CBCS SCHEME

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15EE81

Eighth Semester B.E. Degree Examination, June/July 2019
Power System Operation and Control

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Explain the operating states of power system, with a neat diagram showing the transition between the states. **(08 Marks)**

b. Explain the algorithm of priority list method of unit commitment. **(08 Marks)**

OR

2 a. With a neat diagram explain the general configuration and major components of SCADA system. **(08 Marks)**

b. Explain the various constraints to be considered in unit commitment. **(08 Marks)**

Module-2

3 a. With mathematical model and constraint, explain r-λ iterative algorithm for short term hydrothermal scheduling. **(10 Marks)**

b. Two synchronous generators operate in parallel to supply a load of 400 MW. The capacities of the machines are 200 MW and 500 MW. Each has a droop characteristics of 4%. Their governors are adjusted so that the frequency is 100% on full load. Calculate the load supplied by each unit and frequency at this load. The system is 50 Hz system. **(06 Marks)**

OR

4 a. A two plant system with a hydral plant and a thermal plant has the following characteristics. The fuel cost characteristic of thermal plant is $F_T = 20P_{GT} + 0.04P_{GT}^2 Rs/hr$. The water discharge characteristics of hydral plant is $Q = 7.5P_{GH} + 0.004P_{GH}^2$ m^3/sec. The constant which converts incremental water discharge to incremental plant cost γ is 4.1×10^{-4} Rs/m^3 and $\lambda = 70$ Rs/MWhr, $B_{GH} = 0.0025$ MW^{-1}. Determine the generation of each plant, the load on the system and losses. **(08 Marks)**

b. Explain the following terms used in AGC:
i) Control area ii) Tie line
iii) Net interchange iv) Station control error **(08 Marks)**

Module-3

5 a. Derive the generator model, load model and combined generator load model of ALFC system. **(07 Marks)**

b. Two control areas are connected via a tie line with the following characteristics:
Area 1 : R1 = 1%, $D_1 = 0.8$, base MVA : 500
Area 2 : R1 = 2%, D = 1.0, base MVA : 500
A load change of 100 MW occurs in Area 1. Find the new steady state frequency, change in the line flow and change in generation of each area if the nominal frequency is 50 Hz. **(09 Marks)**

OR

6 a. A single area consists of two generators with following data:
G1: 200 MW $R_1 = 4\%$ (on machine base)
G2 : 400 MW $R_1 = 5\%$ (on machine base)
They are connected in parallel and share a load of 600 MW in proportion to their ratings, at 50 Hz. If 200 MW of load is tripped, what is the generation by each unit? What is the frequency at new load is D = 1.5 pu (on a base of 200 MW). Choose a base of 200 MW. Also find the increase in load due to frequency. **(08 Marks)**

b. Derive the state model of an isolated AGC system. **(08 Marks)**

Module-4

7 a. Explain the different methods of voltage control by reactive power injection. **(08 Marks)**

b. Three generating stations are connected to a common bus bar and as shown in Fig.Q7(b). For a particular system load the line voltage at bus x falls by 5 KV. Calculate the reactive power injection required to bring back the voltage to the original value. All pu values are on a base of 500 MVA.

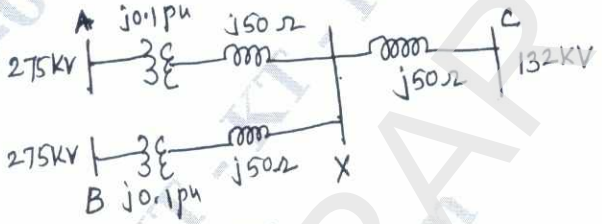

Fig.Q7(b) **(08 Marks)**

OR

8 a. Explain voltage control using; tap changing transformers, Booster transformers and phase shifting transformers. **(08 Marks)**

b. A 415 V, 50 Hz 3ϕ system delivers 500 KW at 0.8 p.f. lag. Shunt capacitors are installed to improve the p.f. to 0.92. Determine the value of capacitors needed if the capacitor bank is star connected. **(08 Marks)**

Module-5

9 a. With a neat flow chart, explain contingency analysis for generation outage using generation shift sensitivity factors. **(08 Marks)**

b. Explain the formulation and state estimate using linear least square estimation. Also explain the condition for observability in least square estimates. **(08 Marks)**

OR

10 a. With a neat flow chart, explain contingency analysis for line outage, using line outage distribution factors. **(08 Marks)**

b. Explain 1P1Q method for contingency Ranking. Also explain contingency processing using AC load flow analysis with a flow chart. **(08 Marks)**

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15EE82

Eighth Semester B.E. Degree Examination, June/July 2019
Industrial Drives and Applications

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Obtain expressions for equivalent load torque and equivalent of a motor drive with i) translational and ii) rotational motion loads. **(08 Marks)**

b. A motor is equipped with a flywheel is to supply a load torque of 1000 N-m for 10 sec followed by a light load period of 200N-m long enough for the flywheel to regain its steady state period. It is desired to limit the motor torque to 700N-m. What should be the moment of inertia of the flywheel? Motor has an inertia of 10kg-m^2. Its no load speed is 500rpm and the slip at a torque of 500 N-m is 50%. Assume speed torque characteristics of motor to be a straight line in the region of interest. **(08 Marks)**

OR

2 a. Explain clearly different components of load torque with its characteristics. Also give a brief description of classification of load torques. **(08 Marks)**

b. A drive has the following parameters:
J = 10 kg-m^2, T = 100 – 0.1N N-m, passive load torque T_l = 0.05N N-m where N is the speed in rpm. Initially the drive is operating in steady-state. Now it is to be reversed. For this motor characteristic is charged to T = -100 – 0.1N N-m. Calculate the time of reversal. **(08 Marks)**

Module-2

3 a. With usual notations derive expression for the temperature rise of a machine. Sketch the temperature rise v/s time curve. **(10 Marks)**

b. A constant speed drive has the following duty cycle:
i) Load rising from 0 to 400kW in 5 min.
ii) Uniform load of 500 kW for 5 min
iii) Regenerative power of 400kW returned to supply for 4 min
iv) Remains idle for 2 min. **(06 Marks)**

OR

4 a. Explain the single phase fully controlled rectifier control of separately excited DC motor. Also obtain equations for average out put voltage V_a and speed W_m. Assume discontinuous conduction mode. **(10 Marks)**

b. A 220V, 1500 rpm, 50A separately excited motor with armature resistance of 0.5Ω is fed from a 3 phase fully controlled rectifier. Available ac source has a line voltage of 440V, 50Hz. Determine the value of firing angle when
i) Motor is running at 1200 rpm and rated torque.
ii) Motor is running at -800 rpm and twice the rated torque. **(06 Marks)**

Module-3

5 a. Explain the behaviour of 3 phase induction motor when fed from a non-sinusoidal voltage supply. **(06 Marks)**

b. A 2200V, 260kW, 735 rpm, 50Hz, 8 pole, 3 phase, squirrel cage induction motor has the following parameters referred to the stator:

$R_s = 0.075\ \Omega$, $R_r^1 = 0.1\Omega$, $X_s = 0.45\Omega$, $X_r^1 = 0.55\Omega$. Stator winding is delta connected and consists of two sections connected in parallel.

i) Calculate starting torque and maximum torque as a ratio of rated torque, if the motor is started by star-delta switching. What is the max value of line current during starting?

ii) If the motor is started by connecting series reactors in line, what should be the value of reactors so as to limit the line current to twice the rated value? **(10 Marks)**

OR

6 a. Explain ac dynamic braking of 3 phase induction motor with i) Two lead ii) Three lead connections. **(10 Marks)**

b. Derive expressions for time required stop the induction motor by plugging when running at synchronous speed. **(06 Marks)**

Module-4

7 a. Explain with relevant diagrams the Voltage source Inverter (VSI) control of 3 phase induction motor. What are the disadvantages of this method, how they can be minimized? **(08 Marks)**

b. Explain the closed loop control for VSI controlled 3 phase induction motor. **(08 Marks)**

OR

8 a. Explain the 3 phase induction motor fed from a variable frequency CSI. What are its advantages and disadvantages and remedial measures? **(06 Marks)**

b. A single phase, 220V, 50Hz, 1425 rpm induction motor has the following parameters:

$Rs = 2\Omega$, $R_r^1 = 5\Omega$, $X_s = X_r^1 = 6\Omega$ and $X_m = 60\Omega$. It drives a fan load at rated speed when full voltage is applied. Motor speed is controlled by the stator voltage control. Calculate the motor terminal voltage for a speed of 1200 rpm. **(10 Marks)**

Module-5

9 a. Explain self controlled synchronous motor drive employing load commutated thyristor inverter. **(08 Marks)**

b. Explain brushless dc motor drive for servo applications. **(08 Marks)**

OR

10 a. Explain variable reluctance type stepper motor. **(08 Marks)**

b. Explain the drive requirements for i) Steel rolling mill ii) Cranes and hoists. **(08 Marks)**

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15EE833

Eighth Semester B.E. Degree Examination, June/July 2019
Integration of Distributed Generation

Time: 3 hrs. Max. Marks: 80

Note: ***Answer any FIVE full questions, choosing ONE full question from each module.***

Module-1

1 a. Explain the properties and space requirements of the solar power. **(08 Marks)**
b. Explain the properties of large and small Hydro with their variation with time. **(08 Marks)**

OR

2 a. Explain the properties of wind power and power distribution as a function of wind speed. **(08 Marks)**
b. List the different reasons for new type of power production in power system. **(08 Marks)**

Module-2

3 a. Discuss about any tow possible schemes of interfacing distributed generation to grid. **(08 Marks)**
b. Discuss about primary and secondary aims of the power system. **(08 Marks)**

OR

4 a. Explain the full power electronics coupling with the grid. **(08 Marks)**
b. Write a note on voltage and current quality concerned to distributed generation. **(08 Marks)**

Module-3

5 a. Explain the energy management systems in distributed generation. **(08 Marks)**
b. Explain the advanced protection schemes used in distributed generation. **(08 Marks)**

OR

6 a. With an example, explain two-stage boosting concerned to voltage variations. **(10 Marks)**
b. Explain the basic design rules of distribution feeders. **(06 Marks)**

Module-4

7 a. Explain the fast voltage fluctuations in wind and solar power. **(08 Marks)**
b. Explain how hosting capacity can be increased by dynamic voltage control. **(08 Marks)**

OR

8 a. Explain the voltage unbalance in weaker transmission system. **(08 Marks)**
b. Explain the stronger distribution system in distributed generation concerned to voltage unbalance. **(08 Marks)**

Module-5

9 a. Explain the low frequency harmonics in induction and synchronous generators. **(08 Marks)**
b. Explain about the balanced and unbalanced voltage dips in synchronous machines. **(08 Marks)**

OR

10 a. Explain the parallel and series resonance concerned to harmonics. **(08 Marks)**
b. Explain how hosting capacity can be increased by strengthening the grid and with emission limits for generator units. **(08 Marks)**

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15ML81

Eighth Semester B.E. Degree Examination, June/July 2019
Medical Imaging System

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. With respect to the x-ray generation explain the concept of white radiation and characteristics radiation. **(08 Marks)**

b. Discuss the different parameters considered in the image characteristics of x-ray image. **(08 Marks)**

OR

2 a. Classify the different interaction between x-rays and matter, explain them in detail. **(08 Marks)**

b. Mention some of the disadvantages of intensifying screen and explain how problem is solved by using image intensifier with a neat diagram. **(08 Marks)**

Module-2

3 a. With a relevant equation explain briefly reflection and refraction of ultrasound. **(08 Marks)**

b. Explain the silent aspect of mechanical and electrical matching of ultrasonic transducer. **(08 Marks)**

OR

4 a. Explain the following terms with respect to ultrasound a mode technique.
i) Signal compression
ii) Time gain compensation. **(06 Marks)**

b. With a neat diagram explain the working principle of Doppler and the Doppler method used in the detection of blood vessel in the ultrasound imaging system. **(10 Marks)**

Module-3

5 a. Explain the different interaction of Nuclear particles and matter. **(08 Marks)**

b. With a neat diagram explain the basic working principle of SPECT scanner. **(08 Marks)**

OR

6 a. Explain the following :
i) Nuclear particle
ii) Nuclear activity and Half life. **(06 Marks)**

b. Mention and explain different test performed using radiation detector probes in diagnostics methods of radio nuclide imaging. **(10 Marks)**

Module-4

7 a. Explain the following with respect to nuclear magnetic resonance.
i) Larmor frequency
ii) Fierier spectrum **(06 Marks)**

b. Explain the different relaxation times seen in nuclear magnetic resonance imaging. **(10 Marks)**

OR

8 a. Describe the concept of magnetic Dipole moment and magnetization with respect to nuclear magnetic resonance. **(08 Marks)**

b. Discuss briefly the spatial resolution and image contrast characteristics of MRI images. **(08 Marks)**

Module-5

9 a. Discuss the principle and operation of thermal camera based on IR sensor. **(08 Marks)**

b. List and explain any 4 common application of thermography. **(08 Marks)**

OR

10 a. What is stereotactic neurosurgery? Discuss stereotactic neuro surgery based on digital image volume with respect to image acquisition. **(08 Marks)**

b. What is intra operative imaging? Discuss the salient features of intra operative diagnostic imaging. **(08 Marks)**

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15ML82

Eighth Semester B.E. Degree Examination, June/July 2019
Neural Networks and AI in Biomedical Engineering

Time: 3 hrs. Max. Marks: 80

Note: Answer any FIVE full questions, choosing ONE full question from each module.

Module-1

1 a. Define neural network. Give the properties and capabilities offered by neural networks. **(05 Marks)**

b. Explain the basic elements of neuronal model. **(06 Marks)**

c. What is signal-flow graph? Explain the basic rules for flow of signals in graph. **(05 Marks)**

OR

2 a. With block diagram, explain the model of machine learning. **(05 Marks)**

b. Explain supervised learning with block diagram. **(05 Marks)**

c. Discuss error-correction learning with block diagram. **(06 Marks)**

Module-2

3 a. Describe competitive learning with equations. **(06 Marks)**

b. Explain the distinctive characteristics of multilayer perception. **(06 Marks)**

c. Explain the signals in multilayer perception network. **(04 Marks)**

OR

4 a. Discuss the architectural graph of network for solving XOR problem with an example. **(08 Marks)**

b. Describe the basic modes of back-propagation learning. **(08 Marks)**

Module-3

5 a. Explain the Fisher's linear discriminant method with necessary equations. **(08 Marks)**

b. Discuss Minimum Squared Error (MSE) procedures for categorization of nonlinearly separable sets. **(08 Marks)**

OR

6 a. Explain the criterion functions used to measure the quality of partition of data. **(08 Marks)**

b. Give the biomedical applications of neural networks. **(08 Marks)**

Module-4

7 a. Describe the second-generation expert systems. **(07 Marks)**

b. List the advantages and limitations of production systems. **(09 Marks)**

OR

8 a. Explain the general structure of production rules in knowledge representation. **(06 Marks)**

b. Explain the types of learning in knowledge acquisition. **(06 Marks)**

c. What are object-oriented databases? Give its advantages. **(04 Marks)**

Module-5

9 a. Give the definition of binary tree with examples. **(05 Marks)**

b. Obtain the AND/OR graph for $\int \{x \cdot \cos x + x^5\}\, dx$. **(03 Marks)**

c. Write the algorithm for:

i) Depth-first blind search

ii) Breadth-first blind search. **(08 Marks)**

OR

10 a. Explain the techniques in game tree searching. **(08 Marks)**

b. Discuss the types of inference engines in rule based expert systems. **(08 Marks)**

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15ML831

Eighth Semester B.E. Degree Examination, June/July 2019
Bio - MEMS

Time: 3 hrs. Max. Marks: 80

Note: *Answer any FIVE full questions, choosing ONE full question from each module.*

Module-1

1 a. Define MEMS. Describe in detail the working of MEMS as a microsensor, microactuator and as a microsystem. **(08 Marks)**

b. Summarize the applications of biomedical sensors and biosensors. **(08 Marks)**

OR

2 a. Briefly describe the different types of chemical sensors. **(04 Marks)**

b. Differentiate between Microsystem and Microelectornics. **(06 Marks)**

c. Explain in detail about the driving force behind biomedical applications. **(06 Marks)**

Module-2

3 a. Elaborate the four principal means of micro actuation. **(10 Marks)**

b. Describe in brief the concepts of Plasma physics. **(06 Marks)**

OR

4 a. Explain the applications of electrochemistry in microfabrication and microsystem design. **(08 Marks)**

b. Briefly describe the scaling issues in electrostatic forces. **(04 Marks)**

c. Summarize the concept of ion and ionization. **(04 Marks)**

Module-3

5 a. Explain the concept of static bending of circular plates and rectangular plates in microsystem design. **(08 Marks)**

b. Describe the schemes of electrochemical , chemiluminescence and bioluminescence detection. **(08 Marks)**

OR

6 a. Describe the principle of Raman microscopy and surface enhanced resonance Raman scattering. **(08 Marks)**

b. Describe the concepts of static bonding of square plates and mechanical vibrations in micro system design. **(08 Marks)**

Module-4

7 a. Describe in detail, the silicon compounds that are used in Microsystems. **(08 Marks)**

b. Elaborate the concept of tissue engineering and explain how cell patterning can be done. **(08 Marks)**

OR

8 a. Describe the emerging Bio – MEMS technologies in endoscopy and diabetes. **(08 Marks)**

b. Explain in detail, the polymers used in MEMS and microsystem applications. **(08 Marks)**

Module-5

9 a. With the help of neat diagrams, explain the process steps involved in photolithography. (08 Marks)

b. Give an overview of the design considerations and constraints for a microsystem. (08 Marks)

OR

10 a. With neat diagrams, explain the process of chemical vapour deposition and physical vapour deposition. (08 Marks)

b. Explain the major fabrication steps and materials used in LIGA process. (08 Marks)

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