Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE -2025

(Branch : Electrical Engineering)

EE-5301 ELECTRICAL MACHINE - II

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : All questions are compulsory and carry equal marks.

1(a) Show the emf generated in a short pitched coil is reduced by a factor $\cos(\varepsilon/2)$, where ε is the chording angle. ***04***

(b) Define distribution factor and derive its expression for fundamental frequency component. ***04***

(c) What are fixed and variable losses in a 3-phase induction motor? Give the power flow diagram for this motor and discuss the various losses involved in it. ***06***

2(a) Derive the condition of maximum torque developed in a 3-phase induction motor and hence prove that to increase the starting torque extra resistance must be added in the rotor circuit. ***07***

(b) A 3-phase, delta connected, 4 pole, 50Hz induction motor has a stator resistance of 0.4 ohm per phase at the operating temperature. For a line current of 20A, the total stator input is 4000 watts. For negligible stator core losses find the internal torque. ***07***

3(a) Explain how the equivalent circuit parameters of a poly phase induction motor can be determined from no load and blocked rotor tests and per phase stator winding D.C. resistance. ***07***

(b) A 3-phase, 4 Pole, 50 Hz induction motor, during short circuit test, took 100 Amp and 30 kW. In case stator resistance is equal to equivalent standstill rotor resistance, compute the starting torque. ***07***

4(a) Describe the various schemes used for exciting large synchronous machines. Which scheme is being preferred these days for exciting very large turbo generators and why? ***07***

(b) Draw the general phasor diagram for a cylindrical rotor alternator. ***03***

(c) Define the voltage regulation of an alternator. Is it possible to have the full load terminal voltage greater than the no-load terminal voltage? Explain. ***04***

5(a) Explain the method of determining the voltage regulation of an alternator by ZPF method. ***07***

(b) A 3-phase alternator is rated at 5 kVA, 110V, 26.3 Amp, 50 Hz and 1000 rpm. The stator resistance between terminals as measured with D.C. is 0.2 ohm with no load and rated speed the stator line voltage is 160 V for a field current of 4 Amp. At rated speed, the short circuit stator current per terminal is 60 Amp. for a field current of 4 Amp. compute voltage regulation at 0.8 p.f. lagging at rated load. ***07***

6(a) Explain why alternators are rated in kVA. ***03***

(b) Compare the performance of a synchronous generator connected to an infinite bus with that of an isolated alternator operating on its own load. ***04***

(c) A 2200V, 400kW, 3-phase star connected synchronous motor has a synchronous impedances of $0.3 + j\,3$ ohm. Determine the excitation emf and the power angle if the motor works at rated load, at 0.8 p.f. leading and with an efficiency of 94%. ***07***

7(a) Find an expression for power in terms of load angle δ for a salient pole synchronous generator working at a lagging p.f. load. Armature resistance may be neglected. ***07***

(b) A salient pole synchronous generator has the following per unit parameters: ***07***

X_d = 0.8, X_q = 0.6, r_a = 0.03

If this generator is delivering rated kVA at rated voltage and at 0.8 lagging power factor compute the power angle and excitation emf.

8 Write short notes on **any two** : ***14***

(i) Speed and p.f. control of induction motor by injected emf.
(ii) Linear induction motor
(iii) Single phase induction regulator.

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-5302 NETWORK ANALYSIS & SYNTHESIS

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Draw the oriented network graph of which reduced incidence matrix is given by – ***07***

Nodes	Branches							
	a	b	c	d	e	f	g	h
1	**1**	**1**	**0**	**0**	**0**	**0**	**0**	**-1**
2	**0**	**-1**	**1**	**1**	**0**	**0**	**0**	**0**
3	**0**	**0**	**0**	**-1**	**1**	**1**	**0**	**0**
4	**0**	**0**	**0**	**0**	**0**	**-1**	**1**	**1**

(b) Construct a cut-set matrix for the given network graph (***fig.1***) by considering a, b, c as the tree branches. Also write the equilibrium equation in standard KCL form. ***07***

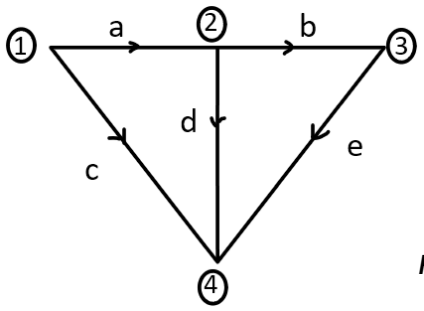

Fig.1

2(a) Connect the two port networks shown in ***fig.2*** & ***fig.3*** in parallel-parallel configuration. Also determine the short circuit parameters of the newly formed two-port network. ***07***

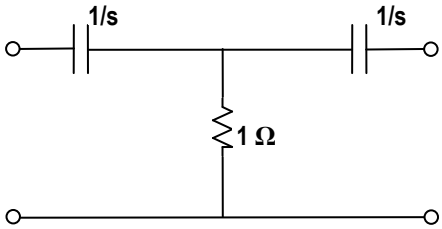

Fig.2

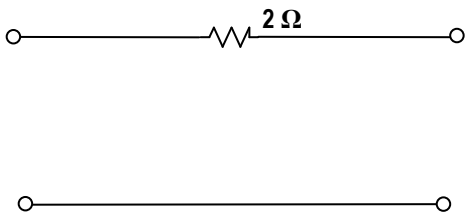

Fig.3

(b) Determine the impedance parameters for the two-port exhibited in the ***fig.4***. ***07***

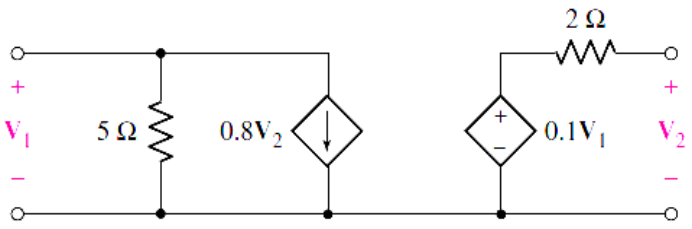

Fig.4

P.T.O.

3(a) Determine what type of filter is shown in the ***fig.5***. Calculate the corner or cut-off frequency the filter circuit. Take $\boldsymbol{R = 2\ k\Omega}$, $\boldsymbol{L = 2\ H}$, **and** $\boldsymbol{C = 2\mu F}$. ***07***

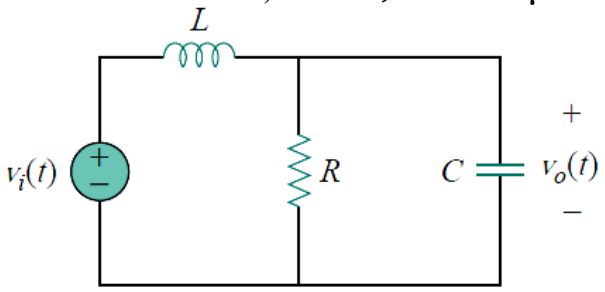

Fig.5

(b) Discuss the various restrictions on the location of poles and zeros of ***07***

(i) driving point function (ii) Transfer functions

4(a) The driving point admittance of network is given by the following equation: ***07***

$$\boldsymbol{Y(s) = \frac{s^3 + s^2 + 3s + 1}{s^3 + s^2 + 2s + 1}}$$

(i) Perform a continued fraction of admittance function ***Y(s)*** given in the above equation
(ii) Realize a network from continued fraction of ***Y(s)***

(b) A low pass constant-k filter with cut-off frequency f_C = 36 kHz is required to produce a maximum attenuation at 60 kHz when used with 500 Ω termination. Design a suitable m-derived T-section filter. ***07***

5(a) For the oriented graph given below (***fig.6***), form a tree using branches 4, 5 & 6. Write the tie-set schedule and thereby write down the relation between the branch currents and loop currents. ***07***

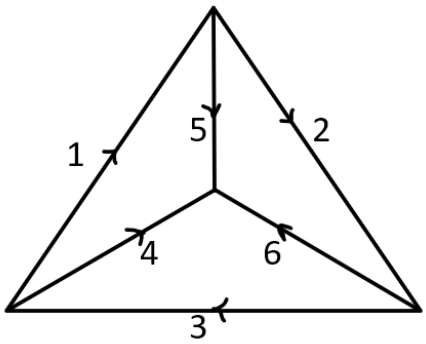

Fig.6

(b) Enumerate the advantages of active filters over passive filters used in electric circuits. List out the applications of filters in modern industries. ***07***

Contd. … 3

6(a) Find $\mathbf{I_1}$ & $\mathbf{I_2}$ if the transmission parameters for the two-port network (***fig.7***) are ***07***

$$\begin{bmatrix} 5 & 10\Omega \\ 0.4\,S & 1 \end{bmatrix}.$$

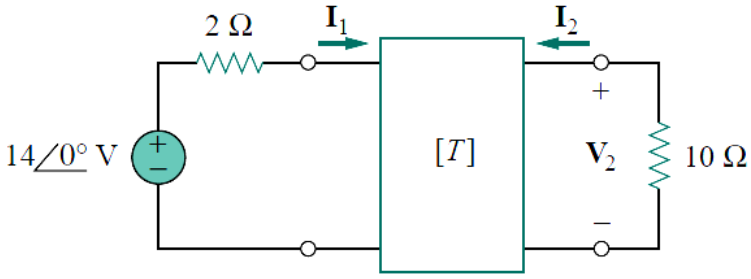

Fig.7

(b) Derive the relationship between transmission parameters with h parameters and Z parameters for a Two-port network. Using the relationship formulae, obtain h-parameters and Z-parameters for the transmission parameters given in the question 6(a). ***07***

7(a) For the s-domain circuit shown in below ***fig.8***, find the following : ***10***

(i) The transfer function $H(s) = \frac{V_o}{V_i}$,

(ii) The impulse response,

(iii) The response when $v_i(t) = u(t)\ V$,

(iv) the response when $v_i(t) = 8cos2t\ V$.

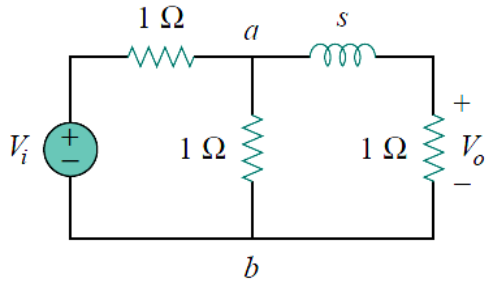

Fig.8

(b) Discuss the impact of location of poles and zeros on time behavior of a transfer function. Also explain with some example, how a pole on right half of s-plane can make a system or a network unstable? ***04***

8(a) Synthesis all the four forms of RC driving point function for the following impedance function. ***10***

$$Z_{RC}(s) = \frac{2(s+2)(s+4)}{(s+1)(s+3)}$$

(b) Give comparison between m-derived filters and prototype filters. ***04***

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-5303 POWER SYSTEM - II

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) What is solar power generation? Explain the operation of various types collectors used in solar power generation. ***07***

(b) What is the basic principle of wind power generation? Enumerate the main components of the horizontal axis wind turbine and explain. ***07***

2(a) State and explain various types of reactors used in nuclear power plant with neat diagrams. ***07***

(b) The mean monthly discharge of a particular site is given below : ***07***

Month	Discharge (m^3s)	Month	Discharge (m^3s)	Month	Discharge (m^3s)
Jan	200	May	1200	Sept	2000
Feb	400	June	1800	Oct	1200
March	600	July	1600	Nov	800
April	2400	Aug	1200	Dec	400

(i) Determine the average inflow
(ii) Draw hydrograph
(iii) Draw flow duration curve

3(a) Define following terms : ***07***

(i) Load factor (ii) Diversity factor (iii) Plant capacity factor
(iv) Demand factor (v) Reserve capacity of plant

(b) A plant costs Rs. 85000/- and has a useful life of 20 years. What amount to be saved annually to replace the equipment at the end of its useful life by sinking fund method? The annual rate of compound interest being 6%. Assume the scrape value of the equipment to be Rs 5000/-. ***07***

4(a) Define economic dispatch in the context of power system operation. What are the primary objectives and constraints associated with economic dispatch? ***07***

(b) The fuel inputs per hour of plant-1 and plant-2 are given as: ***07***

$F_1 = 0.20\ P_1^2 + 40\ P_1 + 120$ Rs/hr.
$F_2 = 0.25\ P_2^2 + 30\ P_2 + 150$ Rs/hr.

Determine the economic operating schedule and the corresponding cost of generation if the maximum & minimum loading on each unit is 100 MW and 25 MW, the demand is 180 MW and transmission losses are neglected. If the load is equally shared by both the units, determine the saving obtained loading the units as per equal incremental production cost.

5(a) Describe various types of buses in a power system for load flow analysis. Justify the classification ***07***

(b) Explain with a flow chart the computational procedure for load flow solution using Newton-Raphson method when the system contains all types of buses. ***07***

P.T.O.

6(a) Describe how co-generation plants can be coordinated with utility power plants in a grid-connected system for optimal operation and reliability. ***07***

(b) The admittance data for a sample power system is given below. Find the admittance matrix of the system. ***07***

Bus Code	Admittance
1 – 2	2.00 – j6
1 – 3	1.00 – j3
2 – 3	0.66 – j2
2 – 4	1.00 – j3
3 – 4	2.00 – j6

7(a) What is electricity tariff? Discuss the different types of tariffs used for charging the consumers of electrical energy? ***07***

(b) Draw the block diagram of thermal power plant and explain the functions of each block. ***07***

8 Write short notes on **any two** : ***14***

(i) MHD generation
(ii) Base and peak load power stations
(iii) Power system operational constraints
(iv) Gauss-Seidel method

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EC-5304 (OEL-I) ANALOG & DIGITAL COMMUNICATION

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) State and prove the parsevals theorem for energy signal. ***07***

(b) Obtain the Fourier transform of the function : ***07***

$$x(t) = 5[u(t+3) - u(t-3)]$$

2(a) Evaluate the Fourier transform of signal : ***07***

$$x(t) = cost(2\pi t)$$

(b) Describe the construction and working of square law device modulator of AM-DSB/FC (Double Side Band with Full Carrier). ***07***

3(a) Describe the construction and working of modulator for the generation of VSB/SC signal. ***07***

(b) An AM modulator has output ***07***

$$x(t) = 30cos400\pi t + 6cos360\pi t + 6cos440\pi t$$

Evaluate the modulation index and efficiency.

4(a) Discuss frequency modulation (FM) and phase modulation (PM). ***07***

(b) Estimate the approximate bandwidth for one FM signal with highest modulating frequency is 10 kHz and maximum deviation of 28 kHz. ***07***

5(a) For a FM signal ***07***

$$v(t) = 20\cos(10^{*}10^{8}t) + 30\sin(3000t)$$

Calculate the power dissipated by the FM wave in a 20Ω resistor, modulating frequency and carrier frequency.

(b) With the help of a block diagram, show how PLL can be used as FM detector. ***07***

6(a) Explain sensitivity, selectivity, fidelity and tracking in super-heterodyne receiver with relevant diagram. ***07***

(b) What is the Sampling? Also give their types. ***07***

7(a) What is Pulse Modulation and describe its types. ***07***

(b) What is transponder? Describe the different section of a transponder channel. ***07***

8 Write a note on **any two** : ***14***

(i) Convolution Theorem (ii) Modulation Index in AM
(iii) PCM (Pulse Code Modulation) (iv) Time Division Multiple Access (TDMA)

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Total No. of Questions : **08** Roll No. : 0701.....

B.Tech FIFTH SEMESTER EXAMINATION JUNE-2025

(Branch : Electrical Engineering)

EE-5305 PRINCIPLES OF MANAGEMENT & ECONOMICS

Time : Three Hours ***Maximum Marks : 70***
Min. Pass Marks : 22

Note : Attempt any five questions. Each question carries equal marks.

1(a) Discuss the nature and scope of management. Is management a science or an art or both? ***07***

(b) Clearly explain the concept and significance of management. Distinguish between management and administration. ***07***

2(a) There are many definitions of management which emphasize one or other important aspect of management discusses and gives various characteristics of management. ***07***

(b) Write down the classification of management function according to Henri Fayol from planning to controlling. ***07***

3(a) What do understand by the term "Level of Management"? Briefly describe the different levels of management. ***07***

(b) How does information technology co-ordinate the activities of managers at various levels of management? ***07***

4(a) What do you understand by informal organization? How does it differ from formal organization? ***07***

(b) Define decision making. What are the various types of a decision? Also give the characteristics of a decision. ***07***

5(a) Write down different techniques of decision making. Also explain them briefly. ***07***

(b) Define the given terms under the decision making : ***07***

(i) Brainstorming (ii) Delphi techniques (iii) Simulation techniques.

6(a) "The job a managerial economist concentrates on taking business decisions and formulating forwards plans". Expand this statement. ***07***

(b) Examine the interrelationship between macro-economics and micro-economics. ***07***

7(a) What is meant by productivity of resources? Explain the importance of productivity in India? ***07***

(b) What are the characteristics of entrepreneurship? According to you what are the qualities of an entrepreneur? ***07***

8 Write short notes on **any two**: ***14***

(i) Role and function of entrepreneur
(ii) Fixed and Variable costs
(iii) Objectives of management

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