

CBCS SCHEME

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BMATE301/BEE301

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Engineering Mathematics for EEE

Time: 3 hrs.

Max. Marks: 100

- Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.
3. Use of Mathematics Handbook is permitted.*

Module - 1				M	L	C																					
Q.1	a.	Solve : $(D^3 - 2D^2 + 4D - 8)y = 0$.	06	L2	CO1																						
	b.	Solve : $(D^2 - 4)y = \cosh(2x - 1) + 3^x$.	07	L2	CO1																						
	c.	Solve : $x^3 \frac{d^3 y}{dx^3} + 3x^2 \frac{d^2 y}{dx^2} + x \frac{dy}{dx} + 8y = 65 \cos(\log x)$.	07	L2	CO1																						
OR																											
Q.2	a.	Solve : $(4D^4 - 8D^3 - 7D^2 + 11D + 6)y = 0$.	06	L2	CO1																						
	b.	Solve : $(D^2 - 6D + 25)y = e^{2x} + \sin x + 4$.	07	L2	CO1																						
	c.	Solve : $(2x + 1)^2 y'' - 6(2x + 1)y' + 16y = 8(2x + 1)^2$.	07	L2	CO1																						
Module - 2																											
Q.3	a.	Fit a least square geometric curve $y = ax^b$ for the following data : <table border="1" style="margin: 5px 0; width: 100%; text-align: center;"> <tr> <td>x</td> <td>350</td> <td>400</td> <td>500</td> <td>600</td> </tr> <tr> <td>y</td> <td>61</td> <td>26</td> <td>7</td> <td>2.6</td> </tr> </table>	x	350	400	500	600	y	61	26	7	2.6	06	L2	CO2												
	x	350	400	500	600																						
	y	61	26	7	2.6																						
b.	Calculate the coefficient of correlation and obtain the lines of regression for the following data : <table border="1" style="margin: 5px 0; width: 100%; text-align: center;"> <tr> <td>x</td> <td>1</td> <td>3</td> <td>4</td> <td>6</td> <td>8</td> <td>9</td> <td>11</td> <td>14</td> </tr> <tr> <td>y</td> <td>1</td> <td>2</td> <td>4</td> <td>4</td> <td>5</td> <td>7</td> <td>8</td> <td>9</td> </tr> </table>	x	1	3	4	6	8	9	11	14	y	1	2	4	4	5	7	8	9	07	L2	CO2					
x	1	3	4	6	8	9	11	14																			
y	1	2	4	4	5	7	8	9																			
c.	Compute \bar{x} , \bar{y} and r from the following equation of the regression lines $2x + 3y + 1 = 0$, $x + 6y - 4 = 0$	07	L2	CO2																							
OR																											
Q.4	a.	If θ is the angle between the lines of regression then show that, $\tan \theta = \frac{\sigma_x \sigma_y}{\sigma_x^2 + \sigma_y^2} \left(\frac{1 - r^2}{r} \right)$	06	L2	CO2																						
	b.	Fit a parabola $y = a + bx + cx^2$ for the data : <table border="1" style="margin: 5px 0; width: 100%; text-align: center;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> </tr> <tr> <td>y</td> <td>1</td> <td>1.8</td> <td>1.3</td> <td>2.5</td> <td>6.3</td> </tr> </table>	x	0	1	2	3	4	y	1	1.8	1.3	2.5	6.3	07	L2	CO2										
	x	0	1	2	3	4																					
y	1	1.8	1.3	2.5	6.3																						
c.	Compute the rank correlation coefficient for the following data : <table border="1" style="margin: 5px 0; width: 100%; text-align: center;"> <tr> <td>x</td> <td>68</td> <td>64</td> <td>75</td> <td>50</td> <td>64</td> <td>80</td> <td>75</td> <td>40</td> <td>55</td> <td>64</td> </tr> <tr> <td>y</td> <td>62</td> <td>58</td> <td>68</td> <td>45</td> <td>81</td> <td>60</td> <td>68</td> <td>48</td> <td>50</td> <td>70</td> </tr> </table>	x	68	64	75	50	64	80	75	40	55	64	y	62	58	68	45	81	60	68	48	50	70	07	L2	CO2	
x	68	64	75	50	64	80	75	40	55	64																	
y	62	58	68	45	81	60	68	48	50	70																	

Module – 3																			
Q.5	a.	Obtain the Fourier Series Expansion for, $f(x) = \frac{\pi-x}{2}$ in $0 \leq x \leq 2\pi$.	06	L2	CO3														
	b.	Find the half range Fourier cosine series for the function $f(x) = (x-1)^2$ in $0 < x < 1$ and hence show that, $\frac{\pi^2}{8} = \frac{1}{1^2} + \frac{1}{3^2} + \frac{1}{5^2} + \dots$	07	L2	CO3														
	c.	Find the Fourier series expansion upto first harmonic if it is given by, <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>0</td> <td>1</td> <td>2</td> <td>3</td> <td>4</td> <td>5</td> </tr> <tr> <td>f(x)</td> <td>9</td> <td>18</td> <td>24</td> <td>28</td> <td>26</td> <td>20</td> </tr> </table>	x	0	1	2	3	4	5	f(x)	9	18	24	28	26	20	07	L3	CO3
x	0	1	2	3	4	5													
f(x)	9	18	24	28	26	20													
OR																			
Q.6	a.	Obtain the Fourier Series expansion of, $f(x) = x $, $-\pi \leq x \leq \pi$.	06	L2	CO3														
	b.	Obtain the half range sine series of, $f(x) = \begin{cases} x & 0 \leq x \leq \frac{\pi}{2} \\ \pi-x & \frac{\pi}{2} < x \leq \pi \end{cases}$	07	L2	CO3														
	c.	Express y as Fourier series upto first harmonic for the following data : <table border="1" style="margin-left: 20px;"> <tr> <td>x</td> <td>0</td> <td>$\frac{\pi}{6}$</td> <td>$\frac{\pi}{3}$</td> <td>$\frac{\pi}{2}$</td> <td>$\frac{2\pi}{3}$</td> <td>$\frac{5\pi}{6}$</td> </tr> <tr> <td>y</td> <td>1.98</td> <td>1.30</td> <td>1.05</td> <td>1.30</td> <td>-0.88</td> <td>-0.25</td> </tr> </table>	x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$	y	1.98	1.30	1.05	1.30	-0.88	-0.25	07	L3	CO3
x	0	$\frac{\pi}{6}$	$\frac{\pi}{3}$	$\frac{\pi}{2}$	$\frac{2\pi}{3}$	$\frac{5\pi}{6}$													
y	1.98	1.30	1.05	1.30	-0.88	-0.25													
Module – 4																			
Q.7	a.	Find the Fourier transform of, $f(x) = \begin{cases} 1- x & \text{for } x \leq 1 \\ 0 & \text{for } x > 1 \end{cases}$	06	L2	CO4														
	b.	Find the Fourier cosine transform of e^{-ax} and xe^{-ax} where $a > 0$. Deduce that $\int_0^{\infty} \frac{\cos mx}{x^2 + a^2} dx = \frac{\pi}{2a} e^{-am}$	07	L2	CO4														
	c.	Obtain z-transform of $\cosh n\theta$ and $\sinh n\theta$.	07	L3	CO4														
OR																			
Q.8	a.	Find the Fourier sine transform of $\frac{e^{-ax}}{x}$, $a > 0$.	06	L2	CO4														
	b.	Find the inverse z-transform of $\frac{8z - z^3}{(4-z)^3}$.	07	L2	CO4														
	c.	Solve the difference equation, $y_{n+1} + \frac{1}{4}y_n = \left(\frac{1}{4}\right)^n$	07	L3	CO4														

Module – 5										
Q.9	a.	In a quiz contest of answering 'yes' or 'no' : what is the probability of guessing atleast 6 answers correctly out of 10 questions asked? Also find the probability of the same if there are 4 options for a correct answer.				06	L2	CO5		
	b.	Fit a Poisson's distribution for the following data and calculate the theoretical frequencies :				07	L2	CO5		
		x	0	1	2	3	4			
		f	122	60	15	2	1			
	c.	Ten individuals are chosen at random from the population and their height's in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the hypothesis that mean height of the universe is 66 inches. ($t_{0.05} = 2.262$ for 9 d.f.)				07	L2	CO5		
OR										
Q.10	a.	A random variable X has the following probability function for various values :				06	L2	CO5		
			x	0	1	2	3	4	5	6
		P(x)	0	K	2K	2K	3K	K ²	2K ²	7K ² +K
		(i) Find K								
		(ii) Evaluate P(x<6), P(x ≥ 6) and P(3 < x ≤ 6)								
	b.	In a test on electric bulbs, it was found that the life time of a particular brand was distributed normally with an average life of 2000 hours and standard deviation of 60 hours. If a firm purchases 2500 bulbs, find the number of bulbs that are likely to last for,				07	L2	CO5		
		(i) More than 2100 hrs								
		(ii) Less than 1950 hrs.								
		(iii) Between 1900 to 2100 hours.								
	c.	A sample of examination result of 500 students was made. It was found that 220 students had failed, 170 had secured third class, 90 had secured second class and 20 had secured first class. Do these figures support the general examination results which is in the ratio 4 : 3 : 2 : 1 for respective categories. ($\chi_{0.05}^2 = 7.81$ for 3 d.f.)				07	L2	CO5		

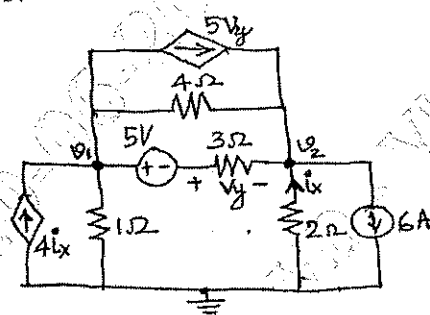
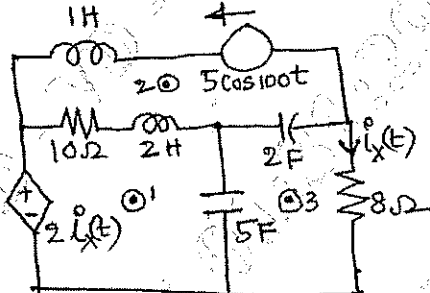
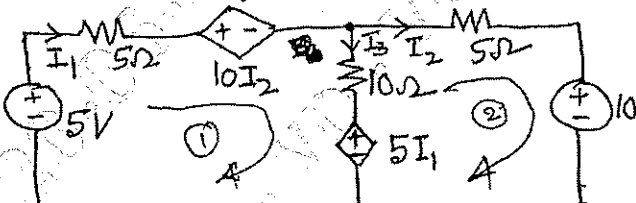
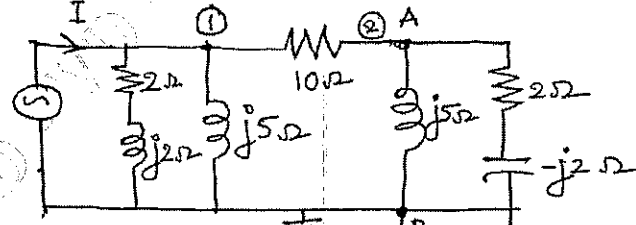
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Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Electric Circuit Analysis

Time: 3 hrs.

Max. Marks: 100

Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.

Module - 1		M	L	C
Q.1	a. Write a system of nodal equations for the circuit shown in Fig.Q1(a) using the nodal voltages V_1 and V_2 as the variables. What power is furnished by the dependent sources?	10	L3	CO1
 <p style="text-align: center;">Fig.Q1(a)</p>				
	b. Draw the exact dual of the circuit shown in Fig.Q1(b). Use dot method and hence construct nodal and mesh equations.	10	L3	CO1
 <p style="text-align: center;">Fig.Q1(b)</p>				
OR				
Q.2	a. Describe the branch currents in the network indicated in the Fig.Q2(a) using branch current mesh analysis method.	10	L3	CO1
 <p style="text-align: center;">Fig.Q2(a)</p>				
	b. Use nodal analysis method to find the current 'I' which results in a voltage V_{AB} of $5\angle 30^\circ$ in the circuit shown in Fig.Q2(b).	10	L3	CO1
 <p style="text-align: center;">Fig.Q2(b)</p>				

Module - 2

Q.3 a. Apply superposition theorem to the networks shown in Fig:Q3(a) to find 'i' through 100V source. **10 L2 CO2**

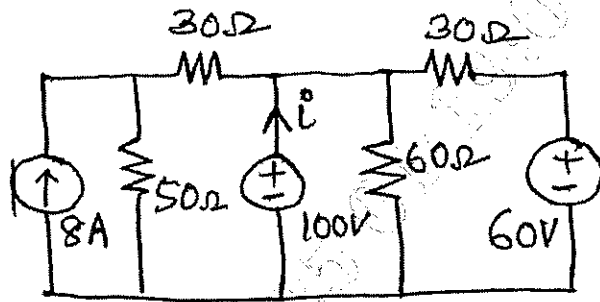


Fig.Q3(a)

b. Determine the maximum amount of power that could be dissipated in R_L in the network shown in Fig.Q3(b). Also find the R_L . **10 L2 CO2**

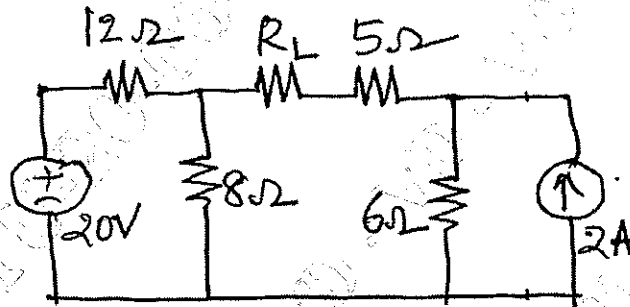


Fig.Q3(b)

OR

Q.4 a. Use Thevenin's theorem to find the power delivered to the 3Ω resistor in the network of Fig.Q4(a). **10 L3 CO2**

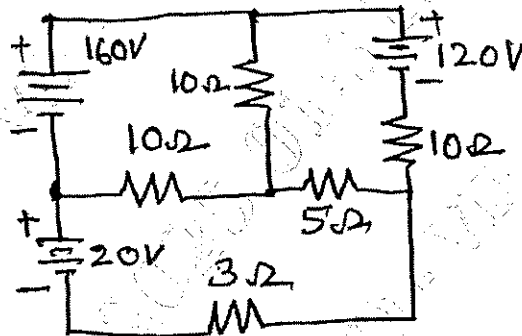


Fig.Q4(a)

b. Find the current flowing through the detector having a resistance of 30Ω as shown in Fig.Q4(b) using Norton's Theorem. **10 L2 CO2**

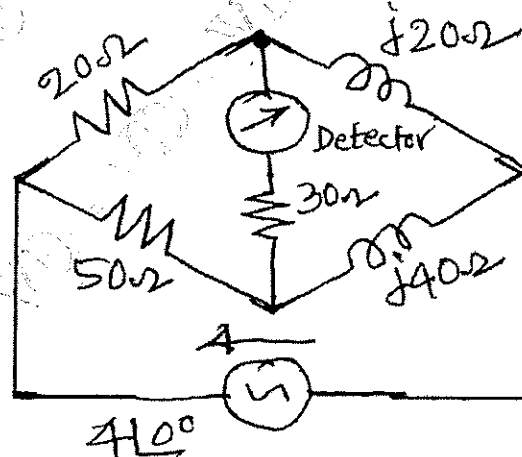


Fig.Q4(b)

Module - 3

<p>Q.5</p>	<p>a. In the network shown in Fig.Q5(a). The switch 'K' is opened at $t = 0$ after the network has attained a steady state with switch closed.</p> <p>i) Find an expression for the voltage across the switch at $t = 0^+$</p> <p>ii) If the parameters are adjusted such that $i(0^+) = I$ and $\frac{di}{dt}(0^+) = -1$, what is the value of the derivative of voltage across the switch $\frac{dv_k}{dt}(0^+)$?</p>	<p>10</p>	<p>L3</p>	<p>CO3</p>
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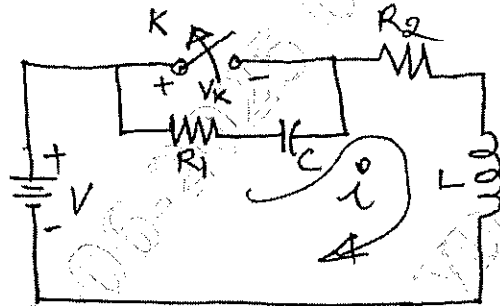


Fig.Q5(a)

	<p>b. Derive an expression for the quality factor (Q_0) of a parallel RLC resonant circuit.</p>	<p>10</p>	<p>L2</p>	<p>CO3</p>
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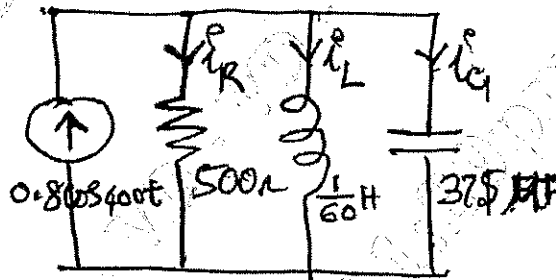


Fig.Q5(b)

OR

<p>Q.6</p>	<p>a. A 400V, 200Hz AC source is connected in series with a capacitor and a coil whose resistance and inductance are 20 mΩ and 6 mH, respectively. If the circuit is in resonance at 200 Hz, find :</p> <p>i) Capacitor value</p> <p>ii) The circuit current</p> <p>iii) Voltage across the capacitor</p> <p>iv) The maximum instantaneous energy stored in the coil</p> <p>v) The half-power frequencies for the circuit.</p>	<p>10</p>	<p>L3</p>	<p>CO3</p>
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	<p>b. The network shown in Fig.Q6(b) has the switch 'K' opened at $t = 0$. Solve for : i) V ii) $\frac{dv}{dt}$ iii) $\frac{d^2V}{dt^2}$ at $t = 0^+$, if $I_s = 1A$, $R = 100 \Omega$, $\alpha = 1H$.</p>	<p>10</p>	<p>L4</p>	<p>CO3</p>
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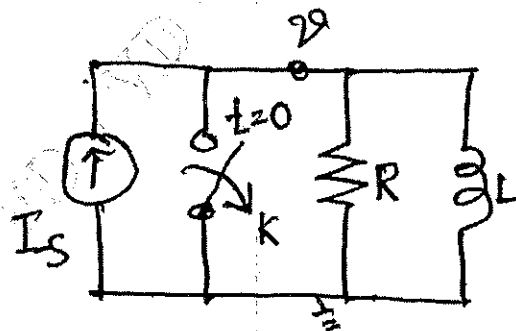


Fig.Q6(b)

Module – 4

<p>Q.7</p>	<p>a. In the circuit shown in Fig.Q7(a) the battery has remained switched on for a long time. Suddenly the switch 'K' is closed. Using Laplace transformation method, find : i) $i(t)$ ii) If $R_1 = 4 \Omega$, $R_2 = 8 \Omega$, $d = 4 H$ and $V = 24 V$, find the current 1.5 seconds after closing the switch.</p>	<p>10</p>	<p>L3</p>	<p>CO4</p>
<p>Fig.Q7(a)</p>				
	<p>b. Using the initial and final value theorems where they apply, find $f(0^+)$ and $f(\infty)$ for the following :</p> <p>i) $F(s) = \frac{(s+1)(s+2)}{(s+3)(s+4)}$ ii) $F(s) = \frac{s}{(s+1)(s-2)}$ iii) $F(s) = \frac{(s+3)(s+7)}{(s+2)(s+5)}$</p>	<p>10</p>	<p>L3</p>	<p>CO4</p>

OR

<p>Q.8</p>	<p>a. The circuit shown in Fig.Q8(a) has been in this condition for a long time. At $t = 0$ the switch is closed. Find using L.T technique i) $V(0^-)$ ii) $V(0^+)$ iii) $V(t)$ iv) What is the time constant of the circuit?</p>	<p>10</p>	<p>L3</p>	<p>CO4</p>
<p>Fig.Q8(a)</p>				
	<p>b. State and prove : i) Initial value theorem ii) Final value theorem as referred to the Laplace transformation operations.</p>	<p>10</p>	<p>L2</p>	<p>CO4</p>

Module – 5

<p>Q.9</p>	<p>a. Three impedances $10 \angle 0^\circ$, $15 \angle 30^\circ$ and $10 \angle -30^\circ$ ohm are connected in star across a balanced 208V system. Take $V_{an} = \left(\frac{208}{\sqrt{3}}\right) \angle 90^\circ V$ as reference voltage. Find the line currents and neutral shift voltage. Construct voltage triangle.</p>	<p>12</p>	<p>L3</p>	<p>CO5</p>
	<p>b. Find the Z-parameters of the networks shown in Fig.Q9(b). Find where the networks is i) reciprocal ii) symmetrical.</p>	<p>8</p>	<p>L3</p>	<p>CO5</p>
<p>Fig.Q9(b)</p>				

OR

<p>Q.10</p>	<p>a. Explain ABCD parameters. Derive the conditions of reciprocity and symmetry of transmission parameters.</p>	<p>10</p>	<p>L2</p>	<p>CO5</p>
	<p>b. A 3-ϕ, 440V symmetrical system supplies a star connected load. $Z_a = 10 \angle 30^\circ$, $Z_b = 12 \angle 45^\circ$ and $Z_c = 15 \angle 45^\circ$ ohm. The phase sequence is abc. Find the neutral shift voltage.</p>	<p>10</p>	<p>L3</p>	<p>CO5</p>

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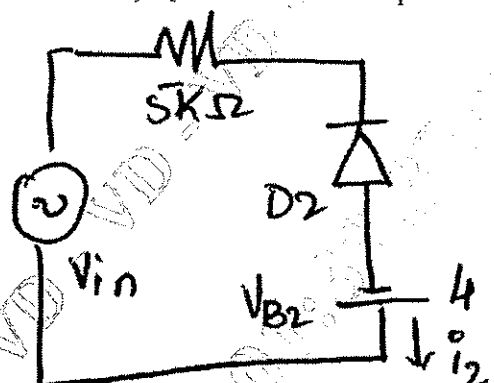
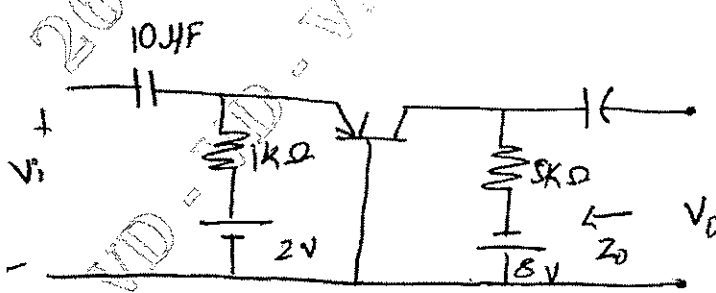
BEE303

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Analog Electronic Circuits

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks, L: Bloom's level, C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	How can a diode circuit be implemented to represented parallel independent clipper, illustrate with circuit equations and waveforms.	10	L2	CO1
	b.	The emitter bias circuit has the following specifications : $I_{CQ} = \frac{1}{2} I_{sat}$, $I_{sat} = 8 \text{ mA}$, $V_C = 18\text{V}$, $V_{CC} = 18\text{V}$, $\beta = 110$. Determine R_C , R_E and R_B .	10	L3	CO1
OR					
Q.2	a.	Find the output voltage V out of the clipper circuit shown assuming. i) Diode are ideal ii) $V_{on} = 0.7\text{V}$. For both cases, $R_f = 0$. Sketch the output waveforms.	10	L3	CO1
	 <p style="text-align: center;">Fig.Q2(a)</p>				
b.	Explain the voltage divider bias circuit and derive I_C and V_{CE} and terminal voltages.		10	L2	CO2
Module - 2					
Q.3	a.	With the help of small signal low frequency transistor model, draw generalized model of the amplifier.	10	L2	CO3
	b.	For the networks shown in below, find I_E , r_e , Z_i , Z_o , A_v , A_i .	10	L3	CO3
 <p style="text-align: center;">Fig.Q3(b)</p>					
OR					
Q.4	a.	Explain miller effect capacitance. Derive C_{mi} .	10	L2	CO3
	b.	Enumerate on general frequency consideration for a Transistors.	10	L2	CO3

Module – 3

Q.5	a.	Derive Z_{in} and Z_o of darlington amplifier also derive A_i and A_v .	10	L4	CO3
	b.	Explain cascade amplifier and explain the overall gain equation.	10	L2	CO3

OR

Q.6	a.	For a transformer coupled amplifier with $V_{CC} = 12V$, $C_{in} \rightarrow \infty$, $\beta = 100$, $V_{BE} = 0.7V$, $A_i = 0$. Find power supplied to load and power required from supply.	10	L3	CO3
	b.	Write important characteristics of: i) Darlington emitter follower ii) Feedback amplifier.	10	L2	CO3

Module – 4

Q.7	a.	Explain push-pull circuit with a circuit and derive A_v .	10	L2	CO3
	b.	Draw DC equivalent circuit for class C amplifier and explain.	10	L2	CO3

OR

Q.8	a.	With a neat circuit diagram explain RC phase shift oscillator and derive equation for frequency.	10	L2	CO3
	b.	The tuned collector oscillator circuit used in the local oscillator of radio makes use of LC tuned circuit with $L_1 = 58.6\mu H$, $C_1 = 300$ pf calculate oscillation frequencies.	5	L3	CO3
	c.	What are the advantages and disadvantages of using crystal oscillator?	5	L2	CO3

Module – 5

Q.9	a.	Explain the operation of JFET.	10	L2	CO3
	b.	Derive g_m for n-channel JFET and draw its characteristic curve.	6	L4	CO3
	c.	What are the advantages of FET over BJT?	4	L2	CO3

OR

Q.10	a.	With a neat circuit diagram for FET – voltage divider bias – derive I_D and $V_{GS(min)}$, $V_{GS(max)}$.	10	L3	CO3
	b.	Derive i_d , μ , g_m for FET amplifier.	10	L3	CO3

CBCS SCHEME

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BEE304

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Transformers and Generators

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module – 1			M	L	C
Q.1	a.	Explain an exact equivalent circuit diagrams of a single phase transformer referred to primary side. Indicate all the parameters in each development stage.	10	L2	CO1
	b.	Find the all day efficiency of single phase transformer having maximum efficiency of 98% at 15 KVA at UPF and loaded as follows : 12 hours – 2 KW at 0.5 p.f lagging 6 hours – 12 KW at 0.8 p.f lagging 6 hours – No load.	10	L3	CO1
OR					
Q.2	a.	Explain the open circuit and short circuit test of a single phase transformer with neat circuit diagram. Show the calculation of efficiency at any load.	10	L2	CO1
	b.	Draw the load phasor diagram of a single phase transformer supplying load with lagging, leading and unity power factor.	10	L4	CO1
Module – 2					
Q.3	a.	Explain with the help of connection and phasor diagram how SCOTT connections are used to obtain two phase from three phase supply.	10	L2	CO2
	b.	A 400 KVA load at 0.7 pf lagging is supplied by three phase transformers connected in Δ - Δ . Each of Δ - Δ transformer is rated at 200 KVA, 2300V/230V. If one defective transformer is removed from service, calculate for V-V connection. i) The KVA load carried by each transformer ii) Percent rated load carried by each transformer iii) Total KVA ratings of two transformer bank in V-V iv) Ratio of V-V bank to Δ - Δ bank transformer ratings.	10	L3	CO2
OR					
Q.4	a.	Analyze the parallel operation if a transformer with unequal voltage ratio. And obtain the expression fro current shared by two transformers.	10	L4	CO2
	b.	Analyze the current distribution in step up and step down auto transformer with the help of neat diagram. And derive the expression for saving of copper in an auto transformer.	10	L4	CO
Module – 3					
Q.5	a.	Derive an EMF equation of an alternator. Also give the expression for pitch factor and distribution factor.	10	L3	CO3
	b.	A 3 phase star connected alternator is rated at 1600 KVA, 13500 volts. The armature resistance and synchronous reactance are 1.5 Ω and 30 Ω respectively/phase calculate the percentage regulation for a load of 1280 KW at a pf 0.8 lag, UPF 0.8 load.	10	L3	CO3
1 of 2					

OR

Q.6	a.	Derive the expression for EMF induced (E_{ph}) in terms of terminal voltage, load current armature resistance, synchronous reactance along with phasor diagram for lagging, leading and unity power factor load.	10	L4	CO3																				
	b.	The open and short circuit test reading for a 3- ϕ star connected 1000 KVA, 2000 V, 50 Hz synchronous generator are : <table border="1" style="margin-left: auto; margin-right: auto;"> <tr> <td style="text-align: center;">Field amps</td> <td style="text-align: center;">10</td> <td style="text-align: center;">20</td> <td style="text-align: center;">25</td> <td style="text-align: center;">30</td> <td style="text-align: center;">40</td> <td style="text-align: center;">50</td> </tr> <tr> <td style="text-align: center;">OC terminal voltage</td> <td style="text-align: center;">800</td> <td style="text-align: center;">1500</td> <td style="text-align: center;">1760</td> <td style="text-align: center;">2000</td> <td style="text-align: center;">2350</td> <td style="text-align: center;">2600</td> </tr> <tr> <td style="text-align: center;">SC armature current in amps</td> <td style="text-align: center;">—</td> <td style="text-align: center;">200</td> <td style="text-align: center;">250</td> <td style="text-align: center;">300</td> <td style="text-align: center;">—</td> <td style="text-align: center;">—</td> </tr> </table> <p>The armature effective resistance is 0.2Ω/phase. Draw the characteristics curves and estimate the full load percentage regulation for 0.8 p.f leading.</p>	Field amps	10	20	25	30	40	50	OC terminal voltage	800	1500	1760	2000	2350	2600	SC armature current in amps	—	200	250	300	—	—	10	L4
Field amps	10	20	25	30	40	50																			
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Module – 4

Q.7	a.	Explain the lamp dark and lamp bright method of synchronization of alternators. Also mention the necessary conditions.	10	L2	CO4
	b.	Discuss the concept of two reaction theory in a salient pole synchronous machine with the help of phasor diagram.	10	L2	CO4

OR

Q.8	a.	Analyze the electrical load diagram of a synchronous generator connected to infinite bus bar and draw the electrical load diagram.	10	L4	CO4
	b.	A 400 V, 50 Hz delta connected alternator has a direct axis reactance of 0.1Ω and a quadrature axis reactance of 0.07Ω /phase. The armature resistance is negligible the alternator is supplying 1000 A at 0.8 pf lagging. i) Find the excitation emf neglecting saliency and assuming $X_s = X_d$ ii) Find the excitation emf, by taking saliency into account.	10	L4	CO4

Module – 5

Q.9	a.	Sketch basic components block diagram of a wind electric system. Discuss all the components in wind electric system.	10	L3	CO5
	b.	Sketch basic elements of a photo voltaic cell and explain the working of PV cell.	10	L3	CO5

OR

Q.10	a.	Sketch horizontal and vertical axis wind power generation. Explain both in detail.	10	L3	CO5
	b.	List : i) Advantages and disadvantages of WECS. ii) Advantages and disadvantages of solar power system.	10	L1	CO5

CBCS SCHEME

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BEE306A

Third Semester B.E./B.Tech. Degree Examination, June/July 2025 Digital Logic Circuits

Time: 3 hrs.

Max. Marks: 100

*Note: 1. Answer any FIVE full questions, choosing ONE full question from each module.
2. M : Marks , L: Bloom's level , C: Course outcomes.*

Module - 1			M	L	C
Q.1	a.	Define combinational Logic with examples.	04	L1	CO1
	b.	Design a combinational logic truth table and circuit diagram so that an output is generated indicating when a majority of four inputs is true.	06	L5	CO1
	c.	Simplify the function using karnaugh map. i) $f(A,B,C,D) = \sum m (1,3,7,11,15) + \sum d (0,2,4)$ ii) $f(A,B,C,D) = \prod M (0, 2, 3, 8, 9, 12, 13, 15)$	10	L4	CO1
OR					
Q.2	a.	Define the following terms with an example: i) Minterm ii) Maxterm	04	L2	CO1
	b.	Find the prime implicants and essential prime implicants. $f(v, w, x, y, z) = \sum m (4,5,6,7,9,11,13,15,25,27,29,31)$	06	L5	CO1
	c.	Simplify the given Boolean function using Quine Mccluskey method. $y = f(a,b,c,d) = \sum (0,1,2,6,7,9,10,12) + d (3,5)$	10	L5	CO1
Module - 2					
Q.3	a.	Explain the design procedure for combinational circuits.	06	L2	CO2
	b.	Implement full subtractor using a decoder and write a truth table.	07	L5	CO2
	c.	Implement the following Boolean function with 8:1 MUX. $F(A,B,C,D) = \sum m (0,2,6,10,11,12,13) + d (3, 8, 14)$	07	L5	CO2
OR					
Q.4	a.	Design a carry look ahead 4-bit parallel adder. Show that the time for addition is independent of the length.	08	L5	CO2
	b.	With the help of truth table and simplification using K-map, design a 2 bit comparator using basic gates.	08	L4	CO2
	c.	What is an Encoder? Explain.	04	L1	CO2
Module - 3					
Q.5	a.	Compare between combinational and sequential circuits.	04	L1	CO3
	b.	With the help of truth table explain application of the SR Latch.	08	L3	CO3
	c.	Derive the characteristics equations of the following flip flops. i) JK flip flop ii) T flip flop	08	L4	CO3

OR

Q.6	a.	With the help of logic diagram. Explain working of master slave JK Flip Flop along with waveforms. Explain race around condition. How is it eliminated?	10	L2	CO3
	b.	Write the Truth table of SR, T and D flip flops.	06	L4	CO3
	c.	What is the difference between latches and flip flops?	04	L2	CO3

Module – 4

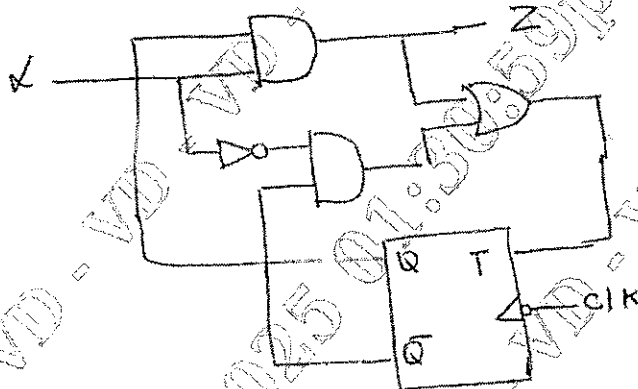
Q.7	a.	With the help of a suitable example, explain the following operations in a shift register i) SISO ii) PISO	08	L4	CO4
	b.	Design mod 6 ripple counter using T – flip flops	08	L5	CO4
	c.	Differentiate between Asynchronous and synchronous counters.	04	L2	CO4

OR

Q.8	a.	With the help of a diagram, explain ring counter and twisted ring counter.	06	L2	CO4
	b.	Design a synchronous Mod – 6 counter using clocked D Flip Flops.	08	L5	CO4
	c.	Design a 3 bit asynchronous ripple counter using T – flip flops and explain the operation.	06	L5	CO4

Module – 5

Q.9	a.	Explain Mealy and Moore model of a sequential circuit.	08	L2	CO5
	b.	Construct the transition table, state table and state diagram for the sequential circuit given below.	08	L5	CO5
	c.	Define state diagram with an example.	04	L2	CO5



OR

Q.10	a.	With a basic structure, explain clearly programmable Read only Memories (PROMS) and EEPROM.	10	L2	CO5
	b.	Explain the following : i) Flash Memory ii) Read only Memory	10	L2	CO5
