Reg. No. : | | | | | | | | | | | | |

Question Paper Code: U7302

B.E./B.Tech. DEGREE EXAMINATION, NOV 2024

Seventh Semester

Electrical and Electronics Engineering

21UEE702 – POWER SYSTEM OPERATION AND CONTROL

(Regulations 2021)

Duration: Three hours | Maximum: 100 Marks

PART A - (10 x 1 = 10 Marks)

1. Demand factor is the CO1 -U

   (a) Maximum Demand /Average Deman

   (b) Maximum Demand /Connected Load

   (c) Average Demand /Maximum Demand

   (d) Connected Load / Maximum Demand

2. The load of a consumer is generally measured in terms of CO1 -U

   (a) Volts (b) Amperes (c) Ampere hour (d) kW.

3. The units of speed regulation of governor are CO1 -U

   (a) Hz (b) Hz per MVA (c) Hz per MW (d) None of the Above

4. The maximum permissible change in system frequency is CO1 -U

   (a) ±6% (b) ±2.5% (c) ±5% (d) ±1%

5. Which of the following method may be used to inject reactive power in the transmission line? CO1 -U

   (a) Series capacitor (b) Series capacitors

   (c) Synchronous capacitors (d) All above

6. The permissible voltage variation in transmission and distribution system is CO1 -U

   (a) ± 0.1% (b) ± 1% (c) ±10% (d) ± 25%.

7. In economic dispatch including transmission losses, the effect of increased penalty is to CO1 -U

(a) increased load on that generator (b) decreased load on that generator

(c) keep the load on that generator constant (d) either (a) or (b)

8. Unit commitment of more number of generating units is done using CO1 -U

(a) gradient method (b) nonlinear programing approach

(c) dynamic programming method (d) all the above

9. Power system security means CO1 -U

(a) Security of power system when load unbalanced

(b) Practices designed to keep the system operating when the components fail

(c) Secure the all the generating station against the failure

(d) Secure the all the transmission line against the failure

10. Which of this power plant is started first after system black out CO1 -U

(a) Thermal (b) Nuclear (c) Hydro (d) All of above

PART – B (5 x 2= 10Marks)

11. Outline the objective of power system operation and control. CO1 -U

12. What is ACE? CO1 -U

13. Mention the significance of Static VAR Compensator (SVC). CO1 -U

14. Mention the advantages of using participation factor. CO1 -U

15. Define SCADA. CO1 -U

PART – C (5 x 16= 80Marks)

16. (a) A generating station has the following daily load cycle: CO1 -App (16)

Time (Hours)	0-6	6 - 10	10- 12	12 – 16	16 - 20	20 - 24
Load (MW)	20	25	30	25	35	20

Draw the load curve and calculate

(i) maximum demand

(ii) units generated per day

(iii) average load

(iv) load factor

Or

(b) A generating station has the following daily loads: CO1 -App (16)

0 – 6 hrs	4500 kW
6 – 8 hrs	3500 kW
8 – 12 hrs	7500 kW
12 – 14 hrs	2000 kW
14 – 18 hrs	8000 kW
18 – 20 hrs	2500 kW
20 – 24 hrs	5000 kW

Sketch the load duration curve and determine the load factor and plant capacity factor, if the capacity of the plant is 12 MW.

17. (a) Two synchronous generators operating in parallel. Their capacities are 300 MW and 400 MW. The droop characteristics of their governor are 4% and 5% from no load to full load. Assuming that the generators are operating at 50 Hz at no load, how would be a load of 600 MW shared between them. What will be the system frequency at this load? Assume free governor action CO2 -App (16)

Or

(b) Two 750 kW alternators operate in parallel. The speed regulation of one set is 100% to 103% for full load to no load and that of other is 100% to 104%. How will the two alternators share a load of 1000 kW? What will be the system frequency at this load? Assume free governor action. CO2 -App (16)

18. (a) Explain the methods in voltage control CO3 -U (16)

(i) Tap changing transformer (10)

(ii) Regulating Transformers & Boosters (6)

Or

(b) Explain the methods in voltage control CO3 -U (16)

(i) Switched Capacitors (8)

(ii) Static VAR compensators (8)

19. (a) Derive the co-ordination equation, conditions and inequalities for the economic dispatch problem with losses. CO4 -App (16)

Or

(b) Consider three units, CO4 -App (16)

$C1=561+7.92P1+0.00156P1^2$

$C2=310+7.85P2+0.00194P2^2$

$C3=780+7.97P3+0.00482P3^2$

Unit	Minimum	Maximum
1	150	600
2	100	400
3	50	200

Find the priority by which the units are committed and decommitted.

20. (a) With a neat State transition diagram, Explain the operating states of a power system in the security perspective with an example. CO5 -U (16)

Or

(b) Explain about the Need of computer control of power systems. CO5 -U (16)