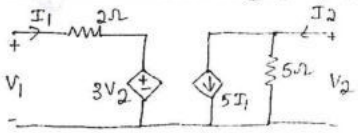

Fig.Q10(b) **(08 Marks)**

c. State reciprocity condition for
(i) Z – parameters
(ii) Y – parameters
(iii) h – parameters
(iv) ABCD – parameters **(04 Marks)**

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CBCS SCHEME

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17EC36

Third Semester B.E. Degree Examination, July/August 2021
Engineering Electromagnetics

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. State and explain Coulomb's law in vector form. **(06 Marks)**

b. Point charge $Q_1 = 300\ \mu c$ located at (1, −1, 3) experiences a force $F = 8a_x - 8a_y - 4a_z$ N due to charge Q_2 at (3, −3, 2). Find Q_2. **(06 Marks)**

c. Find the total charge within the volume indicated:

i) $\rho_v = 10z^2e^{-0.1x}\sin\pi y, \quad 1 \le x \le 2; \quad 0 \le y \le 1; \quad 3 \le z \le 3.6$

ii) $\rho_v = 4xyz^2, \quad 0 \le \rho \le 2; \quad 0 \le \phi \le \frac{\pi}{2}; \quad 0 \le z \le 3$ **(08 Marks)**

2 a. Derive the expression for electric field intensity 'E' at any point due to uniform line charge of density ρ_ℓ c/m. **(07 Marks)**

b. Two uniform surface charge densities of density ρ_s c/m^2 are located at x = ±4m. Determine the electric field at all the points. **(06 Marks)**

c. Given $D = 5x^2a_x + 10za_z$ c/m^2, find the net outward flux for the surface of a cube of 2m on an edge centered at origin. The edges of the cube are parallel to coordinate axes. **(07 Marks)**

3 a. State and prove Gauss law in integral form. **(06 Marks)**

b. Find the numerical value of Divergence of D at the point indicated if:

(i) $D = 20xy^2(z+1)a_x + 20x^2y(z+1)a_y + 10x^2y^2a_z$ c/m^2 at $P_A(0.3, 0.4, 0.5)$

(ii) $D = 4\rho z\sin\phi a_\rho + 2\rho z\cos\phi a_\phi + 2\rho^2\sin\phi a_z$ c/m^2 at $P_B\left(1, \frac{\pi}{2}, 2\right)$ **(06 Marks)**

c. Given $D = \left(\frac{5r^2}{4}a_r\right)$ c/m^2 in spherical coordinates evaluate both sides of divergence theorem for the volume enclosed between r = 1 m and r = 2 m. **(08 Marks)**

4 a. Define scalar electric potential. Derive the expression for potential due to a point charge. **(06 Marks)**

b. Find the work done in moving a 5 μc point charge from origin to p(2, −1, 4) through the field $E = 2xyza_x + x^2za_y + x^2ya_z$ V/m via the path:

(i) Straight line segments (0, 0, 0) to (2, 0, 0) to (2, −1, 0) to (2, −1, 4)

(ii) Straight line x = −2y; z = 2x **(08 Marks)**

c. Given $V = 50x^2yz + 20y^2$ v in free space,

(i) Find voltage at P(1, 2, −3)

(ii) Field strength E at P. **(06 Marks)**

5 a. Using Laplace equation derive the expression for capacitance of a co-axial cylindrical capacitor. The boundary conditions are $V = V_0$ at $\rho = a$ and $V = 0$ at $\rho = b$, $b > a$. **(10 Marks)**

b. In spherical coordinates V = 865 V at r = 50 cm and E = 748.2 a_r V/m at r = 85 cm. Determine the location of voltage reference if the potential depends only on 'r'. **(10 Marks)**

6 a. State and explain Biot-Savart's law. **(05 Marks)**

b. Find 'H' at origin due to an infinite conductor carrying a current of 5A in a_y direction and located at x = 2 and z = –2. **(07 Marks)**

c. Given $H = \frac{x+2y}{z^2}a_y + \frac{2}{z}a_z$ A/m, find J. Find total current passing through z = 4; $1 \le x \le 2$; $3 \le y \le 5$. **(08 Marks)**

7 a. The point charge Q = 18 nc has a velocity of 5×10^6 m/s in the direction $a_v = 0.60a_x + 0.75a_y + 0.30a_z$. Calculate the magnitude of force exerted on the charge by:

(i) $B = -3a_x + 4a_y + 6a_z$ mT (ii) $E = -3a_x + 4a_y + 6a_z$ KV/m **(06 Marks)**

b. Derive the expression for the force on a differential current element moving through a steady magnetic field. **(08 Marks)**

c. The field $B = -2a_x + 3a_y + 4a_z$ mT is present in free space. Find vector force exerted on a straight wire carrying 12 A in a_{AB} direction, given A(1, 1, 1) and (i) B(2, 1, 1) (ii) B(3, 5, 6). **(06 Marks)**

8 a. Define Magnetization. Given a ferrite material which is operating in a linear mode with B = 0.05 T and $\mu_r = 50$. Calculate χ_m, M and H. **(06 Marks)**

b. Derive the boundary conditions for magnetic fields B, H and M for the interface between the different magnetic media. **(07 Marks)**

c. Let $\mu_1 = 4$ μH/m in region 1 where z > 0 while $\mu_2 = 7$ μH/m in region 2 where z < 0, K = 80 a_x A/m on the surface z = 0. If $B_1 = 2a_x - 3a_y + a_z$ mT in region 1, find B_2. **(07 Marks)**

9 a. An area of 0.65 m^2 in z = 0 plane is enclosed by a filamentary conductor. Find the induced voltage given $B = 0.05\cos 10^3 t\left[\frac{a_y + a_z}{\sqrt{2}}\right]$T. **(06 Marks)**

b. What is inconsistency of Ampere's law with continuity equation? How it was modified by Maxwell? Derive the modified equation. **(06 Marks)**

c. Given $E = E_m \sin(\omega t - \beta z)a_y$ V/m in free space, find D, B, H. Sketch E and H at t = 0. **(08 Marks)**

10 a. Prove that the intrinsic impedance of a perfect dielectric $\eta = \frac{|E|}{|H|} = \sqrt{\frac{\mu}{\epsilon}}$ **(06 Marks)**

b. Derive expressions for attenuation constant 'α' and phase constant 'β' for any conducting media. **(06 Marks)**

c. Calculate attenuation constant, wave velocity and intrinsic impedance in sea water for a uniform plane wave at 10 GHz. The constants are $E_r = 80$, $\mu_r = 1$, $\sigma = 4$ Mho s/m. **(08 Marks)**

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18EC32

Third Semester B.E. Degree Examination, July/August 2021
Network Theory

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Find the equivalent resistance Rab for circuit in Fig. Q1 (a) and use it to find i. **(06 Marks)**

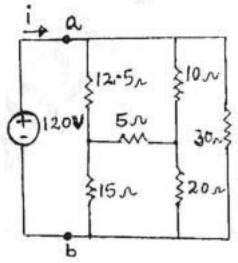

Fig. Q1 (a)

b. Determine power supplied by the dependent source of Fig. Q1 (b), using nodal analysis. **(06 Marks)**

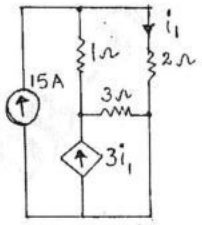

Fig. Q1 (b)

c. Determine current through 2 Ω resistor of Fig. Q1 (c) using mesh analysis. **(08 Marks)**

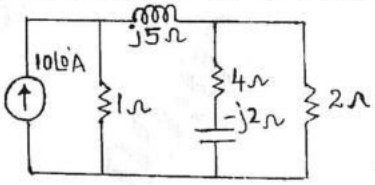

Fig. Q1 (c)

2 a. Using source transformation and source shifting techniques, find voltage across 2 Ω resistor in Fig. Q2 (a). **(06 Marks)**

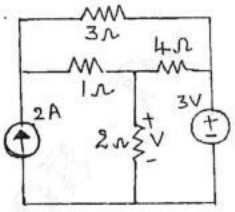

Fig. Q2 (a)

b. Find I_1, I_2, I_3 in the circuit of Fig. Q2 (b) using mesh analysis. **(06 Marks)**

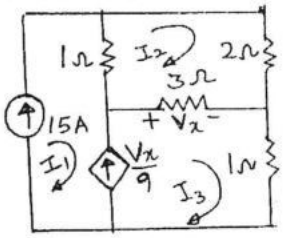

Fig. Q2 (b)

c. Compute V_1, V_2 in the circuit of Fig. Q2 (c) using nodal analysis. **(08 Marks)**

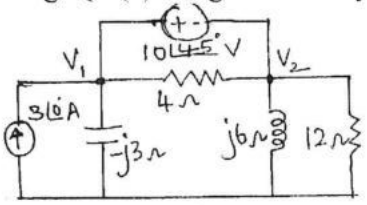

Fig. Q2 (c)

3 a. For the circuit in Fig. Q3 (a), use the superposition theorem to find I. **(06 Marks)**

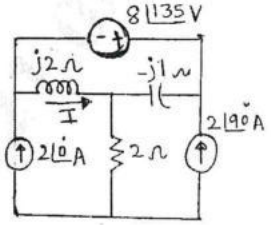

Fig. Q3 (a)

b. Using Norton's theorem, find current through 5 Ω resistor in Fig. Q3 (b). **(06 Marks)**

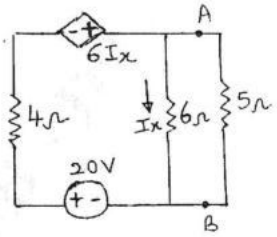

Fig. Q3 (b)

c. State Millman's theorem, using Millman's theorem find I_L in Fig. Q3 (c). **(08 Marks)**

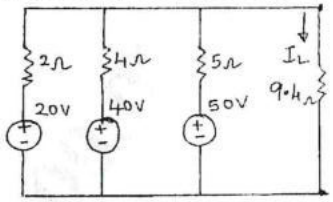

Fig. Q3 (c)

4 a. Determine the Thevenin equivalent at terminals A-B of the circuit in Fig. Q4 (a). **(06 Marks)**

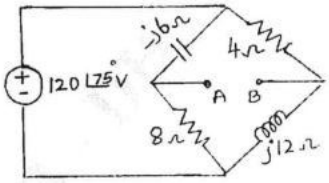

Fig. Q4 (a)

b. Compute the value of R that results in maximum power transfer to it in Fig. Q4 (b). Find the maximum power. **(06 Marks)**

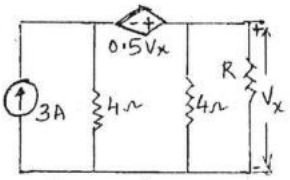

Fig. Q4 (b)

c. State Reciprocity theorem. Find V_x and verify Reciprocity theorem for circuit in Fig. Q4 (c). **(08 Marks)**

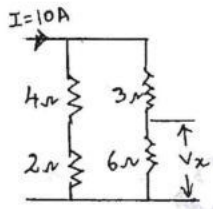

Fig. Q4 (c)

5 a. In the network shown in Fig. Q5 (a), the switch K is opened at t = 0. Solve for the values of V, $\frac{dV}{dt}$ and $\frac{d^2V}{dt^2}$ at $t = 0^+$. **(10 Marks)**

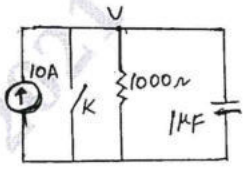

Fig. Q5 (a)

b. In the network shown in Fig. Q5 (b), a steady state is reached with the switch K open. At t = 0 switch K is closed. Solve for the values of I_1, I_2, V_C, $\frac{dI_1}{dt}$, $\frac{dI_2}{dt}$ at $t = 0^+$. **(10 Marks)**

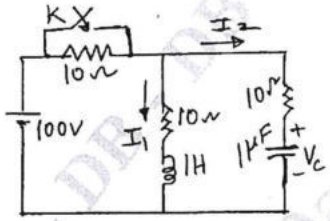

Fig. Q5 (b)

6 a. In the network shown in Fig.6(a), K is changed from position a to b at t = 0. Solve for i, $\frac{di}{dt}$, $\frac{d^2i}{dt^2}$ at $t = 0^+$, The steady state having reached before switching. **(10 Marks)**

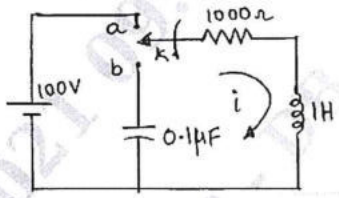

Fig. Q6 (a)

b. In the network of Fig. Q6(b), the switch K is closed at t = 0 with zero capacitor voltage and zero inductor current. Solve for (a) V_1 and V_2 at $t = 0^+$ (b) V_1 and V_2 at $t = \infty$, (c) $\frac{dV_1}{dt}$ and $\frac{dV_2}{dt}$ at $t = 0^+$, (d) $\frac{d^2V_2}{dt^2}$ at $t = 0^+$. **(10 Marks)**

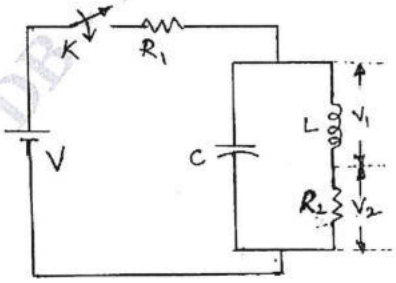

Fig. Q6 (b)

7 a. In the circuit given in the Fig. Q7 (a) switch is closed on position 1 at t = 0 and at t = 500 μs, switch is moved to position 2. Obtain the equation of current in both intervals. Use Laplace transforms. **(10 Marks)**

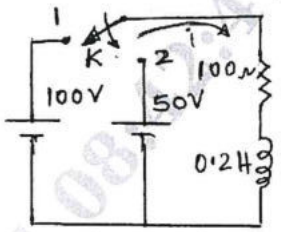

Fig. Q7 (a)

b. Determine the Laplace transform of the periodic sawtooth waveform, as shown in Fig. Q7 (b). **(10 Marks)**

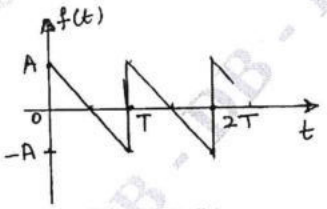

Fig. Q7 (b)

8 a. A voltage pulse, of unit height and width T is applied to the circuit in the Fig. Q8 (a) at t = 0. Determine the voltage across the capacitance C as a function of time. **(10 Marks)**

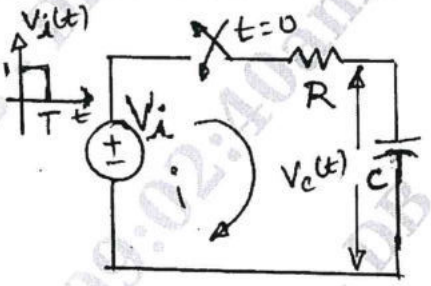

Fig. Q8 (a)

b. Determine the Laplace transform of waveform given in Fig. Q8 (b). **(10 Marks)**

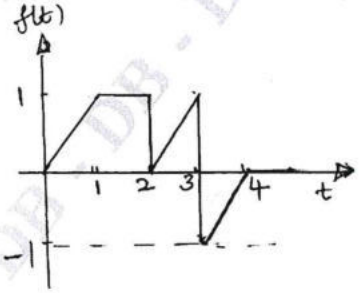

Fig. Q8 (b)

9 a. With respect to series resonant circuit, show that resonant frequency is equal to the geometric mean of two half power frequencies. **(08 Marks)**

b. A series resonant circuit includes 1 μF capacitor, resistance of 16 Ω and an inductance of L henry. If the bandwidth is 500 rad/sec, determine (i) ω_r (ii) Q (iii) L. **(06 Marks)**

c. Find the value of L for which the circuit resonates at a frequency of 1000 rad/sec for the circuit in the Fig. Q9 (c). **(06 Marks)**

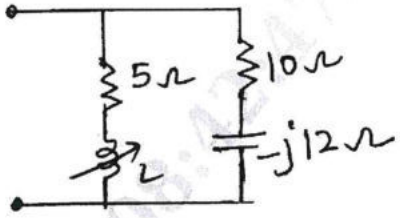

Fig. Q9 (c)

10 a. Derive Z-parameters in terms of hybrid parameters. **(08 Marks)**

b. Determine the Z-parameters of the network shown in Fig. Q10 (b). **(06 Marks)**

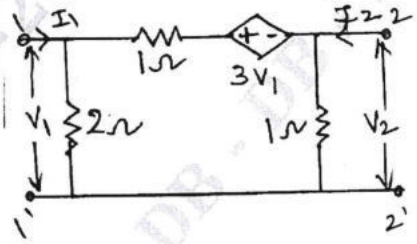

Fig. Q10 (b)

c. For the network shown in Fig. Q10 (c), find the Y parameters. **(06 Marks)**

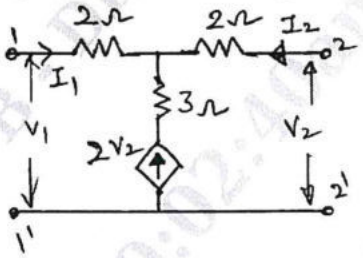

Fig. Q10 (c)

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18EC33

Third Semester B.E. Degree Examination, July/August 2021
Electronic Devices

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1	a.	What are the different types of Bonding Forces in solids and explain any one.	**(06 Marks)**
	b.	Draw the typical band structures at OK for insulator, semiconductor and metal and explain it.	**(06 Marks)**
	c.	With mathematical equations, describe the hall effect.	**(08 Marks)**
2	a.	Explain Electron-hole pair in a semiconductor with the help of the graph.	**(06 Marks)**
	b.	Explain the effects of temperature and doping on mobility.	**(06 Marks)**
	c.	Describe the drift of electrons and holes in a semiconductor bar.	**(08 Marks)**
3	a.	Draw the I-V characteristic of a Pn-junction with current equation under equilibrium, forward and reverse bias and explain it.	**(06 Marks)**
	b.	Explain the concept of Zener breakdown with energy band diagram.	**(06 Marks)**
	c.	Explain the solar cells with structures.	**(08 Marks)**
4	a.	Draw the piece wise linear approximations of junction diode characteristics for ideal diode, ideal diode with offset voltage and ideal diode with offset voltage and resistance.	**(06 Marks)**
	b.	Draw the schematic representation of a P-i-n photodiode and explain it.	**(06 Marks)**
	c.	Explain the Avalanche Breakdown with energy diagram.	**(08 Marks)**
5	a.	Explain the working of P-n-P device and also draw the curve of I_C versus V_{BC}.	**(06 Marks)**
	b.	Describe the various mechanisms of a switching cycle of a PnP transistor.	**(06 Marks)**
	c.	Write the step-by-step fabrication of a BJT with diagrams.	**(08 Marks)**
6	a.	Define the following parameters: i) Emitter injection efficiency ii) Current transfer ratio iii) Base to collector current amplification factor.	**(06 Marks)**
	b.	Draw the simple switching circuit of PnP transistor and explain it.	**(06 Marks)**
	c.	Discuss Base Narrowing in PnP transistor.	**(08 Marks)**
7	a.	Explain the operation of a basic Pn JFET for different gate voltage.	**(10 Marks)**
	b.	Draw the small signal equivalent circuit of JFET and explain it.	**(10 Marks)**
8	a.	Draw the energy band diagram of an two terminal MOS capacitor with a P-type substrate for a negative gate bias and a moderate positive gate bias and explain it.	**(10 Marks)**
	b.	Explain the structure of n-channel enhancement mode and depletion mode MOSFET.	**(10 Marks)**
9	a.	Describe the Rapid thermal processing with the help of diagram.	**(10 Marks)**
	b.	Explain the method of ION implementation with schematic diagram.	**(10 Marks)**
10	a.	What are the types of integrated circuits and explain it.	**(06 Marks)**
	b.	Mention the Advantages of Integration.	**(06 Marks)**
	c.	With input and output waveforms, explain the working of CMOS inverter.	**(08 Marks)**

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18EC34

Third Semester B.E. Degree Examination, July/August 2021
Digital System Design

Time: 3 hrs. Max. Marks: 100

Note: ***Answer any FIVE full questions.***

1 a. Define combinational logic circuit and place the following equation into the proper canonical form:
$P = f(a, b, c) = ab' + ac' + bc$ **(04 Marks)**

b. Obtain minimal expression using k-map for the following incompletely specified function:
$F(a, b, c, d) = \sum m(0, 1, 4, 6, 7, 9, 15) + \sum d(3, 5, 11, 13)$ and draw the circuit diagram using basic gates. **(06 Marks)**

c. Minimize the expression using Quine Mecluskey method.
$Y = \overline{A}\overline{B}\overline{C}\overline{D} + \overline{A}\overline{B}C\overline{D} + A\overline{B}\overline{C}\overline{D} + A\overline{B}C\overline{D} + A\overline{B}\overline{C}D + \overline{A}\overline{B}CD$ **(10 Marks)**

2 a. Place the following equations into the proper canonical form:
i) $G = f(w, x, y, z) = \overline{w}x + y\overline{z}$
ii) $T = f(a, b, c) = (a + \overline{b})(\overline{b} + c)$ **(04 Marks)**

b. Obtain minimal logical expression for the given maxterm expression using K-map $f(a, b, c, d) = \pi M(0, 1, 4, 5, 6, 7, 9, 14) \cdot \pi d(13, 15)$. **(06 Marks)**

c. Obtain all the prime implicants of the following Boolean function using Quine-Meckluskey method
$f(a, b, c, d) = \sum(0, 2, 3, 5, 8, 10, 11)$. Verify the result using K map technique. **(10 Marks)**

3 a. Draw the circuit for 3 to 8 decoder and explain. **(08 Marks)**

b. Implement the following Boolean function using 4:1 multiplexer.
$F[A, B, C, D] = \sum m(0, 1, 2, 4, 6, 9, 12, 14)$. **(06 Marks)**

c. A combinational circuit is defined by the functions $F_1 = \sum m(3, 5, 7)$, $F_2 = \sum m(4, 5, 7)$. Implement the circuit with a programmable logic array having 3 inputs, 3 product terms and two outputs. **(06 Marks)**

4 a. Draw the key pad interfacing diagram to a digital system using 10-line decimal to BCD encoder and explain. **(06 Marks)**

b. Explain Look-Ahead carry adder with neat diagram and relevant expression. **(06 Marks)**

c. Design 2-bit comparator using gates. **(08 Marks)**

5 a. Explain the operation of a switch debouncer using S-R. Latch with the help of circuit and waveforms. **(06 Marks)**

b. Find characteristic equations for S-R and T. Flip flops with the help of function tables and explain. **(06 Marks)**

c. Explain the working principle of 4-bit synchronous binary counts. **(08 Marks)**

6 a. Draw the logic diagram, functional table and timing diagram of master-slave JK flip flop and explain briefly. **(10 Marks)**

b. Explain four bit binary ripple counter with logic and timing diagram. **(10 Marks)**

7 a. Design mod-6 synchronous counter by using JK flip-flop, with excitation table. **(10 Marks)**

b. Draw and explain Mealy and Moore sequential circuit model and compare mealy and Moore circuit models. **(10 Marks)**

8 a. Design a Mod-6 synchronous counter using clocked T Flip-Flop. **(10 Marks)**

b. Construct the transition table, state table and state diagram for the sequential circuit shown in Fig.Q.8(b). **(10 Marks)**

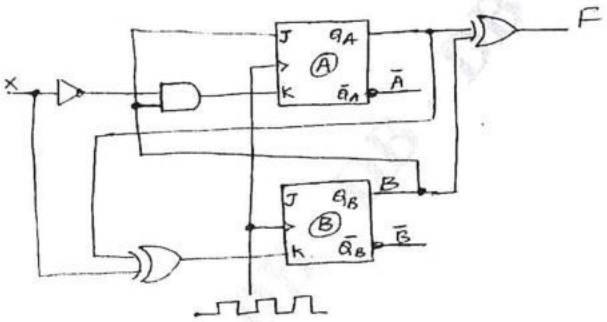

Fig.Q.8(b)

9 a. Design and draw Mealy model of sequential detector circuit to detect the pattern 101. **(10 Marks)**

b. Draw the block diagram of serial adder with accumulator and explain its working operation. **(10 Marks)**

10 a. State the guidelines for construction of state graph. **(06 Marks)**

b. Draw the block diagram of binary multiplier and explain its working principle. **(08 Marks)**

c. Draw and explain the operation of FPGA implementation of a parallel adder with accumulator. **(06 Marks)**

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18EC35

Third Semester B.E. Degree Examination, July/August 2021
Computer Organization and Architecture

Time: 3 hrs. Max. Marks: 100

Note: Answer any FIVE full questions.

1 a. Explain following registers: (i) PC (ii) IR (iii) MAR **(06 Marks)**
b. Explain how user program and OS routine are sharing processor with printer. **(08 Marks)**
c. Explain basic performance equation. **(06 Marks)**

2 a. Perform using 2's complement arithmetic: (i) $-5 + (-2)$ (ii) Subtract -5 from -7 **(06 Marks)**
b. Explain BIG-ENDIAN and LITTLE-ENDIAN assignment. **(06 Marks)**
c. Illustrate instruction execution and straight line sequencing for the program C $\leftarrow$[A] + [B]. [Assume that each instruction is 4 byte]. **(08 Marks)**

3 a. List the generic addressing modes with assembler syntax and addressing function. **(10 Marks)**
b. Explain shift and any two rotate instructions with relevant diagrams. **(10 Marks)**

4 a. Write assembly language program to add 'N' numbers and store the result in 'SUM'. Assume the following address:
(i) Program should start from '100'.
(ii) 'N' is stored at 204
(iii) Numbers are stored in memory from the address 208. Each number is 4 bytes.
(iv) 'SUM' is stored at 200
(v) Assume each instruction is 4 byte **(08 Marks)**
b. Explain stack concept with relevant diagrams. **(08 Marks)**
c. List the steps involved in 'CALL' and 'RETURN' instructions. **(04 Marks)**

5 a. Explain I/O interface for input device and also write the assembly program that reads the one LINE from the keyboard and echoes it back to the display. **(10 Marks)**
b. Explain methods used for enabling and disabling interrupts. **(10 Marks)**

6 a. Explain daisy chain method used for handling simultaneous interrupt request. **(06 Marks)**
b. Explain memory mapped I/O access. **(06 Marks)**
c. Explain use of DMA controller in computer system. **(08 Marks)**

7 a. Calculate number of address lines required to access following memory:
(i) 64 KB (ii) 512 MB (iii) 256 KB (iv) 8 GB **(04 Marks)**
b. Explain internal organization of 2M × 8 dynamic memory chip. **(08 Marks)**
c. Explain different types of nonvolatile memory. **(08 Marks)**

8 a. Explain cache memory and its relevant terms. **(08 Marks)**
b. Explain virtual memory organization. **(06 Marks)**
c. Explain magnetic disk principles. **(06 Marks)**

9 a. Explain single bus organization of the data path inside a processor. **(10 Marks)**
b. List the steps involved in memory read operation and also draw corresponding timing diagram. **(10 Marks)**

10 a. Write the control sequence for execution of the instruction Add (R_3), R_1. **(06 Marks)**
b. Explain block diagram of a complete processor. **(06 Marks)**
c. Explain micro programmed control concept. **(08 Marks)**

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18EC36

Third Semester B.E. Degree Examination, July/August 2021
Power Electronics and Instrumentation

Time: 3 hrs. Max. Marks:100

Note: *Answer any FIVE full questions.*

1 a. Briefly explain power electronic system with neat block diagram. **(04 Marks)**
b. Mention and explain the different types of power electronic converters and mention their any two applications. **(08 Marks)**
c. Explain an operation of resistance firing circuit with neat waveforms. **(08 Marks)**

2 a. Explain with a neat circuit diagram VI characteristics of SCR, define the latching current, break over voltage and holding current. **(08 Marks)**
b. Explain briefly about the gate triggering circuits with waveforms. **(08 Marks)**
c. Explain with a neat circuit diagram basic operation of uJT. **(04 Marks)**

3 a. Explain with neat waveforms phase angle control and PWM control. **(09 Marks)**
b. Explain briefly how choppers are classified. **(06 Marks)**
c. A DC chopper circuit connected to a 100V DC source supplies an inductive load having 40mH in series with a resistance of 5Ω. A freewheeling diode is placed across the load. The load current varies between the limits of 10A and 12A. Determine the time ratio of the chopper. **(05 Marks)**

4 a. Explain the working principle of stepdown chopper with neat circuit diagram and waveforms. And drive the equations for rms voltage and current. **(10 Marks)**
b. With necessary waveforms explain the operation of a single phase half wave controller with inductive load. Derive the expression for average load voltage. **(10 Marks)**

5 a. How inverters are classified. **(04 Marks)**
b. With a neat circuit diagram and waveforms explain the operation of single phase half bridge inverter with resistive load. **(08 Marks)**
c. A basic D'Arsonval movement with an internal resistance of 50Ω and a full scale deflection current of 2mA is to be used as a multi range voltmeter. Determine the series resistance to obtain the voltage ranges of D-10V, 0-50V, 0-100V. **(08 Marks)**

6 a. Briefly explain the discontinuous mode fly back converter. **(10 Marks)**
b. What are the different types of static characteristics and define each term. **(10 Marks)**

7 a. Draw the block diagram and explain the working principle of dual slope integrating type DVM. **(08 Marks)**
b. Explain the working principle of digital frequency meter with basic circuit. **(06 Marks)**
c. Derive an balance bridge equation for wheat stone's bridge. **(06 Marks)**

8 a. With help of staircase waveform and block diagram explain the working of staircase ramp-type voltmeter. **(06 Marks)**
b. With block diagram, explain the time base selector. **(06 Marks)**
c. Derive an equation for unbalanced wheat stone's bridge. **(08 Marks)**

9 a. Write a brief note on potentiometer type resistive transducer. **(06 Marks)**
b. Explain the working of analog weight scale. **(06 Marks)**
c. With a neat diagrams, explain the PLC structure. **(08 Marks)**

10 a. With a neat sketch, explain construction and working of LVDT. **(10 Marks)**
b. Write a note on PLC operation and relays. **(10 Marks)**

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