Syllabus TEE-601 Power System Analysis

Unit I:
Representation of power system components:
Synchronous machines, Transformers, Transmission lines, One line diagram, Impedance and reactance diagram, per unit system.
Symmetrical Components:
Symmetrical components of unbalanced phasors, power in terms of symmetrical components, sequence impedances and sequence networks.
Symmetrical fault analysis:
Transient in R-L series circuit, calculation of 3-phase short circuit current and reactance of synchronous machines, internal voltage of loaded machines under transient conditions.

Unit II:
Analysis of single line to ground fault, line to line fault and double line to ground fault on an unloaded
generator and power system network with and without fault impedance.
Formation of $Z_{bus}$ using singular transformation and algorithm, computer method for short
circuit
calculations.

**Unit III:**
Load flows:
Introduction, bus classifications, nodal admittance matrix (YBUS), development of load flow
equations,
load flow solution using Gauss Siedel and Newton-Raphson method, approximation to N-R
method, line flow
equation and fast decoupled method.

**Unit IV:**
Power system Stability:
Stability and stability limit, steady state stability study, derivation of Swing equation,
transient stability
studies by equal area criterion and step by step method. Factors affecting steady state and
transient stability
and methods of improvement.

**Unit V:**
Wave equation for uniform transmission lines, velocity propagation, surge impedance,
reflection and
transmission of traveling waves under different line loadings, Bewlay’s Lattice diagram,
protection of
equipments and line against traveling waves.

**Reference Books:**
2. P S R Murthy.” Power System Analaysis, BSP, Hyderabad

**TEE-602 Control System**

**Unit I:**
The Control System: Open loop & closed control; servomechanism, Physical examples.
Transfer functions, Block diagram algebra, Signal flow graph, Mason’s gain formula
Reduction of
parameter variation and effects of disturbance by using negative feedback

**Unit II:**
Time Response analysis: Standard test signals, time response of first and second order
systems, time
response specifications, steady state errors and error constants Design specifications of
second order
systems: Derivative error, derivative output, integral error and PID compensations, design
considerations for higher order systems, performance indices

**Unit III:**
Control System Components: Constructional and working concept of ac servomotor,
synchros and
stepper motor Stability and Algebraic Criteria concept of stability and necessary conditions,
Routh-
Hurwitz criteria and limitations Root Locus Technique: The root locus concepts, construction
of root
loci

**Unit IV:**
Frequency response Analysis: Frequency response, correlation between time and frequency responses, polar and inverse polar plots, Bode plots Stability in Frequency Domain: Nyquist stability criterion, assessment of relative stability: gain margin and phase margin, constant M&N circles

**Unit V:**
Introduction to Design: The design problem and preliminary considerations lead, lag and lead-lag networks, design of closed loop systems using compensation techniques in time domain and frequency domain.

**Reference Books:**

**TEE-603 POWER ELECTRONICS**

**Unit I:**
**Power semiconductor devices:** Power semiconductor devices their symbols and static characteristic, characteristics and specifications of switches, type of power electronic circuits, Thyristor operation, V-I characteristic, two transistor model, methods of turn-on operation of GTO, MCT and TRIAC.

**Unit II:**
**Power semiconductor devices (contd):** protection of devices, series and parallel operation of thyristors, commutation techniques of thyristor.

**DC-DC convertors:** Principles of step-down chopper, step down chopper with R-L load, principle of step up chopper, and operation with R-L load, classification of choppers.

**Unit III:**
**Phase controlled converters:** Single phase half wave controlled rectifier with resistive and inductive loads, effect of freewheeling diode, single phase fully controlled and half controlled bridge converters. Performance parameters, three phase half wave converters, three phase fully controlled and half controlled bridge converters, Effect of source inductance, single phase and three phase dual converters.

**Unit IV:**
**AC Voltage controllers:** Principle of on-off and phase controls, single phase ac voltage controller with resistive and inductive loads, three phase ac voltage controllers (various configuration and comparison).

**Cyclo converters:** Basic principle of operation, single phase to single phase, three phase to single phase and three phase to three phase cyclo converters, output voltage equation.
Unit V:
Inverters: Single phase series resonant inverter, single phase bridge inverters, three phase bridge
inverters, introduction to 120° & 180° mode of operation, voltage control of inverters, harmonics
reduction techniques, single phase and three phase current source inverters.

Reference Books:
1. P.S. Bimbhra, “Power Electronics” Khanna Publication
3. Umanand.” Power Electronics'Wiley India.

TEE 604 ELECTRICAL MACHINE DESIGN

Unit I: General Considerations
Basic Concept of design, limitation in design, standardization, modern trends, in design of electrical
manufacturing techniques, classification of insulating materials, Modes of heat dissipation &
temperature rise-time curves. Methods of cooling ventilation (induced & forced, radial & axial), direct
cooling & quantity of cooling medium. Calculation of total mmf and magnetizing current. Specific
permeance and leakage reactance.

Unit II: Transformer Design
Output equation, design of core, yoke and windings, overall dimensions, computation of no load current,
voltage regulation and design of cooling systems.

Unit III: Elements of rotating machine design:
Output equations of rotating machines, specific electrical & magnetic loadings, factors affecting size of
rotating machines, separation of main dimensions, selection of frame size. Core and armature design of dc
and 3-phase ac machines.

Unit IV: Elements of rotating machine design (cont.):
Rotor design of three phase induction motors. Design of field system of DC machine and synchronous
machines. Estimation of performance from design data.

Unit V: Computer aided design:
Philosophy of computer aided design, advantages and limitations. Computer aided design approaches
analysis, synthesis and hybrid methods. Concept of optimization and its general procedure. Flow charts for
design of transformer, dc machines, three phase induction and synchronous machines.

Reference Books:
2. Ghosh, Samarjeet.' Electrical Machines' Pearson Education
3. Murthy, Vishnu.'Computer aided design for Electric Machines' BSP Hyderabad

TCS607 DATA STRUCTURES USING C++

UNIT 1
COMPLEXITY ANALYSIS: Time and Space complexity of algorithms, asymptotic analysis, big O and
other notations, importance of efficient algorithms, program performance measurement, data structures and algorithms.

**LINEAR LISTS**: Abstract data type, sequential and linked representations, comparison of insertion, deletion and search operations for sequential and linked lists, list and chain classes, exception and iterator classes for lists, doubly linked lists, circular lists, linked lists through simulated pointers, lists in STL, skip lists, applications of lists in bin sort, radix sort, sparse tables.

**UNIT 2**
**STACKS AND QUEUES**: Abstract data types, sequential and linked implementations, exception handling in classes, representative applications such as parenthesis matching, towers of Hanoi, wire routing in a circuit, finding path in a maze, simulation of queuing systems, equivalence problem.

**UNIT 3**
**HASHING**: Search efficiency in lists and skip lists, hashing as a search structure, hash table, collision avoidance, linear open addressing, chains, uses of hash tables in text compression, LZW algorithm.

**UNIT 4**
**TREES**: Binary trees and their properties, terminology, sequential and linked implementations, tree traversal methods and algorithms, heaps as priority queues, heap implementation, insertion and deletion operations, heapsort, heaps in Huffman coding, leftist trees, tournament trees, use of winner trees in mergesort as an external sorting algorithm, bin packing.

**UNIT 5**
**GRAPHS**: Definition, terminology, directed and undirected graphs, properties, connectivity in graphs, applications, implementation – adjacency matrix and linked adjacency chains, graph traversal – breadth first and depth first, spanning trees.

**Reference Books:**
2. Storer J A." An introduction to Data structures and Algorithms’ Springer India/BSP
3. Wirth, N., “Algorithms and Data Structures”, Pearson Education

**THU608: PRINCIPLES OF MANAGEMENT**

**UNIT 1**
**INTRODUCTION TO MANAGEMENT**: Theories of management: Traditional behavioral, contingency and systems approach. Organization as a system.

**UNIT 2**
**MANAGEMENT INFORMATION**: Interaction with external environment. Managerial decision making.
and MIS.

UNIT 3
PLANNING APPROACH TO ORGANIZATIONAL ANALYSIS: design of organization structure; job design and enrichment; job evaluation and merit rating.

UNIT 4

REFERENCE BOOKS
3. Stoner: Management, Pearson Education
5 .A V Rau.' Management Science' BSP, Hyderabad

PEE652: CONTROL SYSTEM LAB

Note: The minimum of 10 experiments are to be performed from the following, out of which at least three should be software based.
1. To determine response of first order and second order systems for step input for various values of constant 'K' using linear simulator unit and compare theoretical and practical results.
2. To study P, PI and PID temperature controller for an oven and compare their performance.
3. To study and calibrate temperature using resistance temperature detector (RTD)
4. To design Lag, Lead and Lag-Lead compensators using Bode plot.
5. To study DC position control system
6. To study synchro-transmitter and receiver and obtain output V/S input characteristics
7. To determine speed-torque characteristics of an ac servomotor.
8. To study performance of servo voltage stabilizer at various loads using load bank.
9. To study behaviour of separately excited dc motor in open loop and closed loop conditions at various loads.
10. To study PID Controller for simulation proves like transportation lag.

Software based experiments (Use MATLAB, LABVIEW software etc.)
11. To determine time domain response of a second order system for step input and obtain performance parameters.
12. To convert transfer function of a system into state space form and vice-versa.
13. To plot root locus diagram of an open loop transfer function and determine range of gain 'k' for stability.
14. To plot a Bode diagram of an open loop transfer function.
15. To draw a Nyquist plot of an open loop transfer functions and examine the stability of the closed loop system.
**PEE653: POWER ELECTRONICS LAB**

Note: The minimum of 10 experiments is to be performed out of which at least three should be software based.

1. To study V-I characteristics of SCR and measure latching and holding currents.
2. To study UJT trigger circuit for half wave and full wave control.
3. To study single-phase half wave controlled rectified with (i) resistive load (ii) inductive load with and without freewheeling diode.
4. To study single phase (i) fully controlled (ii) half controlled bridge rectifiers with resistive and inductive loads.
5. To study three-phase fully/half controlled bridge rectifier with resistive and inductive loads.
6. To study single-phase ac voltage regulator with resistive and inductive loads.
7. To study single phase cyclo-converter
8. To study triggering of (i) IGBT (ii) MOSFET (iii) power transistor
9. To study operation of IGBT/MOSFET chopper circuit
10. To study MOSFET/IGBT based single-phase series-resonant inverter.
11. To study MOSFET/IGBT based single-phase bridge inverter.

**Software based experiments (PSPICE/MATLAB)**

12. To obtain simulation of SCR and GTO thyristor.
13. To obtain simulation of Power Transistor and IGBT.
14. To obtain simulation of single phase fully controlled bridge rectifier and draw load voltage and load current waveform for inductive load.
15. To obtain simulation of single phase full wave ac voltage controller and draw load voltage and load current waveforms for inductive load.
16. To obtain simulation of step down dc chopper with L-C output filter for inductive load and determine steady-state values of output voltage ripples in output voltage and load current.

**PCS657: DATA STRUCTURE USING C++ LAB.**

Problems in "C++" using Data Structures involving arrays, stacks, queues, strings, linked lists, trees, graphs.

1) Using STACK to check matching left and right characters such as parantheses, curly braces and square brackets in a given string.
2) Single server queuing system and gathering statistics.
3) Operations on Stacks.
4) Sparse Matrices
5) Linear linked list implementation
6) Operations on Doubly Linked List and Circular List with a test application
7) Operations on Ordered Binary Trees.
8) Graph Traversal Techniques
9) Implementation of Quicksort, Mergesort and Heapsort
10) Operations on Binary Trees
11) Shortest Path Problem

PREVIOUS YEAR QUESTION PAPERS
TEE-601 Power System Analysis
B. Tech.
(SEM. VI) EXAMINATION. 2006-07
POWER SYSTEM ANALYSIS

Time : 3 Hours] [Total Marks : 100

Note : (1) Answer all questions.
(2) In case of numerical problems assume data wherever not provided.
(3) Be precise in your answer.

1 Attempt any three parts of the following : \[ \frac{2}{3} \times 3 - 20 \]
(a) What do you understand by single line and reactance diagram of a power system? Explain. Discuss the per unit system of analysing power system problems and its advantages.
(b) A 100 MVA, 33 kV, 3-phase generator has a subtransient reactance of 15%. The generator is connected to the motors through a transmission line and transformers as shown in Fig 1 (b). The motors have rated inputs of 30 MVA, 20 MVA and 50 MVA at 30 kV with 20% subtransient reactance.

V-2029] 1 [Contd...
The three-phase transformers are rated at 110 MVA, 32 kV ∆/110 kV Y with leakage reactance 8%. The line has a reactance of 50 ohms. Selecting the generator rating as the base quantities in the generator circuit, determine the base quantities in other parts of the system and evaluate the corresponding p.u. values.

(c) What are current limiting reactors? Discuss their locational aspects and advantages.

(d) Explain clearly the variation of current and impedance of an alternator when a 3-phase sudden short circuit takes place at its terminals.

(e) The line to ground voltages on the high voltage side of a transformer are $V_a = 100$ kV, $V_b = 33$ kV and $V_c = 58$ kV on phases $a$, $b$ and $c$ respectively. The voltage of phase $a$ leads that of phase $b$ by 100° and lags that of phase $c$ by 176.5°. Determine the symmetrical components of voltage phasor $V_a$.
2 Attempt any **two** parts of the following: **10×2=20**

(a) (i) Show that the zero sequence impedance of a 3-phase, star connected load with neutral grounded through an impedance $Z_w$ is three times the $Z_n$.

(ii) Draw the zero sequence networks for the transformers of the following connections:

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Y/Y  i  Y/Δ  j  Y/Δ
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**Fig. 2**

(b) An unloaded synchronous generator, whose neutral is grounded through a reactance $X_n$, has balanced emfs and sequence reactances $X_1$, $X_2$ and $X_3$ such that $X_1 = X_2 > X_3$.

(i) Draw the sequence networks of the generator as seen from the terminals.

(ii) Derive expression for fault current for a solid line-to-ground fault on phase $a$.

(iii) Show that, if the neutral grounded solidly, the LG fault current would be more than that of three-phase fault current.

V-2029] 3 [Contd...
(c) Determine the line-to-line to ground (L-L-G) fault current when the fault occurs at point F in the system shown in Fig 2(c). Both the generators are generating power at 1.0 p.u. voltage.

Fig. 3

The per unit reactances, all referred to the same base, are given in the following table:

<table>
<thead>
<tr>
<th></th>
<th>$X_p$</th>
<th>$X_q$</th>
<th>$X_r$</th>
</tr>
</thead>
<tbody>
<tr>
<td>$G_1$</td>
<td>0.05</td>
<td>0.30</td>
<td>0.20</td>
</tr>
<tr>
<td>$G_2$</td>
<td>0.03</td>
<td>0.25</td>
<td>0.15</td>
</tr>
<tr>
<td>Line 1</td>
<td>0.70</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>Line 2</td>
<td>0.70</td>
<td>0.30</td>
<td>0.30</td>
</tr>
<tr>
<td>$T_1$</td>
<td>0.12</td>
<td>0.12</td>
<td>0.12</td>
</tr>
<tr>
<td>$T_2$</td>
<td>0.10</td>
<td>0.10</td>
<td>0.10</td>
</tr>
</tbody>
</table>

3 Attempt any two parts of the following : \(10\times2=20\)

(a) Why is load flow study essential for a power system?

Formulate the mathematical model in polar form for a power system using Newton-Raphson method.

V=2029] 4 [Contd...
(b) (i) Discuss the procedure for representing a tap changing transformer in the formation of system matrix \([V_{BUS}]\) for load flow study.

(ii) Explain the procedure for calculating line flows and line losses.

(c) For the network shown in figure 3(c), obtain the complex bus bar voltage at bus 2 at the end of first iteration. Use Gauss-Siedal method.

Line impedances shown in figure are in p.u.

Given: Bus 1 in black bus with \(V_1 = 1.00^p\)

\(P_2 + jQ_2 = -5.96 + j1.46\) and \(|V_3| = 1.02\)

Assume: \(V_3 = 1.02 \angle 0^\circ\) and \(V_2 = -1 \angle 0^\circ\)

\[\begin{align*}
V_1 &= 1.00 + j0.06 \\
V_2 &= -2 + j0.03 \\
V_3 &= 1.02 + j0.02
\end{align*}\]

Fig. 3

4 Attempt any two parts of the following: \(10 \times 2 = 20\)

(a) (i) Derive the swing equation of a synchronous machine connected to an infinite bus.

(ii) Deduce the condition of equal area criterion for transient stability analysis.

V-2029] 5 [Contd...
(b) (i) Using equal area criterion, discuss about the transient stability of a power system when sudden loss of one of parallel lines occurs in the system.
(ii) Explain the point by point solution technique of swing equation for transient stability study.
(c) Name various factors which affect the stability of a system. Discuss the role of automatic voltage regulator in improving transient stability.

5 Attempt any three parts of the following: \[ \frac{2}{3} \times 3 = 20 \]

(a) Starting from the first principles show that surges behave as travelling waves.
(b) Why the indoor transformers are usually connected to the overhead lines through short length of cables? Explain.
(c) Discuss the reflection and refraction of a travelling wave drawing the Bewlay’s Lattice diagram. Take a suitable example for explanation.
(d) A d.c. voltage source of unit voltage is switched on to a lossless transmission line with surge impedance \( Z_s \) terminated at far end by a lumped resistance \( R \). The ratio \( R/Z_s = 3 \). The line length is 150 km. Draw the Bewley’s Lattice diagram for the voltage and current.

(e) Discuss the behaviour of a travelling wave when it reaches:
   (i) short circuited transmission line and
   (ii) line terminated with an inductance.

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**TEE-602 Control System**

Time: 3hrs
Max Marks: 100

Answer all Questions

**PART - A (10 x 2 = 20 Marks)**
1. Derive the transfer function of the network shown in fig 1.

![Network Diagram](image1)

2. Write the differential equations of the mechanical system shown in fig 2.

![Mechanical System Diagram](image2)

3. Calculate the time response of the following system if the input \( r(t) \) is an unit impulse

\[
\frac{C(s)}{R(s)} = \frac{2}{s + 3}
\]

4. Plot the time response of the first order system to a unit step and unit ramp input.

5. Write the transfer function of a PID controller.

6. Write the Hurwitz determinant for the system given by the characteristic equation \( 4s^3 + 2s^2 + 5s + 7 = 0 \)

7. State the magnitude criterion with reference to a root locus plot.

8. Draw the frequency magnitude plot for an under damped and over damped second order system.

9. Mention any two functions of a compensator in a control system.

10. Draw the circuit of a lead compensator.

**PART - B (5 x 16 = 80 Marks)**
11. The polarized solenoids shown in fig 3 produces a force proportional to the current in the coil. The coil has resistance R and inductance L. Write the differential equations of the system

![Diagram of polarized solenoids with currents l1 and l2, coils R and inductance L, and magnetic forces M1 and M2.]

12.a)i) Derive an expression for the peak overshoot of a second order system for an unit step input.

ii) A mechanical vibratory system and its response when 2kg of force (step input) applied to the system is shown in fig 4. Determine the M, B and K of the system.

![Diagram of a mechanical system with force F, mass M, damping B, and input x(t) with an overshoot of 0.0095 m.] (OR)

12.b) For the control system shown in fig 5, find the steady state error without the proportional and derivative (PD) controller for a unit ramp input. Show that with the PD controller this error can be made to zero for a specific value of K.

![Diagram of a control system with PD controller and transfer function G(s) = K / (s+1)(s+3)(s+4).]

13.a) For a feedback control system

\[ G(s) = \frac{K}{(s+1)(s+3)(s+4)} \]
Calculate the value of K at which the system would become oscillatory in the closed loop \(H(s) = 1\), and obtain the frequency of such oscillations. Also, find the value of K so that the real parts of all the roots will be less than -1.

(OR)

13.b) Sketch the root locus plot of a unity feedback system with an open loop transfer function
\[G(s) = \frac{K}{s (s+2) (s+4)}\]
Determine the value of K so that the dominant pair of complex poles of the system has a damping ratio of 0.5.

14.a) i) Show that the constant M locus in G- plane is a circle for all values of M except M=1
ii) The open loop transfer function of a unity feedback control system is
\[G(s) = \frac{K}{s (1+0.1s) (1+s)}\]
Draw the Bode diagram and analyze the stability of the system for K =10.

(OR)

14.b) The open loop transfer function of a feedback system is given by
\[G(s) = \frac{K}{s (T_1s+1) (T_2s+1)}\]
Draw the Nyquist plot. Derive an expression for gain K in terms of T1, T2 and specific gain margin G_m.

15.a) A Unity feedback system has an open loop transfer function of
\[G(s) = \frac{K}{s (s+1) (s+5)}\]
Draw the root locus plot and determine the value of K to give a damping ratio of 0.3 A network having a transfer function of \(10(1 +10s) /(1 +100s)\) is now introduced in tandem. Find the new value of K, which gives the same damping ratio for the closed-loop response. Compare the velocity error constant and settling time of the original and the compensated systems.

15.b) A servomechanism has an open loop transfer function of
\[G(s) = \frac{10}{s (1+0.5s) (1+0.1s)}\]
Draw the Bode plot and determine the phase and gain margin. A network having the transfer function \((1+0.23s)/(1+0.023s)\) is now introduced in tandem. Determine the new gain and phase margins. Comment upon the improvement in system response caused by the network.
B. Tech.
(SEM. VI) EXAMINATION, 2006-07
EE - 604 : POWER ELECTRONICS

Time : 3 Hours] [Total Marks : 100

Note : Answer all questions.

1 Answer any four parts out of the following :
   (a) What are the characteristics of an ideal power-switching device? Compare the characteristics of IGBT and MOSFET.
   (b) Name the different power electronic converters available and list their advantages over conventional modes of conversion and control.
   (c) Draw the static V-I characteristics of SCR and explain its modes of operation.
   (d) What are the different methods of firing employed for SCR triggering? Explain UJT firing circuit with relevant waveforms.
   (e) Define \( \frac{dV}{dt} \) and \( \frac{dI}{dt} \) ratings of SCR. How is SCR protected against these?
   (f) In a power circuit 4 SCRs are to be connected in series. Permissible difference in blocking voltage is 20 V for a maximum difference in their blocking currents of 10 mA. Difference in recovery charge is 10 micro coulomb. Design suitable equilizer circuit.
2. Answer any two parts out of the following:
   (a) Discuss the working of single-phase full wave ac-dc converter taking into account the effect of source inductance. Draw the output voltage waveform for firing angle 30 degrees.  
   (b) A three phase full converter is fed by 400 Volts, three phase, 50Hz supply. The average load current is 150 A and load is highly inductive. For a firing angle of 60 degrees find output power, average, rms and peak current through thyristors and peak inverse voltage.
   (c) What are dual converters? Explain operation of a three phase dual converter using circulating current mode of operation. How are firing angles of two converters controlled?

3. Answer any four parts out of the following:
   (5 marks each)
   (a) Describe the operation of single phase full wave ac regulator feeding a resistive load. Derive expression for output voltage.
   (b) A single phase voltage controller has input voltage of 230 volts, 50 Hz and R=15 ohms. For 6 cycles on and 4 cycles off, determine rms output voltage and input power factor.
   (c) Describe the operation of solid state AC and DC transfer switches.
   (d) Draw the circuit and waveforms of single phase to single phase sep up cycloconverter for output frequency = Four times input frequency. Assume continuous conduction.
(e) Derive the expression for the fundamental rms value of per-phase output voltage of low frequency for an m-pulse cycloconverter.

(f) Explain the working of three phase bi-directional delta connected AC voltage controller.

4 Answer any two parts out of the (10 marks each) following:

(a) The resonant pulse commutation circuit has C=30 micro Farad and L=4 micro Henry. The initial capacitor voltage is V_C=200 Volts. Determine T_{OFF} if load current is 250 Ampere.

(b) Describe the working of step up chopper and derive expression for output voltage.

(c) A 220 volts, 25A, 1000 rpm separately excited DC motor has armature resistance 1.5 ohms and is controlled by a chopper of 600 Hz and source voltage 230 Volts. Calculate duty ratio for rated.

5 Answer any two parts out of the (10 marks each) following:

(a) A 3-phase bridge VSI feeds three-phase star connected resistive load. Obtain the output phase and line voltage if two SCRs conduct at a time.

(b) Differentiate between the working of voltage source and current source inverters. Explain the working of a single phase series inverter.

(c) Describe forward and reverse speed control of three phase ac voltage controller with relevant circuit diagram. Discuss its merits and demerits.

TEE 604 ELECTRICAL MACHINE DESIGN
B. Tech.
(SEM. IV) EXAMINATION, 2006-07
ELECTRICAL MACHINES

Time : 3 Hours) [Total Marks : 100

Note: Attempt all questions. All questions carry equal marks. In case of numerical problems assume data wherever not provided.

1 Attempt any four parts of the followings : \(5\times4=20\)
   (a) Explain Sumpner’s test with suitable diagram for finding efficiency of a transformer.
   (b) Derive an expression for the saving of copper in auto-transformer as compared with an equivalent two winding transformer.
   (c) Draw the Scott connection of transformers and mark the terminals and turn-ratio.
   (d) A transformer has its maximum efficiency of 0.98 at 20 kVA at unity power factor. During the day it is loaded as follows:
      12 hours; 2 kW at power factor 0.6
      6 hours; 10 kW at power factor 0.8
      6 hours; 20 kW at power factor 0.9
      Find the ‘all-day’ efficiency of the transformer.
   (e) Two transformers each rated 250 kVA, 11/2 kV and 50 Hz are connected in open-delta on both the primary and secondary. Find the load kVA that can be supplied from this transformer connection.
(f) The HV terminals of a 3-phase bank of three single phase transformers are connected to a 3-wire, 3-phase, 11 kV (LL) system. The LV terminals are connected to a 3-wire, 3-phase load rated of 1000 kVA and 2200 V line-to-line (LL). Specify the voltage, current and kVA ratings of each transformer (both HV and LV windings) for the following connections:

(i) \(Y - Y\) 
(ii) \(\Delta - \Delta\) 
(iii) \(Y - \Delta\) 
(iv) \(\Delta - Y\).

2 Attempt any two parts of the following: 10x2=20

(a) (i) Explain the “armature reaction” in a dc machine, indicating remedies to overcome its adverse effects.

(ii) Hopkinson’s test on two dc machines gave the following results for the full load: line voltage 250V, line current excluding field current 50A; motor armature current 300A; field currents 5 and 4.2A. Calculate the efficiency of each machine. The armature resistance of each machine is 0.01 ohm. State the assumptions made.

(b) (i) Why is starter necessary for starting a dc motor? Explain briefly working principle of a 3-point starter with the help of neat diagram.

(ii) A 200V shunt motor with a constant main field drives a load, the torque of which varies as the square of the speed. When running at 600 rpm, it takes 30A. Find the speed at which it will run and the current it will draw, if a 10 ohm resistor is connected in series with armature. Neglect motor losses.
(c) (i) Explain the speed control of dc series motor by (i) Field divertsors (ii) Variable resistance in series with motor
(ii) List the different losses in a dc machine.
Which of these losses are constant? Derive a condition for maximum efficiency?

3 Attempt any two parts of the following : 10x2=20
(a) (i) Is it possible to vary the speed of synchronous motor by varying the field excitation or by any other method? Explain what happens when the field current is increased or decreased.
(ii) Explain how a synchronous motor can be operated as a synchronous condenser.
Give the application of synchronous motor.
(b) A 400 V, 50 Hz, 3-phase, 37.3 kW star-connected synchronous motor has a full-load efficiency of 80%. The synchronous impedance of the motor is (0.2 + j 1.6) ohms per phase. If the motor is adjusted to give a leading power factor of 0.9, calculate the induced emf for full load.
(c) A 1 MVA, 11 KV, 3-phase star-connected synchronous machine has the following open circuit characteristic test data :

<table>
<thead>
<tr>
<th>If (A)</th>
<th>50</th>
<th>110</th>
<th>140</th>
<th>180</th>
</tr>
</thead>
<tbody>
<tr>
<td>V&lt;sub&gt;∞&lt;/sub&gt; (line) (V)</td>
<td>7000</td>
<td>12500</td>
<td>13750</td>
<td>15000</td>
</tr>
</tbody>
</table>

The short circuit test yielded full load current at a field current of 40A. The zero power factor (ZPF) test yielded full load current at rated terminal voltage for a field current of 150A. The armature resistance is negligible.

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V-2049] 3 [Contd..
Calculate the field current needed for the machine to draw full load 0.8 power factor leading current when operated as the motor connected to a 11 kV supply.

4 Attempt any two parts of the following: 10x2=20
(a) A 400 V, 3-phase, 6-pole, 50Hz induction motor gave the following test results:
No load 400 V, 8A, 0.2 power factor
Blocked-rotor 200V, 40A, 0.4 power factor
Determine the mechanical output, torque and slip when the motor draws a current of 30A from the mains. Assume the starter and rotor copper losses to be equal.
(b) Explain various starting methods for 3-phase induction motor with suitable diagrams.
(c) The rotor of a 6 pole 50Hz slip ring induction motor has a resistance of 0.2 ohm per phase and runs at 560 rpm on the full load. Calculate the approximate resistance per phase of a rotor rheostat such that speed is reduced to 750 rpm for the full load torque.

5 Attempt any two parts of the following: 10x2=20
(a) Explain the following:
(i) What is meant by split phase method of motor starting?
(ii) Why regenerative braking cannot be applied to a squirrel cage induction motor?
(b) Explain the construction, working and applications of a stepper motor with neat diagram.
(c) Discuss double revolving field theory of a single phase induction motor. Explain the starting methods of single phase induction motor.

TCS607 DATA STRUCTURES USING C++
B. Tech.
(SEM. IV) EXAMINATION. 2006-07
DATA STRUCTURE USING 'C'

Time : 3 Hours] [Total Marks : 100

Note : (1) Attempt all questions.
(2) All questions carry equal marks.

1 Answer any two Parts :
(a) (i) Define Abstract Data type. Explain it briefly.
(ii) Obtain an addressing formula for the element
\[ A[i_1][i_2]...[i_n] \] in an n-dimensional array
declared as \[ A[u_1][u_2]...[u_n] \]
Assume a column major representation of the array with one word
per element. Given that \( \alpha \) is the address
for \[ A[0][0]...[0] \].
(b) Write a program in C to sort a set of 100 complex
numbers into ascending order of their absolute values.
Real and imaginary part of all the complex numbers
are integers. Absolute value of a complex number
\( x + iy \) is defined as \( \sqrt{x^2 + y^2} \). Choose suitable data
structure to represent complex numbers.
(c) (i) What do you understand by Worst Case time complexity of an algorithm.
Explain clearly.

V-1072] 1 [Contd...
(ii) Write a function in C which searches string x for the first occurrence of string y.
   If Y does not appear in X, then function returns zero. Otherwise function returns starting position in x of the first occurrence of y.

2 Answer any two parts :
(a) (i) Write an algorithm for evaluating an expression in postfix form.
(ii) Consider the following infix expression

\[(a+b) + c \uparrow (d+e)\uparrow (g+h)\]

Convert the expression to equivalent prefix expression and postfix expression.
The operator \(\uparrow\) is defined as \(x \uparrow y = xy\)
The operator + is usual addition operator.

(b) (i) State the Towers of Hanoi problem. Write recursive algorithm to solve the problem.
(ii) Design a method for keeping two stacks within a single linear array so that neither stack overflows until all of the memory is used. Write a C function push(x,s) that pushes element x onto stack s, where s is one or other of these two stacks. Include all necessary error checks.

(c) (i) How would you implement a circular queue of integers in C using array. Write routines to implement the appropriate operations for it.
(ii) Differentiate between dequeue and priority queue.

\[\text{[Contd...]}\]
3 Answer any two parts: 5+5=10
(a) (i) Let $p$ be a pointer to the first node in a singly linked list and $x$ be an arbitrary node in this list. Write an algorithm to delete the node $x$ from the list. If $x=p$ then $p$ should be reset to point to the new first node in the list.
(ii) Write a C function to concatenate two circularly linked lists pointed by list $1$ and list $2$ in such a way that circular list pointed by list $2$ is appended to the circular list pointed by list $1$.
(b) How can a polynomial in two variables be represented by a singly linked list? Write an algorithm to add two such polynomials.
(c) (i) Show that the maximum number of nodes in a binary tree of height $h$ is $2^{h+1} - 1$.
(ii) Formulate an algorithm to find the number of leaf nodes in a binary tree. What is the time complexity of your algorithm?

4 Answer any two parts: 6+4=10
(a) (i) Write an algorithm for sorting a set of integers using Quick sort procedure. What is average case time complexity of the procedure?
(ii) Following are the inorder and postorder traversal of a binary tree $T$.
In order: D K I B A E G H J F C
Post order: K D I E A G B F C J H
construct the tree $T$.
(b) (i) What is an AVL tree? Show at 6+4=10 each step the AVL tree built from following sequence of insertions.
$8, 15, 1, 19, 16, 4, 25, 12, 23, 20, 17$
Start with empty tree. Label the rotations according to type.

V-1072] 3 [Contd..
(ii) Obtain minimum cost spanning tree for the following graph using Krushal algorithm.

```
  10
 /   \
15 /     \13
 |       |
|       |
4 12 6
```

Fig. 1

(c) (i) Write Warshall algorithm to find the shortest path between any two vertices of a graph. Explain the algorithm briefly.

(ii) Write an algorithm to test whether a given graph is connected or not.

5 Answer any two parts : 10

(a) Define B-tree

What do you understand by order of a B-tree?

Consider the following B-tree of order 3.

```
    30
   /   \
 10 15
```

Fig. 2

Show the B-tree after following sequence of operations.

Insert 43, insert 50, delete 15

(b) (i) Differentiate between the following : 6+4=10

(a) B-tree and B’ tree

(b) Indexing and Hashing

(c) Internal sorting and external sorting.

(ii) Show that all B-trees of order 2 are full binary trees.

(c) Define hash function. What do you mean by perfect hash function? Discuss various methods used for resolving hash collisions.

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PRINCIPAL OF MANAGEMENT
THU-608

B. Tech.
(SEM. VI) EXAMINATION, 2012
PRINCIPLE OF MANAGEMENT

Paper ID and Roll No. to be filled in your Answer Book

Roll No.

Total Marks: 50

Time: 2 Hours

Please read the following case let carefully and answer the questions given at the end.

The world's leading mobile phone company, Nokia Corporation, launched its 'take-back' campaign in early 2009.
The initiative, aimed at educating mobile phone users about the importance of recycling e-waste, had launched in a number of countries since 2005.

Main issues behind these campaigns were:
(a) Sustainability
(b) Recycling
(c) Awareness campaigns

On January 1, 2009, Nokia India, the Indian arm of the world's leading mobile phone company, announced this 'take-back' campaign, on the occasion of the launch of the initiative, S. Shailendra, Managing Director,

Nokia India, said, "if every Nokia user recycled just one unused phone, the discarded phone will live on in something new, as the material is used to make items like park benches, utensils etc."

DS-100007] 1

[Contd...
2. While short notes on any of the following:

(a) Difference between continuous improvement and system
(b) Explain the need for coordination and control
(c) To manage is to control and plan to organize and to
(d) Explain the concept and mechanism of 360 degree appraisal
(e) How you can motivate employees by providing them
(f) How coordination is achieved

3. Attempt any two of the following:

(a) What are the elements of control?
(b) Define innovation and its process
(c) Explain all the steps involved in planning process
(d) Job enrichment
(e) Product development
(f) Explain the importance of management information system

4. Attempt any two of the following:

(a) Importance and why?
(b) Order of principles where of these principles are more
(c) Equal essential principles of management provide a
   basis for adoption of management theory. Comment
   on the validity of statement by giving a brief account
   of organizational planning and structure.
(d) Explain the types of management information system
(e) Draw the matrix of leadership "There is no one best
   Explanation of leadership which is applicable to all situations."