EE 4th Sem.

CBCS SCHEME

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

BEE401

Fourth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Electric Motors

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.	A 4 pole DC motor is lap wound with 400 conductors. The flux per pole is 0.0188 wb. Find the torque and gross mechanical power developed when the motor is drawing 25 A and running at 1500 rpm.	10	L3	CO1
	b.	With power flow diagram, explain the losses in DC Motors and derive the condition for maximum efficiency.	10	L3	CO1
		OR			
Q.2	a.	Identify the procedure to control the speed of DC motor, above and below rated speed with necessary circuit diagrams.	10	L3	CO1
	b.	Identify the suitable test that is conducted with two identical shunt machines to calculate the efficiency of machines. With its circuit diagram and related formulas write the procedure to conduct the test.	10	L3	CO1
		Module – 2			
Q.3	a.	Compare the squirrel cage induction motor with slip ring induction motor.	10	L4	CO2
	b.	Derive the torque equation of three phase induction motor and obtain the condition for maximum torque.	10	L4	CO3
		OR			
Q.4	a.	Discuss the torque – slip characteristics of a three phase induction motor with its different regions of operation.	10	L4	CO3
	b.	A 6 pole, 50 Hz, 3 phase induction motor has a rotor resistance of 0.25 Ω per phase and a maximum torque of 10 N. m at 875 rpm. Calculate: i) Synchronous speed ii) Slip at maximum torque iii) Rotor reactance iv) Rotor emf v) the torque when the slip is 5%	10	L4	CO3
		Module – 3			
Q.5	a.	Obtain the equivalent circuit parameters of the circuit modes of induction motor using no load and blocked rotor test and sketch the circuit.	10	L3	CO3
	b.	What do you mean by cogging and crawling in case of three phase induction motor, write the effects and remedy for the same.	10	L2	CO3
		OR			
Q.6	a.	Give the comparison between deep bar and double cage rotor.	10	L2	CO1
	b.	With neat diagram explain the procedure to conduct load test on three phase induction motor.	10	L2	CO3

		Module – 4			
Q.7	**a.**	Explain the operation of star – delta starter with neat diagram.	**10**	**L2**	**CO4**
	b.	Explain the principle of operation of capacitor start split phase motor with necessary circuit and torque speed characteristics.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Explain the operation of auto transformer starter with neat diagram.	**10**	**L2**	**CO4**
	b.	Explain the principle of operation of two value capacitor motor with necessary circuit and torque speed characteristics.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain the V curve and Inverted V curve of synchronous motor and draw the experimental setup to obtain the curves.	**10**	**L2**	**CO5**
	b.	Explain the construction and operation of Synchronous Reluctance Motor.	**10**	**L2**	**CO6**
		OR			
Q.10	**a.**	Explain the principle of operation of synchronous motor and explain when it is operated as synchronous condenser with its applications.	**10**	**L2**	**CO6**
	b.	Explain the construction and operation of universal motor.	**10**	**L2**	**CO6**

* * * * *

CBCS SCHEME

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

BEE501

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Engineering Management and Entrepreneurship

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 term Management and explain various functions of management.	10	L1	CO1
	b.	Explain the essential managerial skills required for discharging the roles successfully.	10	L1	CO1
		OR			
Q.2	a.	Explain various steps in planning.	10	L2	CO1
	b.	Explain the various steps in Decision Making.	10	L3	CO1
		Module – 2			
Q.3	a.	What is an organization and what are its characteristics?	10	L1	CO2
	b.	What are Committees and explain different types of committees.	10	L2	CO2
		OR			
Q.4	a.	Explain various steps involved in selection process.	10	L2	CO2
	b.	Explain Maslow's hierarchy theory.	10	L3	CO2
		Module – 3			
Q.5	a.	Explain the essentials of an effective control system.	10	L2	CO3
	b.	Explain the behavioral approach of leadership.	10	L3	CO3
		OR			
Q.6	a.	Illustrate the social responsibilities of business towards different groups.	10	L2	CO4
	b.	Explain business ethics.	10	L2	CO4
		Module – 4			
Q.7	a.	Explain types of entrepreneurs based on economic development and business type.	10	L2	CO4
	b.	Explain the scenario of entrepreneurship Today.	10	L2	CO4
		OR			
Q.8	a.	Explain the reasons for Entrepreneural mobility.	10	L2	CO4
	b.	Explain the business opportunities in India.	10	L3	CO4
		Module – 5			
Q.9	a.	Explain the procedure for setting up an enterprise.	10	L2	CO5
	b.	List out any five Central Level Institutions and Karnataka State Institutions each, supporting entrepreneurs.	10	L3	CO5
		OR			
Q.10	a.	Explain initiatives and services provided by the Technical Consultation Organization (TCO) and Small Industries Development Bank of India (SIDBI)	10	L1	CO5
	b.	Explain about the Export Promotional Council and their role.	10	L3	CO5

* * * * *

CBCS SCHEME

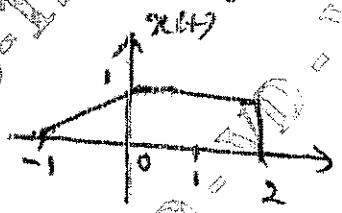
USN | | | | | | | | | | |

BEE502

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Signals and DSP

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 classification signals.	**6**	**L2**	**CO1**
	b.	For the signal x(t) shown in Fig.Q.1(b). Sketch the following: i) $y_1(t) = x(2t-3)$ and ii) $y_2(t) = x\frac{(-t+2)}{3}$  Fig.Q.1(b)	**6**	**L3**	**CO1**
	c.	Determine even and odd components of the following signals: i) $x(t) = (1+t^2-t)\sin 10t$ and ii) $x(n) = \{-1, \underset{\uparrow}{3}, 1, -4\}$	**8**	**L3**	**CO1**
		OR			
Q.2	**a.**	Determine whether it is periodic or not. If periodic find the fundamental period: i) $x(t) = 2\cos(3t+\pi/4)$ and ii) $x(n) = \cos(2\pi n)\sin(4\pi n)$	**6**	**L3**	**CO1**
	b.	Consider a discrete time system characterized by the following equation shows input output relationship. $y(n) = x(n-2) - 2x(n-17)$. Determine whether the system is i) Memory less ii) Time-invariant iii) Linear iv) Causal v) Stable.	**6**	**L2**	**CO1**
	c.	Find the convolution sum of two sequencing $x_1(n)$ and $x_2(n)$ as given below: $x_1(n) = \{1, \underset{\uparrow}{2}, 3, -4\}$ and $x_2(n) = \{1, \underset{\uparrow}{0}, -1, 3, 2\}$	**8**	**L3**	**CO1**
		Module – 2			
Q.3	**a.**	State and prove the following properties : i) Circular time shift ii) Parseval's theorem	**8**	**L2**	**CO2**
	b.	Compute the circular convolution using DFT and IDFT method. $y(n) = x_1(n) \circledast_N x_2(n)$, $x_1(n) = (1, 2, 3, 1)$ and $x_2(n) = (4, 3, 2, 2)$	**12**	**L3**	**CO2**

		OR			
Q.4	**a.**	Compute the IDFT of a 4-point sequence $X(k) = \{4, J2, 0, -J2\}$	**8**	**L3**	**CO2**
	b.	Consider a FIR filter with impulse response $h(n) = (1, 2, -3)$ and input signal $x(n) = \{1, 2, 3, -3, -1, 4, -6, -2, 4, 3, 2, 1\}$. Find the output y(n). Use overlap save method and assume the length of block is 8.	**12**	**L3**	**CO2**
		Module – 3			
Q.5	**a.**	Develop the decimation in frequency algorithm for finding FFT. Draw the signal flow graph for N = 8.	**10**	**L3**	**CO3**
	b.	First five samples of 8-point DFT of real valued sequence is given by $X(0) = 0$, $X(1) = 2 + J2$, $X(2) = -J4$, $X(3) = 2 - J2$ and $X(4) = 0$. Determine remaining points, hence find the original sequence x(n) using DIT-FFT algorithm.	**10**	**L3**	**CO3**
		OR			
Q.6	**a.**	Tabulate the number of complex multiplication, complex additions and speed improvement factor required for direct computation of DFT and FFT for N = 32, 64, 128.	**8**	**L3**	**CO3**
	b.	Find the 8-point DFT of sequence $x(n) = \{1, 2, 3, 4, 4, 3, 2, 1\}$ using DIT-FFT radix-2 algorithm.	**12**	**L3**	**CO3**
		Module – 4			
Q.7	**a.**	List the merits and demerits of Digital filters.	**8**	**L2**	**CO4**
	b.	A discrete time system H(z) is expressed as $H(z) = \frac{10\left(1-\frac{1}{2}z^{-1}\right)\left(1-\frac{2}{3}z^{-1}\right)\left(1+2z^{-1}\right)}{\left(1-\frac{3}{4}z^{-1}\right)\left(1-\frac{1}{8}z^{-1}\right)\left(1-\left(\frac{1}{2}+J\frac{1}{2}\right)z^{-1}\right)\left(1-\left(\frac{1}{2}-J\frac{1}{2}\right)z^{-1}\right)}$ Obtain i) Cascade form realization and ii) Parallel realization	**12**	**L3**	**CO4**
		OR			
Q.8	**a.**	Design a digital filter to satisfy the following pass band ripple $1 \le H(J\Omega) \le 0$, for $0 \le \Omega \le 1404\ \pi$ rad/sec and stop band attenuation $\lvert H(\Omega)\rvert > 60$dB for $\Omega > 8268\ \pi$ rad/sec sampling interval $T_s = \frac{1}{10^4}$ sec. Use BLT designing.	**12**	**L3**	**CO4**
	b.	Obtain the parallel realization for system described by $H(z) = \frac{\left(1+z^{-1}\right)\left(1+2z^{-1}\right)}{\left(1+\frac{1}{2}z^{-1}\right)\left(1-\frac{1}{4}z^{-1}\right)\left(1+\frac{1}{8}z^{-1}\right)}$	**8**	**L3**	**CO4**

		Module – 5			
Q.9	**a.**	List out difference between IIR and FIR.	**4**	**L2**	**CO5**
	b.	Realize the following : $H(z) = 1 + \frac{3}{4}z^{-1} + \frac{17}{8}z^{-2} + \frac{3}{4}z^{-3} + z^{-4}$ in i) Direct form ii) Cascade form realization	**8**	**L3**	**CO5**
	c.	The desired frequency response to the low pass filter is given by $H_a(e^{jw}) = H_a(w) = \begin{cases} e^{-J3w}; & \lvert w\rvert \le 3\pi/4 \\ 0; & 3\pi/4 < \lvert w\rvert < \pi \end{cases}$ Determine the frequency response of FIR filter if the hamming window is used with N = 7.	**8**	**L3**	**CO5**
		OR			
Q.10	**a.**	The frequency response of filter is given by $H(w) = e^{-J3w}(1 + 1.8\cos 3w + 1.2\cos 2w + 0.5\cos w)$ Determine the coefficients of impulse response h(n) of the filter.	**6**	**L3**	**CO5**
	b.	Realize the linear in phase FIR having the following impulse response $h(n) = \delta(n) - \frac{1}{4}\delta(n-1) + \frac{1}{2}\delta(n-2) + \frac{1}{2}\delta(n-3) - \frac{1}{4}\delta(n-4) + \delta(n-5)$	**6**	**L3**	**CO5**
	c.	Realize the following impulse response in i) Direct form ii) Cascade form realization $H(z) = \left(1 - \frac{1}{4}z^{-1} + \frac{3}{8}z^{-2}\right)\left(1 - \frac{1}{8}z^{-1} - \frac{1}{2}z^{-2}\right)$	**8**	**L3**	**CO5**

*****

CBCS SCHEME

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

BEE503

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
Power Electronics

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.	With a neat circuit diagram, input and output waveform, explain the different types of power electronic converters.	10	L1	CO1
	b.	List the applications of power electronics.	6	L1	CO1
	c.	Write short notes on peripheral effects of power electronic circuits.	4	L2	CO1
		OR			
Q.2	a.	Describe the reverse recovery characteristics of diode.	8	L2	CO1
	b.	The reverse recovery time of a diode is $t_{rr} = 3$ μs and the rate of fall of the diode current is di/dt = 30A/μs. Determine the i) (Q_{RR}) Storage Charge ii) Peak Reverse Recovery Current (I_{RR})	6	L3	CO1
	c.	With circuit diagram and waveforms, explain the working of single phase full wave bridge rectifier with R – load.	6	L2	CO1
		Module – 2			
Q.3	a.	Explain the switching characteristics of MOSFET.	8	L1	CO2
	b.	Write short notes on switching limits of BJT.	8	L2	CO2
	c.	List the applications of BJT, MOSFET and IGBT.	4	L2	CO2
		OR			
Q.4	a.	Explain the isolation of Gate and Base drives with the help of a i) Pulse Transformers ii) Opto – Couplers.	10	L1	CO2
	b.	Explain with neat circuit diagram propositional base control and anti – saturation control.	10	L2	CO2
		Module – 3			
Q.5	a.	Explain the two transistor model of Thyristor with neat diagram and derive the expressions for anode current.	8	L1	CO3
	b.	Draw the VI characteristics of thyristor. Define latching and holding current.	6	L2	CO3
	c.	Explain different methods to turn – ON SCR.	6	L2	CO3
		OR			

Q.6	a.	Explain the d_i/d_t protection of thyristors.	6	L1	CO3
	b.	Explain UJT firing circuit for the SCR.	8	L1	CO4
	c.	Design the valves of snubber circuit elements if the supply voltage is 200V, d_v/d_t rating = 100 V/μs, d_i/d_t rating = 50A/μs. If effective series resistance is 1.5 Ω , Take damping factor of 0.6.	6	L3	CO4
		Module – 4			
Q.7	a.	With neat circuit and waveforms, explain the single phase semi – converter with R – load.	10	L2	CO4
	b.	Explain with neat circuit and waveforms, the single phase dual converters.	10	L2	CO4
		OR			
Q.8	a.	Derive an expression for the rms valve of the O/P voltage of a bi – directional AC voltage controller employing ON – OFF control.	10	L2	CO5
	b.	An AC voltage controller with ON – OFF control has an input of 230V, 50Hz is connected to a resistive load of 20Ω. The circuit is operating with the switch ON for 30 cycles and OFF for 30 cycles. Determine i) RMS O/P voltage and current ii) Input Power Factor.	6	L3	CO5
	c.	List the applications of AC voltage controller.	4	L1	CO5
		Module – 5			
Q.9	a.	With neat diagram and waveform, explain the step – up chopper and derive the expression for the output voltage.	10	L2	CO5
	b.	Classify the different types of chopper. With the help of circuit and waveform explain four quadrant (class E) choppers.	10	L2	CO6
		OR			
Q.10	a.	Explain single – phase full bridge inverter operation with R – load.	8	L1	CO6
	b.	Write a note on Performance Parameters for inverters.	6	L2	CO6
	c.	Explain Sinusoidal PWM technique used for controlling the output voltage of an inverter.	6	L2	CO6

* * * * *

CBCS SCHEME

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

BEE515A

Fifth Semester B.E./B.Tech. Degree Examination, Dec.2025/Jan.2026
High Voltage Engineering

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.	Mention desired properties of gaseous dielectric for HV application. Give any three examples of gaseous dielectric.	6	L2	CO1
	b.	What is Paschens law? Discuss to measure the minimum voltage for break down under given p × d condition.	10	L2	CO1
	c.	What will be breakdown strength of air be for small gaps (1 mm) and large gaps (20 cm) under uniform field conditions and standard atmospheric conditions.	4	L3	CO1
		OR			
Q.2	a.	Derive an expression for the current in the air gap that is $I = I_o e^{\alpha d}$ considering first ionization coefficient.	10	L3	CO1
	b.	Explain the following breakdown mechanism in solid : i) Electromechanical breakdown ii) Thermal breakdown	10	L2	CO1
		Module – 2			
Q.3	a.	With neat sketch explain the working of four stage Cockcroft Walton DC generator with waveform.	10	L2	CO2
	b.	With neat sketch, explain marx circuit arrangement for multistage impulse generator.	6	L2	CO2
	c.	Describe wave front and wave tail time of an impulse voltage wave with sketch.	4	L2	CO2
		OR			
Q.4	a.	A Cockcroft-Walton type voltage multiplies has eight stages with capacitances all equal to 0.05 μF. The supply transformes secondary voltage is 125 kV at a frequency of 150 Hz. If the load current to be supplied is 5 mA, Find: i) the percentage ripple ii) the regulation iii) the optimum numbers of stages for minimum regulation.	10	L3	CO2
	b.	Explain the construction and working of a three electrode gap tripping circuit used for the impulse generator.	10	L2	CO2

		Module – 3			
Q.5	**a.**	With neat sketch, explain principle of working and construction of electrostatic voltmeter.	**10**	**L2**	**CO3**
	b.	Explain how and why a sphere gap is used for measurement of high voltage. Explain the various factors that affect the break over voltage of sphere gap.	**10**	**L4**	**CO3**
		OR			
Q.6	**a.**	Explain the Chubb-Fortescue method for measurement of peak value of an AC voltage waveform.	**10**	**L2**	**CO3**
	b.	With neat sketch, explain the construction? Working principle of generating voltmeters and bring out the advantages and disadvantages.	**10**	**L2**	**CO3**
		Module – 4			
Q.7	**a.**	Explain the working principle of a surge arrester with neat diagram.	**10**	**L2**	**CO4**
	b.	Explain different theories of charge formation in clouds.	**10**	**L2**	**CO4**
		OR			
Q.8	**a.**	Write short note on: i) Lighting protection using shielded wire ii) Protection using grounds rod	**10**	**L2**	**CO4**
	b.	Explain the different methods to control over voltages due to switching.	**10**	**L2**	**CO4**
		Module – 5			
Q.9	**a.**	Explain different method of conducting short circuit test on circuit breakers.	**10**	**L2**	**CO5**
	b.	Explain in brief the method of discharge detection using straight detector.	**10**	**L2**	**CO5**
		OR			
Q.10	**a.**	Explain the types of testing on transforms and explain in detail with neat circuit diagram of impulse testing.	**10**	**L2**	**CO5**
	b.	With the help of Schering bridge diagram, explain how capacitance and tan δ can be measured.	**10**	**L2**	**CO5**

* * * * *