Sl.No. 3038 SUBJECT CODE: 44717304

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third/Fifth Semester
ELECTIVE - EHV POWER TRANSMISSION

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What are the advantages and disadvantages of transmitting the power by three phase AC system?

2 Elucidate break even distance.

3 What is bundled conductor?

4 Elucidate neutral loading of lines.

5 What is meant by high temperature super conducting technology (HTSC)?

6 Elucidate Electrostatic effect.

7 Define disruptive critical voltage and visual critical voltage.

8 Differentiate between I^2R and corona loss.

9 State the minimum clearances between the conductors of a power line and telecommunication cable for 22kv, 400kv, 760kv lines.

10 List any three applications to be followed for measurement of ES field.

PART-B (5 x 16 = 80)

11 a. A 2 wire dc distributor is changed to a 3wire dc system by running a third similar conductor. For the same percentage of loss and same consumer's voltage, calculate the additional power which can be supplied. Assume balanced loads.

OR

b. A single circuit 3-phase 50 Hz, 400KV line has series reactance per phase of 0.327 ohm/km. Neglect line resistance. The line is 400km long and the receiving end load is 600Mw at 0.9p.f. lag. The positive sequence line capacitance is 7.27nF/km. In the absence of any compensating equipment connected to ends of line, calculate the sending end voltage work with and without considering line capacitance. The base quantities for calculation are 400KV, 1000MVA.

12 a. A three phase 500kv line has a building arrangement of two conductors per phase.. Each conductor carries 50% of phase current. Assume full transposition and following parameters :Diameter of conductor =30 mm ; Span between centre of 2 conductors per phase =0.5m ;Span between the conductors of each phase =15m . Compute the reactance per phase of this line at 50 Hz

OR

b. Discuss briefly about the calculation of sequence inductance and capacitance.

13 a. Explain about accurate methods for the multiconductor problem and markt and mengele's method.

OR

b. Derive an equation for distribution of voltage gradient on sub conductors of bundle and draw the characteristics.

14 a. A 3 phase 50Hz, 1000KV transmission line has conductor in equilateral formation spaced 2.5 m apart .the conductor diameter is 1.04 cm and the surface factor is 0.85. The air pressure and temperature are 74 cm of Hg and 210C. Determine the critical visual voltage for corona and the corona loss per km per phase of the line. Take mv=0.72

OR

b. Describe briefly about the charge voltage diagram and corona loss.

15 a. Compare the wire antenna and transmission line model for transient analysis of grounding electrodes.

OR

b. Describe briefly the meters and measurements of electrostatic fields.

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Sl.No. 3062 SUBJECT CODE: 44717206

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third Semester
ELECTIVE - FLEXIBLE AC TRANSMISSION SYSTEM

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Define fixed series compensation.

2 Define phase angle regulator.

3 What is meant by enhanced power control strategies of TCSC?

4 What is need of sub synchronous resonance?

5 List the implementation methods of unified power flow controller.

6 List the switching devices used in SSSC.

7 Compare SVC-SVC interactions in power system.

8 Draw a diagram of non linear Variable Structure FACTS controller.

9 Define saturation.

10 How the controlled reactor is differing from reactor?

PART-B (5 x 16 = 80)

11 a. Explain the operating characteristics of a TCR (i) without voltage control and (ii) with voltage control.

OR

b. Explain the different types of controller are used in AC transmission.

12 a. Derive the expression to obtain the torsional torque during compensation.

OR

b. Elucidate how the system stability and system damping can be improved by TCSC.

13 a. Elucidate the principle and operation of STATCOM with neat diagram.

OR

b. Explain in detail about independent real and reactive power flow control.

14 a. Discuss about the TSSC-TCSC interactions in power system operation.

OR

b. Explicate the TCSC- TCSC interactions in power system operation

15 a. Explain briefly about Thyristor switched capacitor with neat sketch.

OR

b. Compare STATCOM and SVC in detail.

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Sl.No. 3027 SUBJECT CODE: 44717303

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third/Fifth Semester
ELECTIVE - WIND ENERGY CONVERSION SYSTEMS

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Which types of generators are used for wind turbine?

2 What are the assumptions to be considered for the design of wind turbine?

3 Give the merits of 3 blade rotor over 2 blade rotor.

4 Define power regulation.

5 Draw the structure of fixed speed squirrel-cage induction generator.

6 List the types of generator drive for the operation of WECS.

7 What is the need of variable speed system?

8 Write short notes on variable speed direct drive.

9 What is stand alone WECS?

10 What is fixed speed wind turbines?

PART-B (5 x 16 = 80)

11 a. Write short notes on.
i. Blades.
ii. Nacelle.
iii. Gear Box.
iv. Brake.
v. Yaw System

OR

b. Describe in detail about simple momentum theory.

12 a. Describe in detail about the rotor design considerations.

OR

b. Write short notes on :
i. Passive – Stall control.
ii. Active – Stall control.

13 a. Derive the transient model of Induction Generator.

OR

b. Briefly explain about fixed – speed wind turbine.

14 a. Describe the DFIG wind power system model.

OR

b. Discuss about variable speed Variable frequency scheme.

15 a. Briefly explain about the stand alone wind energy conversion system.

OR

b. Describe in detail about problems related with grid connections

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Sl.No. 3054 SUBJECT CODE: 44717205

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third Semester
HIGH VOLTAGE SWITCHGEAR

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What is time setting and plug setting multiplier?

2 What is an isolator?

3 Draw an Equivalent circuit of Transient recovery voltage during interruption of a small inductive current.

4 List the requirements of a high voltage circuit breakers

5 Write the importance of rating in circuit breakers.

6 Define positive sequence impedance.

7 List out the advantages of using air as arc quenching medium in high voltage circuit breakers?

8 List the application of circuit breaker.

9 Explain any one type tests of a high voltage circuit breaker

10 Mention the advanced techniques implemented in circuit breaker.

PART-B (5 x 16 = 80)

11 a. With a neat sketch explain high voltage oil filled condenser bushing.

OR

b. Write brief notes on dielectric in power system and describe the rating of mechanical strength of dielectric.

12 a. Briefly describe about Transient Recovery Voltage under Normal Operating Conditions

OR

b. Discuss the phenomena of capacitive current breaking with necessary illustrations?

13 a. Explain the concept of short circuit capacity of a bus with neat sketch.

OR

b. Derive the expression to calculate MVA rating in short circuit.

14 a. Briefly explain about arc quenching with neat sketch.

OR

b. With a neat sketch explain the functioning of SF6 gas circuit breaker

15 a. Describe the synthetic testing of high voltage circuit breakers.

OR

b. State the various tests carried out to prove the ability of a circuit breaker. Distinguish between type tests and routine tests.

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Sl.No. 3061 SUBJECT CODE: 44717104

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third Semester
POWER SYSTEM ANALYSIS

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Define sparse system.

2 Mention the advantages of gauss elimination method.

3 Compare the Newton Raphson and Fast Decoupled Method.

4 Write the load flow equation of FDLF method.

5 Define negative sequence component.

6 What are the objects of short circuit analysis?

7 Explain the Newton method of OPF.

8 Why the penalty function ordered to the objective function of OPF?

9 What is SLIB system?

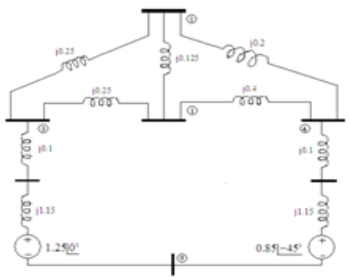
10 Draw the equivalent circuit of transformer ratio.

PART-B (5 x 16 = 80)

11 a. Find the L and U triangular factors of the symmetric matrix $M = \begin{pmatrix} 2 & 1 & 3 \\ 1 & 5 & 4 \\ 3 & 4 & 7 \end{pmatrix}$. Verify the result using $L = U^T D$.

OR

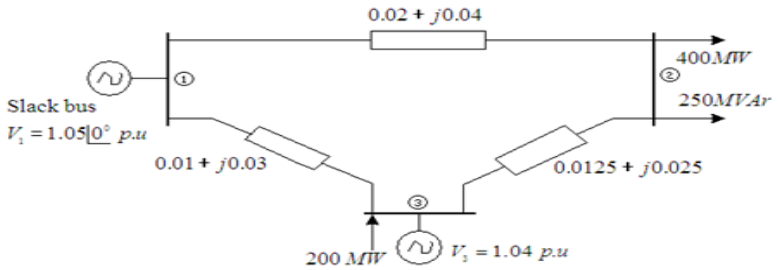
b. Using gauss elimination method, solve the nodal equation of the given figure, to find the bus voltages. At each step of the solution find the equivalent circuit of the reduced coefficient matrix.



(p.t.o)

12 a.

Determine the power flow solution by using FDLF method for the given system and apply the two iterations.



OR

b. Explain the sensitivity factors for PV bus adjustment.

13 a. Derive the equation for bus voltage, fault current and line current both in 012 frame and abc frame for line to line.

OR

b. A synchronous generator and motor are rated 30, 000 KVA, 13.2 KV and both have sub transient reactance of 20%. The line connecting them has a reactance of 10% on the base of the machine ratings. The motor is drawing 20,000 KW at 0.8 pf leading .The terminal voltage of 12.8 kV. When a symmetrical three- phase fault occurs at the motor terminals. Find the subtransient current in generator, the motor and at the fault by using internal voltages of the machines. using Thevenins theorem.

14 a. Derive the sensitivity coefficient of AC network model.

OR

b. Explain about the Interior Point algorithm.

15 a. (i) Explain about the Maximum power derived from the power flow.
(ii) Write the short notes on power – voltage relationship.

OR

b. Explain about the VQ curve.

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Sl.No. 3032 SUBJECT CODE: 44717201

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Second Semester
POWER SYSTEM CONTROL

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 State the necessity of large mechanical forces in speed governing system.

2 Enumerate the necessity of secondary ALFC loop.

3 Mention the types of tap changing transformer.

4 Derive the fundamental components of current wave form equation of TCR.

5 Enumerate the main function of SCADA.

6 Discuss about RTU.

7 Discuss about standard deviation.

8 What is diagonal matrix?

9 Draw the typical structure of deregulated electricity system.

10 Describe about demand in real time.

PART-B (5 x 16 = 80)

11 a. Derive an expression for the static frequency change of a single area ALFC. How can the static frequency change be compensated?

OR

b. The two 50 HZ power system are connected by means of interconnected cable of negligible impedance so that stations work in parallel.

Station A	Station B
15 MW full load capacity	1. 4 MW full load capacity
Regulation 3%	Regulation 4%

The Load on A is 10 MW and on B is 4MW. Calculate the generator output of the each station, power transmitted by the interconnection and operating frequency? Assume free governor action and the speed changes generators were set to have a frequency of 50 HZ

i. at No load
ii. at Full load

12 a. How is voltage control possible using tap changing transformer? How can tap ratio be calculated? Derive the necessary equation.

OR

b. A, B, C are connected to a common bus bar. Supply point A maintained at nominal 275kV and it is connected to M to a 275/132kV, transformer reactance of 0.1p.u and a 132 kV line of reactance 50ohm. Supply point B is nominally at 132 kV and connected to M to a 132 kV line of 50 ohm reactance. Supply point C is nominally at 275 kV to connect to M to 275 kV/132 kV of 0.1 reactance, 132 kV reactance 50 ohm if at a particular system load the line voltage. M falls below of its nominal voltage by 5 kV. Calculate the magnitude of reactive VA injection required at M to maintain voltage 500 MVA Base voltage.

13 a. Explain about reliability planning and monitoring.

OR

b. Illustrate about concentric relaxation.

14 a. Derive and explain the generation shift factor and linear sensitivity factor of power system.

OR

b. Give an algorithm of least square error method.

15 a. How deregulation has affected the power system and validate with example?

OR

b. Explain briefly about Load frequency control under deregulated environment.

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Sl.No. 3049 SUBJECT CODE: 44717204

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Fourth Semester
POWER SYSTEM OPERATION

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Describe Load factor.

2 Draw the load curve and load duration curve.

3 List the difficulties to find unit commitment solution.

4 Define minimum uptime.

5 How is incremental cost calculated?

6 Discuss the relationship between λ and power demand when the cost curve is given.

7 Write the significance of no spill rule curve.

8 How can the economic controller to be added as the tertiary loop of LFC control?

9 State diversity interchange.

10 Describe Allocating pool savings.

PART-B (5 x 16 = 80)

11 a. Explain briefly about Auto- Regressive Model and Auto-Regressive Moving.

OR

b. Explain about different types of load.

12 a. Obtain the priority list of unit commitment using full load average production cost for the given data for the load level of 900MW.

$$F_1 = 392.7 + 5.544P_1 + 0.001093P_1^2$$

$$F_2 = 217 + 5.495P_2 + 0.001358P_2^2$$

$$F_3 = 65.5 + 6.695P_3 + 0.004049P_3^2$$

Generation limits:

$$150 \le P_1 \le 600MW$$

$$100 \le P_2 \le 400MW$$

$$50 \le P_3 \le 200MW$$

There are no other constraints on system operation. Obtain an optimum unit commitment table.

OR

b. Explain the steps involved in solving the FLAPC.

13 a. Explain briefly about i) Effect of transmission losses.
ii) Representation of transmission losses

(p.t.o)

OR

b. Explain the procedure for DP situtrar to Hydro – Thermal scheduling problems.

14 a. What advantages accrue from operating a hydro and thermal plant in coordination?

OR

b. The transmission loss coefficients are given by

$$B_{mn} = \begin{bmatrix} 0.01 & -0.0003 & -0.0002 \\ -0.0003 & 0.0025 & -0.0005 \\ -0.0002 & -0.0005 & 0.0031 \end{bmatrix}$$

Three plants A, B, C supply powers of 50MW, 100MW and 200MW. Calculate the transmission loss in the network in p.u value and the incremental transmission loss of three plants. Assume base value = 200MVA.

15 a. Explain about multiple-utility interchange transactions.

OR

b. Discuss about transmission effects and issues.

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Sl.No. 3048 SUBJECT CODE: 44717102

VINAYAKA MISSIONS RESEARCH FOUNDATION
(Deemed to be University)
M.E -DEGREE EXAMINATIONS - FEB-2022
POWER SYSTEMS ENGINEERING
Third /Fifth Semester
POWER SYSTEM PROTECTION

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 What are the essential qualities of a relay?

2 How the relays are classified?

3 What is transverse fashion of connecting the CTs?

4 What are the merits of the carrier current relaying?

5 State the different types of faults.

6 What are the techniques applicable for line protection?

7 Define Busbar reactors.

8 How the capacitors are protected in a power system?

9 What is meant by digital data transmission?

10 What are the advantages of Numeric relay hardware?

PART-B (5 x 16 = 80)

11 a. What are the techniques used in the development of Static Relays?

OR

b. Derive and show the operating characteristics of an over current relay on an RX diagram.

12 a. Explain the typical stepped distance time characteristics for feeders fed from both ends.

OR

b. Explain the carrier system of protection with a suitable block diagram.

13 a. Compare the various systems of feeder protection.

OR

b. Explain briefly the carrier current protection.

14 a. Explain about overall differential protection of a three – phase series reactor.

OR

b. Explain in detail about protection of synchronous shunt compensators.

15 a. What is software consideration in protection?

OR

b. Explain in details about any two numeric relay algorithms.

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Sl.No. 3040 SUBJECT CODE: 44717202

VINAYAKA MISSIONS RESEARCH FOUNDATION

(Deemed to be University)

M.E -DEGREE EXAMINATIONS - FEB-2022

POWER SYSTEMS ENGINEERING

Second Semester

TRANSIENTS IN POWER SYSTEM

(Candidates admitted under 2017 Regulations-CBCS)

Time : Three Hours Maximum Marks:100 Marks

Answer **ALL** questions

Part-A (10 x 2 =20 Marks)

1 Describe ‘pre discharge current’.

2 Mention the parameters of lighting current?

3 What is the significance of resistance in transients?

4 Define transient recovery voltage.

5 Draw beweley’s lattice diagram.

6 Explain attenuation of traveling wave.

7 Explain shielding angle.

8 Explain substation.

9 State frequency domain transient program?

10 Write the special expression for voltage and current for an open circuit.

PART-B (5 x 16 = 80)

11 a. Derive the expressions for voltage stress experienced by insulator when a stroke contacts a tower and midspan.

OR

b. Briefly explain about Electrification of thunderclouds.

12 a. Illustrate switching surges on integrated power systems.

OR

b. Explain briefly about
i) Switching transients
ii) Harmonics

13 a. Derive the differential equations and their solutions in time domain for travelling waves.

OR

b. Illustrate about time domain transient program (TTP). Give an example.

14 a. Explain the different methods employed for lightning protection of overhead lines?

OR

b. Write the short notes on insulation co-ordination of substation.

15 a. Obtain the solution in Laplace transform for a transmission line which is terminated with a line having matched impedance.

OR

b. Obtain the solution for a short circuited transmission line in Laplace transform.

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