CBCS SCHEME

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BEE/BMATE301

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
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. VTU Handbook is permitted.

Module – 1

			M	L	C
Q.1	a.	Solve $(D^4 + 8D^2 + 16)\, y = 0$.	6	L2	CO1
	b.	Solve $x^2y'' - 3xy' + 5y = 3\, \text{Sin}(\log x)$.	7	L2	CO1
	c.	Solve $y'' - 4y' + 4y = 8\,\text{Cos}\, 2x$.	7	L2	CO1

OR

			M	L	C
Q.2	a.	Solve $(D^2 + 5D + 6)\, y = x^2$	6	L2	CO1
	b.	Solve $(1 + x)^2 y'' + (1 + x)y' + y = 2\,\text{Sin}(\log(1 + x))$.	7	L3	CO1
	c.	Solve $(D^2 - 3D + 2)y = 2\ \text{Sin}\ hx$.	7	L2	CO1

Module – 2

Q.3 a. Fit a Second degree parabola of the form $y = a + bx + cx^2$ to the following data : (M: 6, L: L2, C: CO2)

x	0	1	2	3	4
y	1	1.8	1.3	2.5	2.3

b. Ten students got the following ranks in two subjects Maths and Physics : (M: 7, L: L3, C: CO2)

Maths	3	8	9	2	7	10	4	6	1	5
Physics	5	9	10	1	8	7	3	4	2	6

Find the Rank Correlation Coefficient.

c. Fit a least geometric curve $y = a\, x^b$ for the data : (M: 7, L: L2, C: CO2)

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

OR

Q.4 a. Calculate the coefficient of correlation and hence find the lines of regression : (M: 6, L: L2, C: CO2)

x	1	2	3	4	5	6	7	8	9
y	9	8	10	12	11	13	14	16	15

b. Fit a Straight line $y = ax + b$ for the following data : (M: 7, L: L1, C: CO2)

x	1	3	4	6	8	9	11	14
y	1	2	4	4	5	7	8	9

c. In a partially destroyed lab record, only the lines of regression of y on x and x on y are available as $4x - 5y + 33 = 0$ and $20x - 9y = 107$ respectively. Calculate i) Mean of x and y
ii) Correlation coefficient between x and y.
(7 | L3 | CO2)

Module – 3

Q.5

a. Obtain the Fourier series of $f(x) = \frac{\pi - x}{2}$ in $0 < x < 2\pi$.
(6 | L2 | CO3)

b. Find the Half range cosine series of $f(x) = x(\ell - x)$, $0 \le x \le \ell$.
(7 | L2 | CO3)

c. Obtain the constant term and the first cosine and sine terms of Fourier series of y from the following data :

x°	0	45	90	135	180	225	270	315
y	2	$\frac{3}{2}$	1	$\frac{1}{2}$	0	$\frac{1}{2}$	1	$\frac{3}{2}$

(7 | L3 | CO3)

OR

Q.6

a. Find the Fourier series expansion of the function :

$$f(x) = \begin{cases} x & \text{in } (0, \pi) \\ x - 2\pi & \text{in } (\pi, 2\pi) \end{cases}$$

and hence deduce that $\frac{\pi}{4} = 1 - \frac{1}{3} + \frac{1}{5} - \ldots\ldots$
(6 | L2 | CO3)

b. Obtain the Sine Half range Fourier series of $f(x) = x^2$ in $0 < x < \pi$.
(7 | L2 | CO3)

c. Obtain the First Harmonic of Fourier series of f(x) from the given data :

x	0	1	2	3	4	5
y	9	18	24	28	26	20

(7 | L3 | CO3)

Module – 4

Q.7

a. Find the Complex Fourier transform of

$$f(x) = \begin{cases} 1 & |x| \le a \\ 0 & |x| > a \end{cases}$$ Hence evaluate $\int_0^\infty \frac{\sin x}{x} dx$
(6 | L2 | CO4)

b. Find the Fourier Sine transform of $f(x) = \frac{e^{-ax}}{x}$, $a > 0$
(7 | L2 | CO4)

c. Find the Z-transform of the following :
i) $\sin(3n + 5)$ ii) $(2n - 1)^2$
(7 | L2 | CO4)

OR

Q.8

a. Solve by using Z – transform $Y_{n+2} - 4Y_n = 0$ given that $Y_0 = 0$, $Y_1 = 2$. (6, L2, CO4)

b. Find the Fourier Sine and Cosine transform of (7, L3, CO4)

$$f(x) = \begin{cases} x & 0 < x < 2 \\ 0 & \text{otherwise} \end{cases}$$

c. Find the inverse Z transform of (7, L3, CO4)

$$\frac{5z}{(2-z)(3z-1)}$$

Module – 5

Q.9

a. Find the Mean and Variance of the probability distribution of the following table : (6, L2, CO5)

x	1	2	3	4	5
f(x)	0.2	0.35	0.25	0.15	0.05

b. Given that 2% of the fuses manufactured by a firm are defective. Find the probability that a box containing 200 fuses has i) atleast one defective ii) 3 or more defective. (7, L2, CO5)

c. Define the terms : i) Type I and Type II error ii) Confidence interval iii) Level of significance. (7, L1, CO5)

OR

Q.10

a. In a normal distribution 31% of the items are under 45 and 8% are over 64. Find the mean and standard deviation. Given A(0.5) = 0.19 and A(1.4) = 0.42. (6, L3, CO5)

b. Ten individuals are choosen at random from a population and their heights in inches are found to be 63, 63, 66, 67, 68, 69, 70, 70, 71, 71. Test the Hypothesis that the mean height of the universe is 66 inches [$t_{0.05} = 2.262$] for 9 d.f. (7, L3, CO5)

c. The following table gives the number of accidents that occurred in a large city during the various days of a week. Find whether accidents are uniformly distributed over the week. (7, L3, CO5)

Day	Sun	Mon	Tue	Wed	Thur	Fri	Sat	Total
No. of Accidents	14	16	8	12	11	9	14	84

[The number of degrees of freedom for χ^2 is 6.]

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CBCS SCHEME

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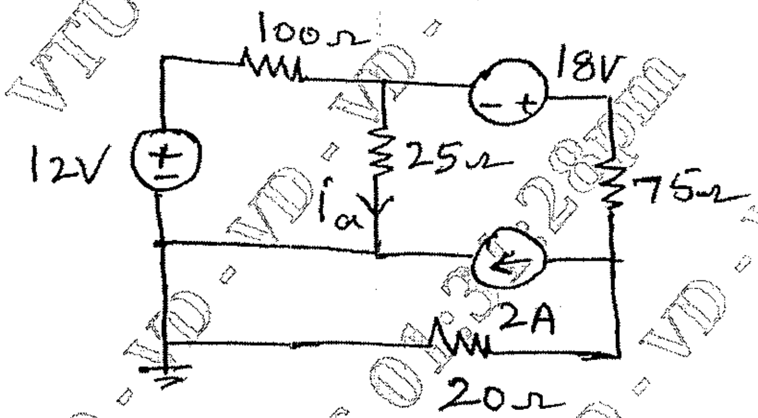
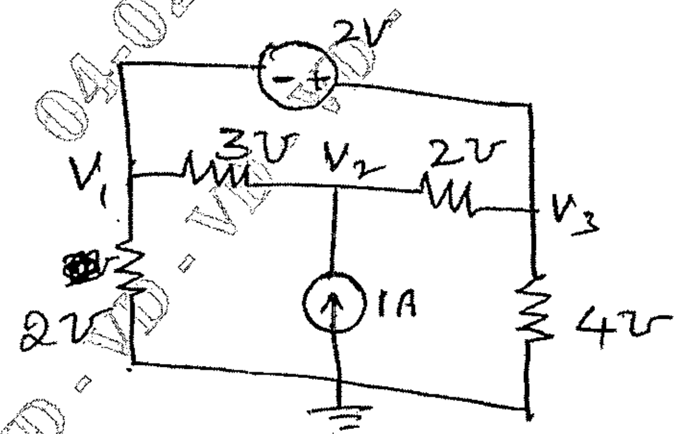
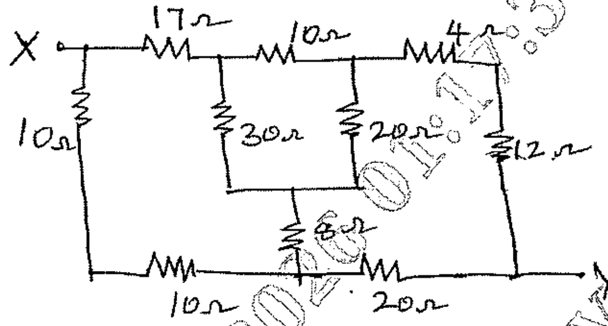
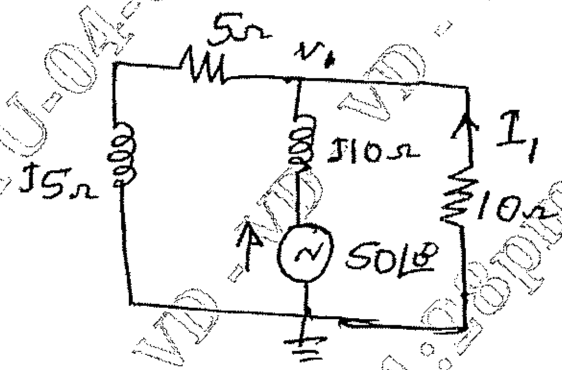
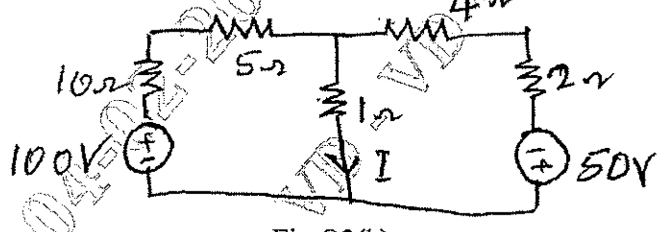
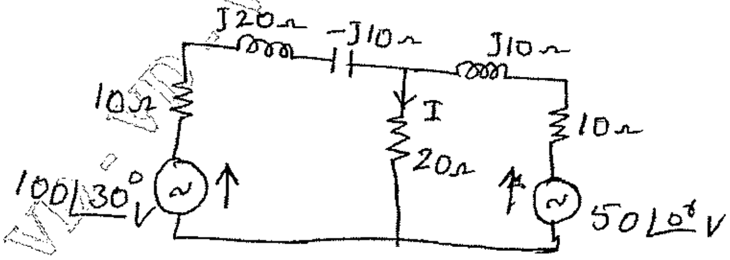
BEE302

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Electric Circuit Analysis

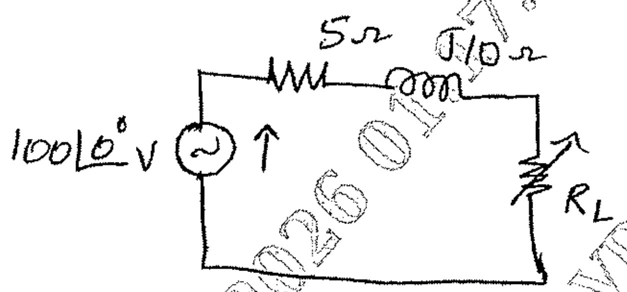
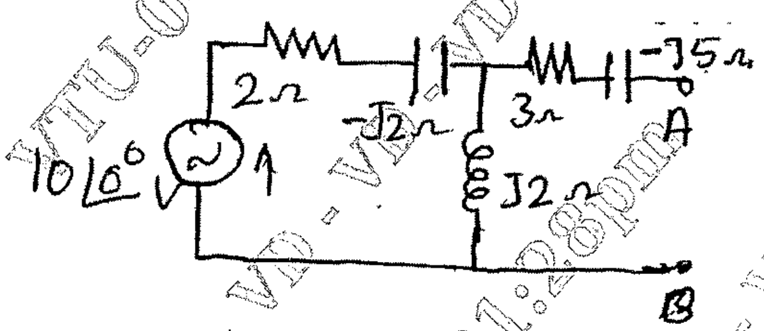
Time: 3 hrs. Max. Marks: 100

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

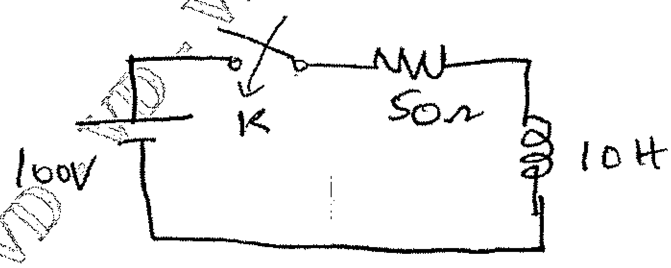
		Module – 1	**M**	**L**	**C**
Q.1	**a.**	Distinguish between : i) Active and Passive elements ii) Ideal and Practical sources.	**6**	**L1**	**CO1**
	b.	Using Mesh current method, determine the current i_a in the network as shown in the Fig.Q1(b).  Fig.Q1(b)	**7**	**L3**	**CO1**
	c.	Find the voltages at nodes V_1, V_2 and V_3 for the network shown in Fig.Q1(c) using nodal analysis.  Fig.Q1(c)	**7**	**L3**	**CO1**

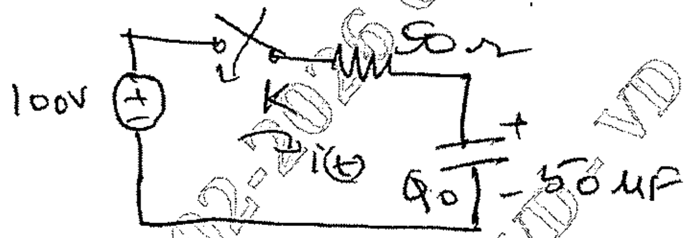
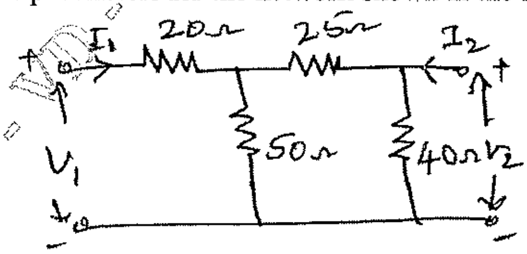
		OR			
Q.2	**a.**	Explain the concept of super node analysis with a suitable circuit diagram.	6	L3	CO1
	b.	Determine the equivalent resistance between X, Y in the network shown in Fig.Q2(b) using Star – delta conversion.  Fig.Q2(b)	7	L1	CO1
	c.	Find the voltage at node V_1 for the network shown in Fig.Q2(c) and current I_1.  Fig.Q2(c)	7	L3	CO1
		Module – 2			
Q.3	**a.**	State and explain Super Position Theorem.	6	L1	CO2
	b.	Using the superposition theorem find the current I in the network shown in Fig.Q3(b).  Fig.Q3(b)	7	L3	CO2
	c.	Find the current I in the circuit shown in the Fig.Q3(c) by using Norton's theorem.  Fig.Q3(c)	7	3	CO2

OR

Q.4	**a.**	State and explain the Norton's theorem.	**6**	**L1**	**CO2**
	b.	What will be the value of R_L to get maximum power delivered to it? What is the value of this power refer the network shown in the Fig.Q4(b).  Fig.Q4(b)	**7**	**L3**	**CO2**
	c.	Using Thevenin's theorem. Determine the current in a 1 Ω resistor connected to terminals A, B of the network shown in Fig.Q4(c).  Fig.Q4(c)	**7**	**L3**	**CO2**

Module – 3

Q.5	**a.**	Derive an expression for resonant frequency in the geometric mean of the two half power frequencies.	**6**	**L3**	**CO3**
	b.	A series connected RLC circuit has R = 15Ω, L = 40 mH and C = 40 μF. Determine the resonant frequency and under resonant condition. Calculate the current, power the voltage drops across various elements, if the applied voltage is 75 volts.	**7**	**L3**	**CO3**
	c.	Find the equation of the current. If the switch is closed at t = 0, find also the voltages across L and R the current at t = 0.1 sec and the time at which the voltages across L and R are equal as in Fig.Q5(c).  Fig.Q5(c)	**7**	**L3**	**CO3**

		OR			
Q.6	**a.**	Derive expressions for resonant frequency in parallel circuit.	**6**	**L3**	**CO3**
	b.	A series circuit consisting of a capacitor and a coil takes a maximum current of 0.314 A at 200 V, 50 Hz. If the voltage across the capacitor is 300V at resonance, determine the Capacitance, Inductance, Resistance and the 'Q' of the coil.	**8**	**L**	**CO3**
	c.	Find the expression for the current i(t) if the switch is closed at t = 0, there is an initial charge of 500 μc on the capacitor with polarity as shown in Fig.Q6(c).  Fig.Q6(c)	**6**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	State and explain the initial value theorem and final value theorem.	**10**	**L3**	**CO4**
	b.	Find the Laplace transform of the signals : i) Step ii) ramp iii) Impulse.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Find the Laplace transform of the following : i) e^{at} ii) $\cos \omega t$ iii) $\sin \omega t$.	**10**	**L4**	**CO4**
	b.	Find the inverse Laplace transform of the following functions : i) $\frac{1}{s(s+1)}$ ii) $\frac{1}{(s-a)^2}$.	**10**	**L4**	**CO4**
		Module – 5			
Q.9	**a.**	Determine the Z–parameters in terms of Y–parameters.	**10**	**L3**	**CO5**
	b.	Three impedances of (7 + J4)Ω, (3 + J2)Ω and (9 + J2)Ω are connected between the neutral and RYB phase respectively of a 3-phase, 4-wire system. The line voltage is 440 V. calculate : i. The current in each line ii. The current in the neutral wire.	**10**	**L3**	**CO5**
		OR			
Q.10	**a.**	Determine the Y – parameters in terms of T – parameters.	**10**	**L3**	**CO5**
	b.	Find the Y and T parameters for the network shown in the Fig.Q10(b).  Fig.Q10(b)	**10**	**L3**	**CO5**

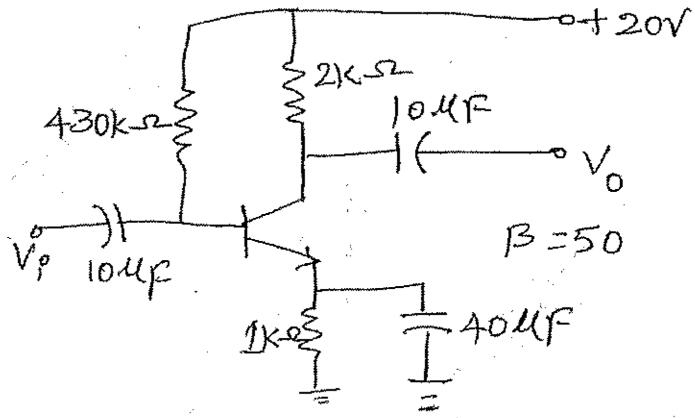
CBCS SCHEME

USN | | | | | | | | | | | **BEE303**

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
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.**	Draw a double ended chipper circuit and explain it's working principle with transfer characteristics.	10	L2	CO1
	b.	For the emitter bias network of fig. Q.1 (b) determine the following parameters. i) I_B ii) I_c iii) V_{CE} iv) V_c v) V_E vi) V_B vii) V_{BC}  Fig. Q.1 (b)	10	L2	CO1
		OR			
Q.2	**a.**	Derive the expression for stability factor for fixed bias circuit with respect to I_{CO} , V_{BE} and β.	10	L2	CO1
	b.	With a circuit diagram explain the operation of self bias circuit.	06	L2	CO1
	c.	Define operating point, explain it's significance.	04	L2	CO1
		Module – 2			
Q.3	**a.**	Define h-parameters and hence derive h-parameter model of CC-BJT.	08	L2	CO2
	b.	State and prove Millers Theorem.	08	L2	CO2
	c.	Compare common base, common collector and common emitter modes.	04	L1	CO2
		OR			
Q.4	**a.**	For the common collector amplifier, calculate current gain, input resistance, voltage gain and output impedance if $V_{cc} = 10V$, $R_1 = 6$ KΩ , $R_2 = 6$ KΩ, $R_s = 600\ \Omega$, $R_E = 1$ KΩ , $R_L = 10$ KΩ. h- parameters are hoc = 25 µ A/v , $h_{rc} = 1$, $h_{fc} = -101$, $h_{ic} = 1.2$ KΩ use exact h- parameter Model.	10	L3	CO2
	b.	Using hybrid Pi model, derive an expression for common emitter short circuit current gain and its variation on frequency. Also obtain expression for f_β and f_T .	10	L2	CO2

Module – 3

Q.5	**a.**	Derive expression for Z_i and A_i for a Darlington emitter follower circuit.	**10**	**L2**	**CO2**
	b.	For the two stage amplifier circuit as shown in fig. Q. 5 (b) $R_s = 1$ KΩ, $R_G = 3.3$ KΩ, $R_{E2} = 4.7$ KΩ, $h_{ie} = 50$, $h_{re} = 0$, $h_{oe} = 0$. Calculate the overall voltage gain A_v and overall z_0. ($h_{fe} = \beta = 50$)	**10**	**L3**	**CO2**

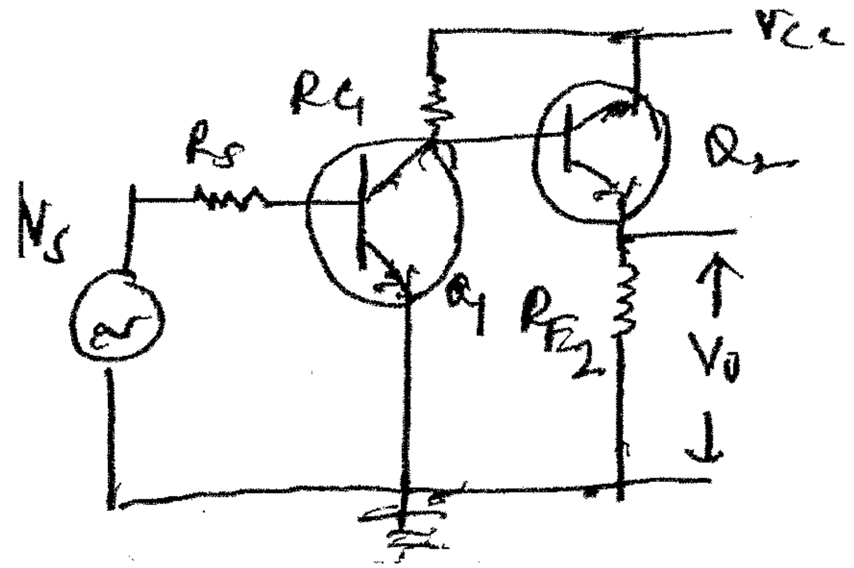


Fig. Q. 5 (b)

OR

Q.6	**a.**	For voltage series feedback amplifier topology obtain expression for A_v and R_{if}.	**8**	**L2**	**CO2**
	b.	List and explain the advantages of employing respective feed back in amplifiers.	**06**	**L2**	**CO2**
	c.	For the current series feed back as shown in fig. Q.6 (c) , $R_l = 2.1$ KΩ , $R_E = 1.2$ KΩ , $R_B = 1$ KΩ , $h_{ie} = 1.1$ KΩ , $R_s = 1.1$ KΩ , $h_{fe} = 50$. Calculate G_μ , β, D.	**06**	**L3**	**CO2**

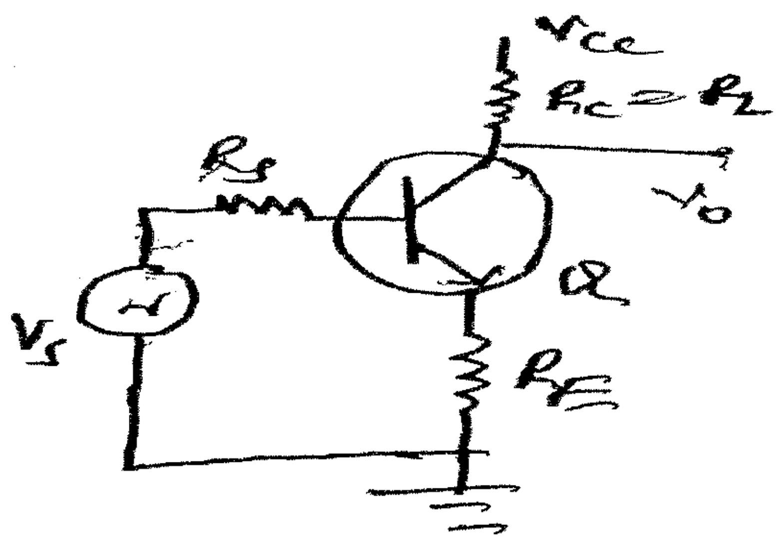


Fig. Q.6 (c)

Module – 4					
Q.7	**a.**	With neat circuit diagram and waveforms, explain the operation of transformer coupled class – A Power amplifier .	**10**	**L2**	**CO3**
	b.	Show the maximum efficiency of class – B Push-pull amplifier is 78.54%.	**10**	**L2**	**CO3**
OR					
Q.8	**a.**	Explain Barkhasen criteria for sustained oscillations.	**05**	**L2**	**CO3**
	b.	Draw the circuit of wein bridge oscillator and explain its operation. Also derive an expression for frequency of oscillation.	**10**	**L2**	**CO3**
	c.	Calculate the frequency of oscillation in Colpitt's oscillator if $C_1 = C_2 = 3$ nF, $L = 200\ \mu$H. Draw the circuit diagram.	**05**	**L3**	**CO3**
Module – 5					
Q.9	**a.**	Draw the circuit for JFET common source amplifier using fixed biased configuration and determine its input impedance, output impedance and voltage gain using ac equivalent small signal model.	**10**	**L2**	**CO3**
	b.	With the help of neat diagrams explain the construction working and characteristics of n- channel depletion type MOSFET.	**10**	**L2**	**CO3**
OR					
Q.10	**a.**	Explain the working and construction of JFET in detail and draw its transfer characteristics and drain characteristics.	**10**	**L2**	**CO3**
	b.	For the voltage divider bias circuit of JFET $R_1 = 20$ KΩ, $R_2 = 10$ KΩ, $R_D = 1.2$ KΩ , $R_s = 2$ KΩ, $V_{DD} = 12$V , $I_{DSS} = 12$mA , $V_p = -4$V. Calculate the drain current voltage between gate and source, voltage between drain and source, voltage at the source.	**10**	**L3**	**CO3**

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CBCS SCHEME

USN | | | | | | | | | | **BEE304**

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
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 the operation of a practical transformer on NO-LOAD and draw the phasor diagram.	6	L2	CO1
	b.	Explain the different types of losses in a transformer and also derive the condition for maximum efficiency.	7	L2	CO1
	c.	A 50 KVA transformer has iron loss of 550 W and full load copper loss of 950 W. If the power factor of the load is 0.8 lagging. Calculate (i) Full load efficiency (ii) KVA load at which maximum efficiency occurs. (iii) Maximum efficiency	7	L3	CO1
		OR			
Q.2	a.	Explain Sumpner's test with relevant circuit diagram.	6	L2	CO1
	b.	Explain the Open Circuit (OC) and Short Circuit (SC) for determination of efficiency and regulation of single phase transformer.	8	L2	CO1
	c.	A 10 KVA, 2000/400 V transformer has $R_1 = 5\ \Omega$, $X_1 = 12\ \Omega$, $R_2 = 0.2\ \Omega$, $X_2 = 0.48\ \Omega$ Calculate the secondary terminal voltage at full load, 0.8 p.f. lagging when the primary supply voltage is 2000 V.	6	L3	CO1
		Module – 2			
Q.3	a.	What is the need for parallel operation of a transformer? Mention the conditions to be satisfied for parallel operation.	7	L2	CO2
	b.	Derive an expression for saving of copper when an auto transformer is used.	6	L2	CO2
	c.	Two single phase transformers with equal voltage ratios have impedances of $(0.659 + j3.502)\Omega$ and $(0.6 + j2.57)\Omega$ with respect of secondary. If they operate in parallel, how they will share a total load of 3000 kW at 0.8 p.f lagging.	7	L3	CO2
		OR			
Q.4	a.	Discuss how load sharing takes place when two single phase Equal voltage ratio transformers are connected in parallel.	6	L2	CO2

			Marks	Level	CO
	b.	Describe the advantages, disadvantages and applications of autotransformers.	8	L2	CO2
	c.	A three phase, 50 Hz transformer has a delta connected primary and star connected secondary the line voltage being 22000 V and 400 V respectively. The secondary has a star connected balanced load at 0.8 p.f. lagging. The line current on primary side is 5 A. Determine the current in each coil of the primary and in each secondary line. What is output of transformer in kW?	6	L3	CO2
		Module – 3			
Q.5	a.	Derive the EMF equation of three phase alternator.	6	L2	CO3
	b.	Explain Armature reaction in alternator for lagging, leading and unity power factor with necessary diagrams.	7	L2	CO3
	c.	A three phase star connected alternator on open circuit is required to generate a line voltage of 3200 V at 50 Hz, when driven at 800 rpm. The stator has 5 slots per pole per phase and 10 conductors per slot. Calculate (i) Number of poles (ii) Useful flux per pole Assume all the conductors per phase to be connected in series and coils to be full pitch.	7	L3	CO3
		OR			
Q.6	a.	Describe the construction of alternator with suitable diagram.	6	L2	CO3
	b.	Describe the synchronous impedence method (EMF) of finding voltage regulation of alternator.	6	L2	CO3
	c.	A 50 KVA, 500 V, single phase a.c. generator gave following results in open and short circuit tests. Field current (A) : 5, 10, 15, 20, 25, 30 E.M.F (volts) : 125, 250, 370, 480, 566, 640 S.C.Armature current (A) : 73, 146, 220 Using the ampere-turn method, find the full-load voltage regulation at (i) Unity p.f. (ii) p.f. 0.8 lagging (iii) p.f. 0.8 leading. Effective armature resistance is 0.2 Ω	8	L3	CO3
		Module – 4			
Q.7	a.	Describe the advantages of parallel operation of alternator and also state the four conditions for parallel operation.	7	L2	CO4
	b.	Explain the three lamps method of synchronization with the help of neat sketch.	7	L2	CO4
	c.	A 2 pole, 50 Hz, 3-φ alternator is excited to generate the bus bars voltage of 11 kV at no load. Calculate the synchronizing power per degree of mechanical displacement of the rotor and the corresponding synchronizing torque. The machine is stag-connected and the short circuit current for this excitation is 1200 A.	6	L3	CO4

Table for Q.6 c.:

Field current (A) :	5	10	15	20	25	30
E.M.F (volts) :	125	250	370	480	566	640
S.C.Armature current (A) :	73	146	220			

		OR			
Q.8	**a.**	What is hunting? How to reduce this in salient pole machines?	**6**	**L2**	**CO4**
	b.	Describe the synchronizing action of alternator with neat diagram.	**8**	**L2**	**CO4**
	c.	A 3-φ star connected synchronous generator supplies a current of 10 A having phase angle of 20° lagging at 400 V (phase voltage). Given $X_d = 10\ \Omega$, $X_q = 6.5\ \Omega$. Neglect armature resistance. Find (i) The load angle. (ii) Components I_d and I_q of armature current. (iii) Voltage regulation.	**6**	**L3**	**CO4**
		Module – 5			
Q.9	**a.**	Describe the basic photo voltaic system for power generation with block diagram.	**7**	**L2**	**CO5**
	b.	Explain the advantage and disadvantages of photo voltaic solar energy conversion.	**7**	**L2**	**CO5**
	c.	Discuss the working of Horizontal axis wind machine with neat diagram.	**6**	**L2**	**CO5**
		OR			
Q.10	**a.**	Discuss the principle of solar cell with neat diagram.	**7**	**L2**	**CO5**
	b.	Describe the basic components of Wind Energy Conversion System (WECS).	**7**	**L2**	**CO5**
	c.	Explain the advantages and disadvantages of Wind Energy Conversion System (WECS).	**6**	**L2**	**CO5**

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CBCS SCHEME

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

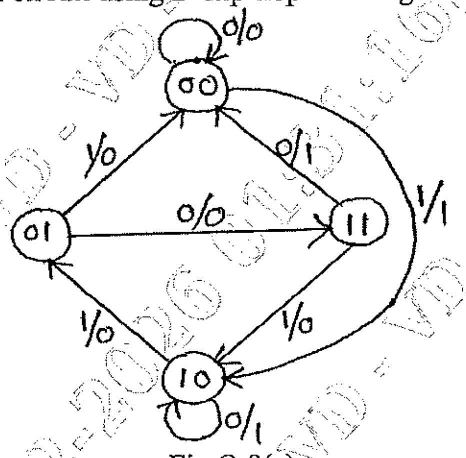
BEE306A

Third Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
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 the following terms with examples: i) Literal ii) Sum of product form iii) Product of sum form	**5**	**L2**	**CO1**
	b.	Reduce the following function using K-map technique: i) $f(a, b, c, d) = \Sigma m(0, 1, 4, 8, 9, 10)$ ii) $f(a, b, c, d) = \pi m(0, 2, 3, 8, 9, 12, 13, 15)$	**10**	**L2**	**CO1**
	c.	Obtain all the prime implicants of the given Boolean functions using Quine Mc-Cluskey method $f(a, b, c) = \Sigma(0, 2, 3, 4)$	**5**	**L3**	**CO1**
		OR			
Q.2	**a.**	Find all the prime implicants of the function $f(a, b, c, d) = \Sigma(0, 2, 3, 4, 8, 10, 12, 13, 14)$ using the Quine Mc-Cluskey algorithmic tabulation.	**10**	**L2**	**CO1**
	b.	Represent the following in both canonical maxterm and minterm forms in decimal notation: i) $f = \bar{x}y + yz$ ii) $f = (\bar{a} + b)(b + \bar{c})$	**6**	**L3**	**CO1**
	c.	With basic block diagram, explain combinational logic circuit.	**4**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	Implement full subtractor using a decoder and two NAND gates. Write its truth table.	**8**	**L3**	**CO2**
	b.	Design a two bit magnitude comparator and draw the logic diagram.	**12**	**L3**	**CO2**
		OR			
Q.4	**a.**	Implement the following using 8:1 MUX with a, b, c as the select lines $f(a, b, c, d) = \Sigma m(0, 1, 5, 6, 7, 9, 10, 15)$	**8**	**L3**	**CO2**
	b.	Distinguish between a decoder and encoder.	**5**	**L3**	**CO2**
	c.	Explain briefly about carry look ahead adder.	**7**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Explain the working of i) Basic S-R latch ii) Gated S-R latch iii) Gated D latch	**12**	**L2**	**CO3**
	b.	Explain the operation of Master-slave JK flip-flop along with its circuit diagram.	**8**	**L2**	**CO3**

		OR			
Q.6	**a.**	With a neat logic diagram, explain the working of positive edge triggered D-flip-flop.	**10**	**L2**	**CO3**
	b.	Derive the characteristic equations for D, JK, T and SR flip-flops.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Explain with suitable logic and timing diagram, i) Serial-in-serial out shift register ii) Parallel-in-parallel out shift register	**10**	**L2**	**CO4**
	b.	Compare registers and counters. Explain the working of 4-bit asynchronous counter using JK flip-flops.	**10**	**L3**	**CO4**
		OR			
Q.8	**a.**	Describe the block diagram of a Mod-7 twisted ring counter. Give the count sequence table and decoding logic used to identify the various states.	**8**	**L4**	**CO5**
	b.	Explain the design of a synchronous Mod-6 counter using clocked D-flip-flops. Clearly indicate application table, excitation table and minimal sum expressions.	**12**	**L4**	**CO6**
		Module – 5			
Q.9	**a.**	Design a sequential circuit using D-flip flop for the given state diagram.  Fig.Q.9(a)	**12**	**L3**	**CO5**
	b.	Explain the procedure of designing clocked synchronous sequential circuit with a suitable example.	**8**	**L3**	**CO6**
		OR			
Q.10	**a.**	Distinguish between Moore and Mealy model with necessary block diagrams.	**8**	**L1**	**CO5**
	b.	Write brief notes on i) ROM ii) RAM iii) EPROM iv) Flash memory	**12**	**L2**	**CO6**

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