Register Number:……..

KUMARAGURU
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B.E DEGREE EXAMINATIONS: MAY 2018

(Regulation 2015)

Sixth Semester

ELECTRICAL AND ELECTRONICS ENGINEERING

U15EEPE27**:** Smart Grid Engineering

COURSE OUTCOMES

CO1: Understand the fundamental elements of the smart grid.

CO2: Have knowledge on communication and networking technologies involved with the smart grid.

CO3: Understand various sensing and measurement technologies involved with the smart grid.

CO4: Illustrate the concepts of control and automation techniques in smart grid.

CO5: Understand the role of power electronics in smart grid and to classify the different energy storage techniques.

CO6: Apply and pass on knowledge, perspectives and terminology regarding Smart Grid as a basis for innovation in the energy sector.

Time: Three Hours **Maximum Marks: 100**

Answer all the Questions:-

PART A (10 x 1 = 10 Marks)

1. Matching the list I with II CO1 [K_2]

List I	List II
A. Flywheels	i. Home Area network
B. ADC	ii. Energy storage
C. DAC	iii. Successive approximation method
D. HVAC	iv. Sigma-delta method

	A	B	C	D
a)	ii	i	iii	iv
b)	iii	iv	ii	i
c)	ii	iii	iv	i
d)	iii	i	ii	iv

2. Dedicated communication channels are used for CO2 [K_2]

a) Differential protection of transmission lines
b) Protection of different mediums
c) Protection of transformers
d) All the above.

3. Sensors can be used for the following purposes in Smart Grid technology as CO3 [K_2]

i. Detect mechanical failures, ii. Tower erecting, iii. Real time mechanical and electrical conditions of power lines, iv. Diagnose imminent as well as permanent fault. The correct statements are

a) i,ii
b) ii,iv
c) i,iii,iv
d) i,ii,iii

4. In cryptography, the original message before being transformed is called CO3 [K_2]

a) Simple text
b) Plain text
c) Empty text
d) Filled text

5. Assertion (A): Demand side integration (DSI), the time of use pricing is complicated. CO4 [K_2]

Reason(R): Time of use rates reflect the cost of generation and delivering power during different time periods.

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

6. The primary function of the NAN is to _____ readings from smart meters. CO4 [K_2]

a) Fault
b) Transfer redundant
c) display
d) transfer consumption

7. The correct sequence in a smart metering is 1. NAN 2.Meter data management 3.Gateway 4.DNO 5.Database. CO2 [K_2]

a) 1-2-3-4-5
b) 1-3-2-4-5
c) 1-3-2-5-4
d) 5-4-3-1-2

8. Price elasticity is calculated as _____. CO6 [K_2]

a) $(\Delta D/D)/(\Delta P/P)$
b) $\Delta P/P$
c) $(D/\Delta D)/(\Delta P/P)$
d) $(\Delta P/P)/(\Delta D/D)$

9. Assertion (A): Flow batteries electrodes have long life. CO6 [K_2]

Reason (R): The electrodes do not take part in the chemical reaction.

a) Both A and R are Individually true and R is the correct explanation of A
b) Both A and R are Individually true but R is not the correct explanation of A
c) A is true but R is false
d) A is false but R is true

10. Rogowski coils wound on a _____ core. CO5 [K_2]

a) Magnetic
b) Non-magnetic
c) saturated
d) copper

PART B (10 x 2 = 20 Marks)

(Answer not more than 40 words)

11. State the working definition of Smart Grid. CO1 [K_2]
12. How do you classify the communication channels? CO2 [K_2]
13. What factors should the security measure ensure in smart grid for reliable data communication? CO3 [K_2]
14. List the switching techniques used for data transfer. CO3 [K_2]
15. Summarize the benefits of advanced metering. CO6 [K_2]
16. What is meant by state estimation? CO4 [K_2]
17. Draw the basic block diagram of PMU. CO4 [K_2]
18. Conclude the usages of FACTs devices in power system. CO5 [K_3]
19. Draw the TCSC simplified connection diagram. CO5 [K_2]
20. Compare CSC with VSC. CO5 [K_2]

Answer any FIVE Questions:-

PART C (5 x 14 = 70 Marks)

(Answer not more than 300 words)

Q.No. 21 is Compulsory

21. Discuss in detail about the functions of the different smart grid components. CO1 [K_2]

22. List the various communication technologies for smart grid and write about each of them in detail with relevant sketch. CO2 [K_2]

23. Explain the communications infrastructure and protocols for smart metering. CO3 [K_2]

24.	Briefly explain		CO4	[K_2]
	(i) Smart Metering	(7)		
	(ii) EMS system	(7)		
25.	Describe the structure and functions of an EMS/SCADA system.		CO6	[K_2]
26.	Discuss various energy storage techniques in details.		CO5	[K_2]
27.	i) Write short notes on faults in distribution system.	(7)	CO4	[K_2]
	ii) Summarize the role of FACTs devices in smart grid system.	(7)	CO5	[K_3]

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