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7E1732

Roll No. _____

Total No. of Pages: 2

7E1732

B. Tech. VII - Sem. (Main / Back) Exam., January - 2022

Electrical Engineering

7EE5 -11 Wind and Solar Energy Systems

Time: 3 Hours

Maximum Marks: 120

Min. Passing Marks: 42

Instructions to Candidates:

Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

PART - A

(Answer should be given up to 25 words only)

[10×2=20]

All questions are compulsory

- Q.1 What is Tip speed ratio?
- Q.2 What is Power-cumulative distribution functions?
- Q.3 Write down the five advantages of Induction Generators.
- Q.4 Draw the V-I characteristics of a PV cell.
- Q.5 What is Maximum Power Point Tracking (MPPT) algorithms?
- Q.6 What is parabolic trough?
- Q.7 How can measure the quality of power?
- Q.8 What is the difference between the real and reactive power?
- Q.9 Draw the block diagram of converter control.
- Q.10 How can be measure the speed of wind turbines?

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PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Draw the neat and clean block diagram of power-cumulative distribution functions. Explain all the blocks in brief.
- Q.2 Explain hybrid and isolated operations of solar PV and wind systems.
- Q.3 What is wind speed statistics probability distributions? Explain its functionality.
- Q.4 What are the difference between fixed and variable speed wind turbines? Draw the diagram and explain its working.
- Q.5 How can estimate of solar energy availability? Explain the working principle of solar energy.
- Q.6 What is stall and pitch control? How it is used for physics of wind power?
- Q.7 Write down the name of technologies used for solar thermal power generation. Explain it with a suitable diagram.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[4×15=60]

Attempt any four questions

- Q.1 Explain the methodology used for generations of solar thermal power generation. Draw the block diagram and explain it.
- Q.2 Write and explain the issues for network integration and also discussed about the voltage and frequency of operating limits.
- Q.3 Draw the block diagram of Permanent Magnet Synchronous Generators and explain all the block in brief.
- Q.4 What is the procedure for estimation of solar energy availability in solar resources? Explain all the steps in brief.
- Q.5 What is the use of Power Electronic Converters for solar system? How can measure the power in solar system.
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7E1733

Roll No. _____

Total No. of Pages: 2

7E1733

B. Tech. VII - Sem. (Main / Back) Exam., January - 2022

Electrical Engineering

7EE5 -12 Power Quality and FACTS

Time: 3 Hours

Maximum Marks: 120

Min. Passing Marks: 42

*Instructions to Candidates:**Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*1. NIL2. NIL**PART - A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 Explain some basic of AC Transmission.
- Q.2 Explain importance of FACTS.
- Q.3 Explain some applications of TCSC.
- Q.4 With reference to power quality explain "Tolerance".
- Q.5 Define some places in transmission lines where shunt compensation can be installed.
- Q.6 Explain importance of SPST switch.
- Q.7 What is a power swing damping?
- Q.8 Explain importance of reactive power control.
- Q.9 What do you understand by unbalance mitigation?
- Q.10 What is Fault Current Limiter?

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PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 What is need of FACTS device in transmitting power?
- Q.2 Give some difference between FACTS & STATCOM?
- Q.3 Explain the methodology adopted for Harmonics & control of SVC?
- Q.4 Explain the shunt & series compensation the midpoint of an AC line.
- Q.5 Explain the GTO controlled series compensator.
- Q.6 Explain the concept of Flicker and methods for its measurement.
- Q.7 Explain the working principle of Interphase power flow controller.

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[4×15=60]

Attempt any four questions

- Q.1 Explain the principle of a SSSC and explain how this controls reactive VAR's & damping oscillation by help of suitable example.
 - Q.2 Explain some power quality issues and explain technologies for their measurement and their probable causes.
 - Q.3 Design a FACT model having capability to store power & having power electronic based controllers for unbalance reactive power control in a transmission network.
 - Q.4 By help of mathematical modeling, explain the working module of series & shunt capacitor equipped with thyristor controller.
 - Q.5 Explain the need of voltage source converter, design a multilevel converter with space vector modulation and explain its output & efficiency.
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7E1735

Roll No. _____

Total No. of Pages: 3**7E1735****B. Tech. VII - Sem. (Main / Back) Exam., January - 2022****Open Elective - I****7EE6 –60.1 Electric Machine & Drives****Time: 3 Hours****Maximum Marks: 120****Min. Passing Marks: 42***Instructions to Candidates:**Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

Q.1 Draw the Torque-Speed characteristics of a DC series motor.

Q.2 An induction motor having 8 poles runs on 50Hz supply. If it operates at full load at 720 rpm. Calculate slip.

Q.3 What are the solid state speed control methods used in DC motor?

Q.4 List the classification of drives based on classes of duty.

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- Q.5 What is Regenerative braking?
- Q.6 Why single phase induction motor is not self-starting?
- Q.7 Draw the heating and cooling curve of electric drives.
- Q.8 What are the advantages in operating choppers at high frequency?
- Q.9 How the eddy current losses will be reduced?
- Q.10 What are the advantages of a solid state device?

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 Write a brief note on the selection of motor rating.
- Q.2 Draw and explain a closed loop operation for a static Kramer controlled device.
- Q.3 Discuss operation of a dual converter in different modes feeding a separately excited dc motor drive.
- Q.4 Explain four quadrant operations in motor.
- Q.5 Explain the construction & operating principle of 1 - ϕ Induction motor.
- Q.6 Explain AC operation of magnetic circuits & derive the energy stored in magnetic field.
- Q.7 A 240V DC series motor takes 40 A when giving its rated output at 1500 rpm. Its resistance is 0.3Ω . Calculate the value of resistance that must be added to obtain the rated torque-
- (a) at starting
- (b) at 1000 rpm

PART – C**(Descriptive/Analytical/Problem Solving/Design Questions)****[4×15=60]****Attempt any four questions**

- Q.1 Explain the construction & working of chopper controlled DC drives.
- Q.2 Explain in detail about Static Scherbius System for recovery of slip power.
- Q.3 A 400V, 750 rpm, 70A DC shunt motor has as armature resistance of 0.3Ω . When running under rated conditions, the motor is to be braked by plugging with armature current limited to a 90A. What external resistance should be connected in series with the armature? Calculate the initial braking torque and its value when the speed has fallen to 300 rpm. neglect saturation.
- Q.4 The temperature rise of an electric motor is 40°C after 1 hour and 60°C after 2 hours. The motor current is 100A. Determine approximately its final temperature rise when it works on load cycle of 4 minutes working, 8 minutes rest with a current of 125A. Neglect the effect of iron losses.
- Q.5 Explain in detail about the different methods used for speed control of induction machine.
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7E1736

Roll No. _____

Total No. of Pages: 2**7E1736****B. Tech. VII - Sem. (Main / Back) Exam., January - 2022****Open Elective - I****7EE6 -60.2 Power Generation Sources****Time: 3 Hours****Maximum Marks: 120****Min. Passing Marks: 42***Instructions to Candidates:**Attempt all ten questions from Part A, five questions out of seven questions from Part B and four questions out of five from Part C.**Schematic diagrams must be shown wherever necessary. Any data you feel missing may suitably be assumed and stated clearly. Units of quantities used /calculated must be stated clearly.**Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*1. NIL2. NIL**PART – A****(Answer should be given up to 25 words only)****[10×2=20]****All questions are compulsory**

- Q.1 What is meant by solar greenhouse? [2]
- Q.2 Explain electromagnetic energy storage method. [2]
- Q.3 Describe the application of hydro fuel cell. [2]
- Q.4 Explain uses of HP turbine in thermal power plant. [2]
- Q.5 What you mean by hybrid system, explain with example. [2]
- Q.6 What is the use of blades in wind energy system? [2]
- Q.7 Write short note on Solar Panels. [2]
- Q.8 What is the use of nuclear moderator in nuclear power plant? [2]

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- Q.9 What is the Head race tunnels/channels with respect to hydro power plant? [2]
Q.10 Describe the cellulose and hemicellulose. [2]

PART – B

(Analytical/Problem solving questions)

[5×8=40]

Attempt any five questions

- Q.1 What is solar radiation? Explain its measurement process. [8]
Q.2 Explain Magnus effect-performance. [8]
Q.3 Explain Nuclear fission and fusion in detail. [8]
Q.4 Write short note on family biogas plants with its application. [8]
Q.5 Describe the open and closed OTEC cycles. [8]
Q.6 With a neat diagram explain the basic nuclear plant schemes with boiling water reactor. [8]
Q.7 What is Flat plate and concentrating collectors? Explain its working in solar thermal system. [8]

PART – C

(Descriptive/Analytical/Problem Solving/Design Questions)

[4×15=60]

Attempt any four questions

- Q.1 Explain Hydrogen energy production, storage, transportation and its utilization. [15]
Q.2 Explain the following with neat diagram –
(a) Solar pond [5]
(b) Solar cooker [5]
(c) Solar pumping [5]
Q.3 (a) Explain wind energy conversion system with a neat diagram. [8]
(b) What is Geothermal energy, explain its social and environmental aspects? [7]
Q.4 How Biomass energy is generated? Explain its usable forms, composition, fuel properties and applications. [15]
Q.5 With a neat diagram explain the open cycle and closed cycle gas turbine plants. [15]
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7E7041

Roll No. _____

Total No. of Pages: **2****7E7041****B. Tech. VII - Sem. (Main / Back) Exam., January - 2022****Electrical Engineering****7EE1A Power System Planning****Common for EE, EX****Time: 3 Hours****Maximum Marks: 80
Min. Passing Marks: 24***Instructions to Candidates:*

*Attempt any five questions, selecting one question from each unit.
All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**UNIT- I**

- Q.1 (a) Explain the power system planning. Write the difference between the national and regional planning. [8]
- (b) Explain the structure of a modern power system with the help of neat diagram. [8]

OR

- Q.1 (a) Explain the factor affecting the load of utility in forecasting modeling. Discuss the methods of load forecasting in detail. [10]
- (b) Describe in brief the electricity regulation in India. [6]

UNIT- II

- Q.2 (a) Explain power pooling and trading in India and its role in power system planning. [8]
- (b) What are the basic processes of cogeneration? What are its benefits? Explain. [8]

OR

- Q.2 (a) Explain the strategies for transmission and distribution planning in electrical power system. [10]
(b) Explain the components of rural electrification planning in India. [6]

UNIT- III

- Q.3 (a) What do you mean by state estimation? Explain with the help of block diagram the function of state estimation. [8]
(b) Explain the load management and load predication in power system. [8]

OR

- Q.3 (a) Explain the on-line power flow studies and computerized management in power system. [8]
(b) Explain system adequacy and security of power system reliability. [8]

UNIT- IV

- Q.4 (a) What is insulation coordination? Explain the principle of insulation coordination. [8]
(b) Define wheeling in power system and explain the typical objectives of wheeling. [8]

OR

- Q.4 (a) Explain the computer-aided planning in electrical power system. [8]
(b) Explain the greenhouse effect and its technological impact in brief. [8]

UNIT- V

- Q.5 (a) Explain the WASP programme for generation system expansion planning with the help of block diagram. [8]
(b) Explain the formulation of least cost optimization problem incorporating the capital for a thermal power plant. [8]

OR

- Q.5 (a) Explain the minimum assumed reliability constraints by using optimization method of programming. [8]
(b) Explain the operating and maintenance cost of various types of power plant. [8]
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7E7042

Roll No. _____

Total No. of Pages: 4**7E7042****B. Tech. VII - Sem. (Back) Exam., March - 2022****Electrical & Electronics Engineering****7EX2A Power System Analysis****EE, EX****Time: 3 Hours****Maximum Marks: 80**
Min. Passing Marks: 24*Instructions to Candidates:**Attempt any five questions, selecting one question from each unit.
All questions carry equal marks. Schematic diagrams must be shown wherever
necessary. Any data you feel missing suitably be assumed and stated clearly.**Units of quantities used/calculated must be stated clearly.**Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*1. NIL2. NIL**UNIT-I**

Q.1 (a) What is meant by per-unit value of any quantity? Why the per-unit system is used in power system analysis? Explain the advantages of per-unit system and derive the fundamental relations between the actual values and per-unit values. [8]

(b) Form bus admittance matrix for the following line data. [8]

Bus Code	Series impedance	Per unit line charging admittance $Y/2$
1 - 2	$0.02 + j0.08$	$0.0 + j0.04$
1 - 3	$0.06 + j0.24$	$0.0 + j0.03$
2 - 3	$0.04 + j0.16$	$0.0 + j0.025$
2 - 4	$0.04 + j0.16$	$0.0 + j0.025$
3 - 4	$0.01 + j0.04$	$0.0 + j0.015$

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OR

Q.1 (a) Explain the formation of admittance matrix. Also, explain the modification in admittance matrix. [8]

(b) Draw the pu impedance diagram for the power system shown in below figure. Neglect resistance and use a base of 100MVA, 220kV in 50Ω line. The rating of the generator, motor and transformer are - [8]

Generator : 40MVA, 25kV, $X'' = 20\%$

Motor : 50MVA, 11kV, $X'' = 30\%$

Y-Y Transformer : 40MVA, 33Y-220Y kV, $X = 15\%$

Y-Δ Transformer : 30MVA, 11Δ - 220Y kV, $X = 15\%$

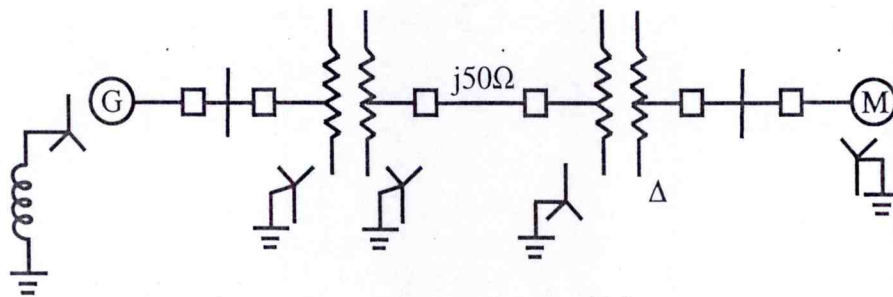
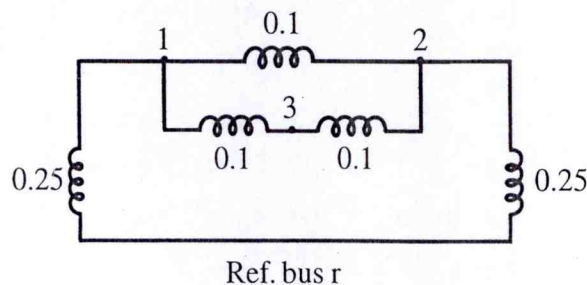


Fig.

UNIT- II

Q.2 (a) For the 3-bus network shown in below fig. build Z_{Bus} . [8]



Ref. bus r

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(b) Explain and draw the equivalent circuits of a synchronous machine for the following conditions: [8]

- (i) Transient condition
- (ii) Sub transient condition
- (iii) Steady state condition

OR

- Q.2 (a) Discuss the transient on a transmission line and also explain the doubling effect. [8]
- (b) Explain the modification of an existing bus. Discuss all possible conditions. [8]

UNIT- III

- Q.3 (a) Explain the phase shift in star-delta transformer with the help of suitable diagrams. [8]
- (b) Derive the expression for fault current of a single line to ground fault. [8]

OR

- Q.3 (a) A 25MVA, 13.2kV alternator with solidly grounded neutral has a sub transient reactance of 0.25pu. The negative and zero sequence reactance are 0.35 and 0.1pu respectively. A single line to ground fault occurs at the terminals of an unloaded alternator. Determine the fault current and line-to-line voltages. Neglect resistance. [8]
- (b) Derive the expression for sequence impedances of synchronous machine. [8]

UNIT- IV

- Q.4 (a) Derive the expression for fault current of a line to line fault. Also, draw the interconnection diagram of sequence networks. [8]
- (b) Explain the bus impedance matrix method for analysis of unsymmetrical shunt faults. [8]

OR

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- Q.4 (a) Discuss double line to ground fault using symmetrical components and draw the interconnection diagram of sequence networks. [8]
- (b) A 15MVA, 13.2kV alternator has $X'' = X_2 = 20\%$ and $X_0 = 8\%$. The neutral of this machine is grounded through a reactance of 0.5Ω . Compute initial symmetrical rms current in all the three phases of the machine when L-L fault occurs at its terminals under unloaded condition. The fault impedance is $j0.1pu$. [8]

UNIT- V

- Q.5 (a) Derive the static load flow equations of a power system. What are the practical applications of power flow analysis? [8]
- (b) Explain the fast decoupled method for load flow analysis. [8]

OR

- Q.5 (a) Explain the Gauss-Seidel method for load flow analysis. [8]
- (b) Write short notes on the following:
- (i) Load flow problem [2]
 - (ii) Bus classification [3]
 - (iii) Comparison of load flow methods [3]
-

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7E7043

Roll No. _____

Total No. of Pages: **3****7E7043****B. Tech. VII - Sem. (Back) Exam., March - 2022****Electrical & Electronics Engineering****7EX3A Artificial Intelligence Techniques****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 24***Instructions to Candidates:*

*Attempt any **five** questions, selecting **one** question from each unit. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL**UNIT- I**

Q.1 (a) Explain why Artificial Intelligence is beneficial even though computer cannot really think. How it is different from the Natural Intelligence System? [8]

(b) What are the various expert system tools? Differentiate between a shell and a tool? [8]

OR

Q.1 (a) What is Artificial Intelligence (AI) and Artificial Technique? What engineering fields are related with AI and what are their role in AI? [12]

(b) List some task domain of AI. [4]

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UNIT- II

Q.2 (a) State the difference between knowledge representation and knowledge acquisition. [8]

(b) How knowledge can be represented using logic rules, frames? [8]

OR

Q.2 (a) Write a recursive algorithm to implement depth first search. [8]

(b) Explain the difference between forward and backward chaining and under what conditions each would be best to use. [8]

UNIT- III

Q.3 Write a note on –

(a) Single layer perception [8]

(b) Multi-layer perception [8]

OR

Q.3 (a) Explain the concept of neural network. [8]

(b) What are different types of activation function? [8]

UNIT- IV

Q.4 Compare feedforward and feedback neural network. Back propagation algorithm methods comes in which type area. Explain the Back propagation with example. [16]

OR

Q.4 (a) Explain Kohonen's top field network and algorithm. [12]

(b) Explain Kohonen's algorithm application in Artificial Neural Network? [4]

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UNIT- V

Q.5 Write a note on any four -

[4×4=16]

- (a) Fuzzy controller
- (b) Fuzzy Set
- (c) Crossover
- (d) Sealing 2 fitness
- (e) Mutation
- (f) Population

OR

Q.5 (a) Design a flowchart of genetic algorithms in game playing.

[12]

(b) Describe Fuzzy logic concept.

[4]

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7E7044

Roll No. _____

Total No. of Pages: 3**7E7044****B. Tech. VII - Sem. (Main & Back) Exam., March - 2022****Electrical & Electronics Engineering****7EX4A Non-Conventional Energy Sources****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 24***Instructions to Candidates:*

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL _____2. NIL _____**UNIT- I**

Q.1 (a) What are non-conventional energy sources? Differentiate between conventional and non-conventional energy sources. [8]

(b) What is tidal power? What are the advantages and limitations of tidal power generation? [8]

OR

Q.1 (a) Explain about the Indian energy scene. [8]

(b) What are the various components of tidal power plants? Explain the double basin arrangement in tidal power plant. [8]

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UNIT- II

- Q.2 (a) What is solar radiation? Explain the working of a basic solar power plant. [8]
- (b) What is solar energy collector? Write the differences between flat plate collectors and concentrating type collectors. [8]

OR

- Q.2 (a) What is the difference between a solar cell and a solar cell array? Explain about the working of a basic photovoltaic power generating system. [8]
- (b) Explain the working of a solar pond. Also write the applications, benefits and drawbacks. [8]

UNIT- III

- Q.3 (a) Explain about the basic principle of wind energy conversion system. Also, write the applications of wind energy and five factors to be considered for good site selection. [8]
- (b) Explain the working of a basic geothermal steam power plant. Also, write five advantages and disadvantages of geothermal energy. [8]

OR

- Q.3 (a) What are the various basic electric generation schemes for wind power generation? Explain the working of constant speed constant frequency scheme. [8]
- (b) Describe with a neat sketch, the working of a binary fluid geothermal power plant. Write the applications of geothermal energy. [8]

UNIT- IV

- Q.4 (a) What is nuclear fission and nuclear fusion? What are the requirements for nuclear fusion? Also, write the advantages of nuclear fusion. [8]
- (b) Explain about the basic Tokamak reactor. What are the advantages of laser fusion reactor? [8]

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OR

- Q.4 (a) What is plasma confinement? Explain the difference between magnetic confinement and inertial confinement. [8]
- (b) What is fusion hybrid and cold fusion? [8]

UNIT- V

- Q.5 (a) What are biofuels? What are the different types of biomass categories? [6]
- (b) Explain the operations of Deen Bandhu Biogas Plant. Differentiate between fixed dome type and floating gasholder type biogas plants. [10]

OR

- Q.5 (a) Explain the operations of Pragati Design Biogas Plant. What are the various applications of biogas? [8]
- (b) Explain the basic process of ethanol production. What are the various uses of methanol? [8]

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7E7045

Roll No. _____

Total No. of Pages: 3**7E7045****B. Tech. VII - Sem. (Back) Exam., March - 2022****Electrical & Electronics Engineering****7EX5A Power System Engineering****EE, EX****Time: 3 Hours****Maximum Marks: 80
Min. Passing Marks: 24***Instructions to Candidates:*

*Attempt any five questions, selecting one question from each unit.
All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.*

Units of quantities used/calculated must be stated clearly.

*Use of following supporting material is permitted during examination.
(Mentioned in form No. 205)*

1. NIL2. NIL**UNIT- I**

- Q.1 (a) Derive an expression for economic distribution of load between power stations, considering losses in transmission line. [8]
(b) Briefly describe all types of system constraints. [8]

OR

- Q.1 (a) Derive an expression for the transmission loss. Find loss coefficient in terms of voltage and power factor. [8]
(b) The fuel inputs per hour of plants 1 and 2 are given as : [8]

$$F_1 = 0.2P_1^2 + 40P_1 + 120 \text{ ₹ per hr.}$$

$$F_2 = 0.25P_2^2 + 30P_2 + 150 \text{ ₹ per hr.}$$

Determine the economic operating schedule and the corresponding cost of generation if the maximum and 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 by loading the units as per equal incremental production cost.

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UNIT- II

- Q.2 (a) Derive the swing equation of a synchronous machine. [8]
(b) What is synchronizing power coefficient? Explain. [8]

OR

- Q.2 (a) Explain the power angle equation and power angle curve under steady state and transient conditions. [8]
(b) Discuss steady state stability of a power system. [8]

UNIT- III

- Q.3 (a) Explain the application of equal area criterion for the following cases - [8]
(i) A sustained line fault
(ii) A line fault cleared after sometime by the simultaneous tripping of the breakers at both the ends.
(b) Derive an expression for critical clearing angle and critical clearing time. [8]

OR

- Q.3 (a) Discuss the factors affecting the transient stability. How can transient stability be improved. [8]
(b) Explain the transient stability and equal area criterion in detail. [8]

UNIT- IV

- Q.4 (a) Explain brushless excitation system with its block diagram. [8]
(b) Write a short note on the following -
(i) Reserve capacity of power station [3]
(ii) Spinning reserve [3]
(iii) Isolated power system [2]

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OR

- Q.4 (a) Explain in detail excitation system of synchronous machine, types of excitation systems and elements of an excitation system. [8]
- (b) What is the need of system interconnection? What are the advantages and problems of interconnected power system? [8]

UNIT- V

- Q.5 (a) Explain the series compensation of transmission lines. What are the advantages and problems of series compensation? [8]
- (b) Explain the voltage stability in detail. [8]

OR

- Q.5 (a) Explain the power system security in detail. [8]
- (b) Write short note on the following –
- (i) Phase shifting transformer [4]
- (ii) Protection of series capacitor [4]
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Roll No. _____

Total No. of Pages: **3****7E7047****7E7047****B. Tech. VII - Sem. (Back) Exam., March - 2022****Electrical & Electronics Engineering****7EX6.2A Computer Aided Design of Electrical Machines****EE, EX****Time: 3 Hours****Maximum Marks: 80
Min. Passing Marks: 24***Instructions to Candidates:*

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL2. NIL

UNIT- I

Q.1 (a) Define specific magnetic loading and specific electric loading of an electrical machine and explain them. [4]

(b) List and explain briefly the limitations being imposed on the design of electrical machines. [7]

(c) Write and explain Ohm's law for magnetic circuit. [5]

OR

Q.1 (a) A 350 kW, 500 V, 450 rpm, 6 pole d.c. generator is built with an armature diameter of 0.87m and a core length of 0.32 m. The lap wound armature has 660 conductors. Calculate the values of specific magnetic loading and specific electric loadings. [8]

(b) Describe rest and apparent flux density. [8]

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UNIT- II

- Q.2 (a) Define cooling time constant of an electrical machine and draw its cooling time curve. [6]
- (b) Derive the equation for mmf required for air gap of a rotating machine having slotted armature, what is the meaning of effective length of air gap? [10]

OR

- Q.2 (a) Derive the equation for temperature rise of an electrical machine during its heating. Draw temperature rise-time curve and define heating-time constant. [8]
- (b) Write short note on "Hydrogen cooling of turbo alternators". [8]

UNIT- III

- Q.3 (a) Derive an equation for voltage per turn in terms of phase output of a transformer. [6]
- (b) Determine the main dimensions of the core, number of turns and the area of conductors for a 5kva, 50 Hz, 11000/ 400 V, single phase, core type distribution transformer. The net conductor area in the window is 60% of the net cross section (square) of the iron case. Assume a flux density of 1 Wb/m^2 , a current density of 1.4 A/mm^2 and a window space factor of 0.2. The window height is 3 times its width. [10]

OR

- Q.3 (a) Explain the difference between a power and distribution transformer from the design and working principles considerations. [8]
- (b) A 200 KVA, 6600/440 Volts, 3-phase, delta-star connected 50 Hz, core type transformer has the following particulars: [8]
- max flux density = 1.3 wb/ m^2
current density = 2.5 Amp/ mm^2
window space factor = 0.3
overall height = overall width
window area = 1.25 times core area
Determine the overall dimensions of core.

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UNIT- IV

- Q.4 (a) Explain and derive an expression for the output coefficient of an alternator. [8]
- (b) Determine the main dimensions of a 3000 kVA, 6.6 kV, 50 Hz, 187.5 rpm, 3 phase, star connected alternator. Also find the turns per phase. Given that Average flux density = 0.58 Wb/m^2 , specific electrical loading = 3500 ac/mt, pole-arc to pole-pitch ratio = 0.7. [8]

OR

- Q.4 (a) Explain the term "Short Circuit Ratio" and its effects on the performance of synchronous machines. Show that the short circuit ratio (SCR) of synchronous machines is inversely proportional to its synchronous reactance. [8]
- (b) Explain the design of stator core and winding. Also describe rotor design. [8]

UNIT- V

- Q.5 (a) Deduce the output equation of a 3-phase induction motor in terms of its specific loadings. Why the length of air gap in induction motor is kept as minimum as possible? [7]
- (b) Determine the main dimensions, turns per phase of a 250 hp, 3-phase, 50 Hz, 400 V, 1410 rpm, slip ring induction motor. Assume: Average flux density in air gap = 0.5 wb/m^2 , specific elect, loading = 30000 Ac/m, efficiency = 0.9, power factor = 0.9, winding = 0.955, ratio of core length to pole pitch = 1.2. The machine is delta connected. [9]

OR

- Q.5 (a) What do you mean by the phenomenon of cogging in case of squirrel cage induction motor. Why is an induction motor, the number of stator slots should never be equal to the number of rotor slots? [10]
- (b) Explain the design and working of stator core with suitable diagrams. [6]

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B. Tech. VII - Sem. (Back) Exam., March - 2022

Electrical Engineering

7EE6.3A Economic Operation of Power Systems

Time: 3 Hours

Maximum Marks: 80
Min. Passing Marks: 24

Instructions to Candidates:

Attempt any five questions, selecting one question from each unit. All questions carry equal marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.

Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No. 205)

1. NIL

2. NIL

UNIT- I

Q.1 (a) What do you mean by depreciation? Describe the straight line method and sinking fund method in brief to calculate the depreciation charge. [8]

(b) Derive an expression for the cost of electrical energy of generating plants. [8]

OR

Q.1 (a) A power plant has an initial cost of ₹ 2×10^8 . Assuming a salvage value of 15% and useful life of 25 years. [8]

(i) Find rate of depreciation by fixed percentage method.

(ii) Also find accumulated depreciation at the end of 10th year.

(b) Explain the factors affecting economic generation and distribution systems. [8]

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UNIT- II

- Q.2 (a) Explain the different methods of loading turbo – generators in a power plant. [8]
(b) Discuss about the input, output and heat rate characteristics. [8]

OR

- Q.2 (a) Explain about the economic scheduling considering transmission losses. [8]
(b) What are the effects of transmission losses? Explain the sequence of adding units. [8]

UNIT- III

- Q.3 (a) Explain about the base load and peak load operation requirement. [8]
(b) What are the various advantages of combined operation? [8]

OR

- Q.3 (a) Describe the importance of short term hydro thermal co – ordination. [8]
(b) Explain about the combined working of run off river and steam plant. [8]

UNIT- IV

- Q.4 (a) Explain about the synchronizing current and power of generators. [8]
(b) Define infinite bus – bar. Discuss the necessary conditions for the parallel operations of alternators. [8]

OR

- Q.4 (a) Discuss about the effect of change in the excitation and load sharing effects of alternators. [8]
(b) Describe the followings –
(i) Control of active and reactive power [4]
(ii) Operating limits of alternators and operating characteristics [4]

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UNIT- V

- Q.5 (a) Explain the various techniques of break-even and minimum cost analysis with applications and limitations. [8]
- (b) Describe the followings –
- (i) Linear and non linear break-even [4]
- (ii) Economics for electrical goods and services [4]

OR

- Q.5 (a) Explain the concept of physical and financial efficiencies of electrical goods and services. [8]
- (b) Describe the followings –
- (i) Relationship between supper [4]
- (ii) Minimum cost analysis [4]
-

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