

8E4112

Roll No. \_\_\_\_\_

Total No of Pages: 4**8E4112****B. Tech. VIII Sem. (Back) Exam., April – May 2018****Electrical & Electronics Engineering****8EX4.3 (O) Non – Conventional Energy Sources****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 26***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.*

1. NIL \_\_\_\_\_2. NIL \_\_\_\_\_**UNIT-I**

- Q.1 (a) What is meant by renewable energy sources? Explain in brief these energy sources with special reference to Indian Context. [8]
- (b) State the basic working principle of Tidal Power . What are the basic operational methods of utilization of Tidal energy. [8]

**OR**

- Q.1 (a) Discuss briefly the possibilities of utilizing the Tidal energy of power generation. What are the limitations that Tidal energy is not being utilized in India on large scale. [8]
- (b) A tidal power plant of the simple single basin type has a basin area of  $30 \times 10^6 \text{ m}^2$ . The tide has a range of 12m. The turbine, however, stops operating when the head on it falls below 3m. Calculate the energy generated in one filling (or emptying) process in KWH, if turbine generator efficiency is 73%. [8]

## UNIT-II

- Q.2 (a) A PV system feeds a DC motor to produce 1 HP power at the shaft. The motor efficiency is 0.85. Each module has 36 multi crystalline Si – solar cells arranged in a  $9 \times 4$  matrix. The cell size is  $125\text{mm} \times 125\text{mm}$  and efficiency is 0.12. Calculate the number of modules required in the PC array. Assume Global Solar Radiation Incident (Normal) to the panel is  $1\text{kw} / \text{m}^2$  [8]
- (b) Estimate the rate at which the sun emits energy .What fraction of this energy is intercepted by the earth and determine the amount of interception. [8]

### OR

- Q.2 (a) What is the principle collection of solar energy used in a non-convective solar pond? Describe a method to maintain a stable density gradient in a solar pond. [8]
- (b) The glass of  $(1 \times 2)$  m flat-plate solar collector is at a temperature of  $80^\circ\text{C}$  and has an emissivity of 0.90. The environment is at a temperature of  $15^\circ\text{C}$ . Calculate the convection and radiation heat losses if the convection heat transfer coefficient is  $5.1 \text{ W} / \text{m}^2\text{k}$ . [8]

## UNIT-III

- Q.3 (a) What do you understand by attached and separated flow? With the help of labelled diagram show attached and stalled flow. [5]
- (b) What are the sub-classification of hydrothermal convective systems? Explain a vapor dominated or dry steam field in short. [5]
- (c) A hot water geothermal plant of total flow type receives water at  $225^\circ\text{C}$ . The pressure at turbine inlet is  $10.5 \text{ kg} / \text{cm}^2\text{a}$ . The plant uses a direct contact condenser that operates at  $0.35 \text{ kg} / \text{cm}^2\text{a}$ . The turbine was a polytrophic efficiency of 0.65. For a cycle, net output of 10MW, calculate-
- (i) Plant cycle efficiency [2]
  - (ii) Plant heat rate [2]
  - (iii) the hot water flow rate. [2]



OR

Q.3 (a) Derive the expression for maximum and minimum axial thrust expended by a wind turbine and also find the optimal conditions for such operation. [6]

(b) Wind at 1 atm. and 15°C has velocity of 15m/s. Calculate-

(i) total power density in wind stream [2]

(ii) Maximum obtainable power density [2]

(iii) total power [2]

(iv) reasonably obtainable power density [2]

(v) torque and axial thrust [2]

Given- Turbine diameter = 120m, Turbine operating speed = 40rpm (max efficiency). Wind Turbine Type: Propeller type.

UNIT-IV

Q.4 (a) Describe the Magnetic – Confinement – Fusion, consider D – T reaction. [8]

(b) Describe the structure of Tokamak reactor system for power generation. [8]

OR

Q.4 (a) Describe the different methods of plasma heating in fusion reaction. [8]

(b) Write short notes on-

(i) Cold Fusion [2]

(ii) Pellet-Fusion Reactor [2]

(iii) Lawson Criterion [2]

(iv) Magnetic Heating [2]

5/2

## UNIT-V

- Q.5 (a) With the help of a neat diagram, explain the working of a gasifier using wood – chip biomass .What further processing is required to use the gas produced in a diesel engine. [8]
- (b) Calculate the volume of a cow – dung based biogas plant required for cooking needs of a family of five (5) adults and lightning needs with two 100 C.P. lamps for 3 hours daily. Also, calculate the required number of cows to feed plant. [8]

### OR

- Q.5 (a) Explain the desirable features of bio – ethanol that makes it suitable as automobile fuel. What grade of bio – ethanol is required for blending with petrol? [8]
- (b) Calculate the volume of a fixed – dome type biogas digester for output of two cows. Also, calculate the thermal power available than bio – gas. Use following data, as needed-

Retention time	=	40 days	
Dry matter production	=	2kg / day / cow	
Biogas yield	=	0.22m <sup>3</sup> / kg of dry matter	
% of dry matter is cow dung	=	18%	
Density of slurry prepared	=	1090 kg / m <sup>3</sup>	
Burner efficiency	=	60%	
Heating value of biogas	=	23 MJ / m <sup>3</sup>	[8]

-----

8E4111

Roll No. \_\_\_\_\_

Total No of Pages: **3****8E4111****B. Tech. VIII Sem. (Back) Exam., April – May 2018****Electrical & Electronics Engineering****8EX3 (O) Switchgear & Protection****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 26***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.*

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

Q.1 (a) Draw and explain block diagram of static relays. [8]

(b) Give the comparison between static relays and electromechanical equivalents with respect to the following parameters of relays – [8]

- (i) Burden
- (ii) Response
- (iii) Resetting Time
- (iv) Overshoot
- (v) Precision
- (vi) Sensitivity

What are the limitations of static relays over electromagnetic relays?



**OR**

Q.1 Classify and describe various types of comparators used in static relay. [16]

**UNIT-II**

Q.2 (a) Explain the basic principle of operation of a percentage differential relay for [6]

(i) Internal fault,

(ii) External fault

(b) Describe static differential protection of transformer and generator with suitable diagram. And explain with reasons the connection of CTs for protection against internal faults in a delta-star transformer. [10]

**OR**

Q.2 (a) Draw and explain characteristics of different types of distance relay on the R-X diagram. Compare their merits and demerits. And discuss their application. [14]

(b) Define the terms reach, under reach, over reach. [2]

**UNIT-III**

Q.3 What is carrier current protection? For what voltage range is it used for the protection of transmission lines? What are its merits and demerits? Explain phase comparison scheme of carrier current protection with neat sketches. [16]

**OR**

Q.3 (a) What do you understand by out of step tripping? Discuss the operating principle of an out of step tripping relay. [8]

- 515
- (b) Discuss how an elliptical characteristic is realised using static comparators. Why is an elliptical characteristic used only for back – up protection? [8]

### UNIT-IV

Q.4 Discuss different methods of interrupting the arc current in circuit breakers. Explain two main theories of current zero interruption. [16]

#### OR

- Q.4 (a) Explain the terms – [8]
- (i) Recovery voltage
  - (ii) Restriking voltage
  - (iii) Rate of rise of restriking voltage
  - (iv) Breaking capacity of circuit breaker
- (b) Discuss the problems associated with the interruption of - [8]
- (i) Low inductive current
  - (ii) Capacitive current and suggest their remedies

### UNIT-V

Q.5 Describe the various types of SF<sub>6</sub> circuit breakers. What are its advantages over other types of circuit breakers? For what voltage range is it recommended? [16]

#### OR

Q.5 Explain basic components of a digital relay. Draw & describe block diagram of digital relay. Compare it with other types of relays. [16]

-----

8E8044

Roll No. \_\_\_\_\_

Total No of Pages: 4**8E8044****B. Tech. VIII Sem. (Main / Back) Exam., April – May 2018****Electrical & Electronics Engineering****8EX4.1A Utilization of Electrical Power****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 26***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.*

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

- Q.1 (a) Explain the principle of dielectric heating. Derive the mathematical expression of power consumed in such process. State important applications of dielectric heating. [8]
- (b) Compare in details, the electric arc welding with resistance welding. Explain with the help of a neat sketch the process of spot welding. [8]

**OR**

- Q.1 (a) A piece of an insulating material is to be heated by dielectric heating. The size of the piece is  $12\text{cm} \times 12\text{cm} \times 3\text{cm}$ . A frequency of  $20\text{ MHz}$  is used and the power absorbed is  $450\text{W}$ . If the material has a relative permittivity of 5 and a power factor of 0.05. Calculate the voltage necessary for heating and current that follows in the material? [8]



- (b) Discuss advantages of electric heating over conventional methods. Derive the condition for maximum power output for electric arc furnace .Obtain the power factor for such condition. [8]

## UNIT-II

Q.2 Differentiate the following-

- (a) Illumination and luminous intensity. [4]
- (b) Lamp efficiency and specific consumption. [4]
- (c) Maintenance factor and depreciation factor. [4]
- (d) Specular reflection and diffusion reflection. [4]

## OR

- Q.2 (a) Compare the metal filament lamp, with discharge lamp. What is the advantage of coiled coil? Describe principle of operation ,construction and working of a sodium discharge lamp. [8]
- (b) Compare fluorescent lamp,CFL and filament lamps on the basis of light, capital and running cost. [8]

## UNIT-III

- Q.3 (a) Explain the term 'Polarization', 'Throwing Power' and 'Electro-Deposition'. How are zinc and copper refined from their base metal electrically? [8]
- (b) What is meant by anodizing? Explain process of anodizing and describe the equipment used for it. [8]

OR

- Q.3 (a) Calculate the quantity of aluminium produced from aluminium oxide in 24 hours if average current is 2800 A and current efficiency is 98%. Aluminium is trivalent and atomic weight is 27. Chemical equivalent weight and ECE of silver are 107.98 and  $111 \times 10^{-8}$  kg/C respectively. [8]
- (b) What is electroplating? Describe various operations involved in electro plating. [8]

UNIT-IV

- Q.4 (a) What are the advantages and disadvantages of electric traction over other types of traction system? [8]
- (b) What are the merits and demerits of D.C system track electrification? [8]

OR

- Q.4 (a) Discuss merits and demerits of the single phase A.C system for main and suburban line electrification of the railways. [8]
- (b) What are different types of current collection? Give their merits and demerits. [8]

UNIT-V

- Q.5 (a) Using a simplified speed time curve of a railway train, derive expression [8]

$$\frac{1}{\alpha} + \frac{1}{\beta} = \frac{7200 D}{V_m^2} \left[ \frac{V_m}{V_a} - 1 \right]$$

Where  $\alpha$  and  $\beta$  are acceleration and retardation  $V_m$  is maximum speed, ' $V_a$ ' is average speed and  $D$  is total distance.

- (b) Discuss a method of electric braking for traction motors. [8]

**OR**

Q.5 (a) State the mechanical and electrical features of electric traction motors and discuss relative suitability of (i) DC series motor (ii) AC series motor. [12]

- (b) Write a short note on series-parallel starting. [4]

-----



8E8043

Roll No. \_\_\_\_\_

Total No of Pages: **4****8E8043****B. Tech. VIII Sem. (Main / Back) Exam., April – May 2018****Electrical & Electronics Engineering****8EX3A Protection of Power System.****EE, EX****Time: 3 Hours****Maximum Marks: 80  
Min. Passing Marks: 26***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.*1. NIL \_\_\_\_\_2. NIL \_\_\_\_\_**UNIT-I**

- Q.1 (a) What are different types of faults? What are the main objectives of power system protection? Draw and Explain trip circuit of circuit breaker. [6]
- (b) What are primary and backup protections? What are various kinds of backup protections? [5]
- (c) Discuss functional characteristics of a relay. [5]

**OR**

- Q.1 (a) What are instrument transformers? Give their advantages and uses. [4]
- (b) What are ratio and phase angle errors in CTs? Give causes and remedies for them. [6]
- (c) Define the terms: [6]
- (i) Rated short-time current
  - (ii) Short-time factor
  - (iii) Composite error
  - (iv) Rated short-circuit current.

## UNIT-II

- Q.2 (a) Describe the construction, principle of operation and application of an induction disc type of relay. [6]
- (b) Explain why the ratio of reset to pickup should be high. [2]
- (c) Show that the torque on the disc of an induction disc relay is maximum when the phase difference between the two fluxes is 90°. Indicate the direction of rotation of the disc with reference to the fluxes under the poles. [6]
- (d) Define the terms: [2]
- (i) Pick up value
  - (ii) Reset value
  - (iii) Operating time
  - (iv) Reset time

### OR

- Q.2 (a) Classify the various types of over current relays and give their applications along with approximate characteristics. [8]
- (b) An IDMT type overcurrent relay is used to protect a feeder through a 500/1 A CT. The relay has a PS of 125% and TMS = 0.3. Find the time of operation of the relay if a fault current of 5000 A flows through the feeder. The relay – characteristic curve is as follows- [8]

PSM	2	4	5	8	10	15
Time for unity TMS (100% current = 1A)	10	6	4.5	3.2	3	2.5



### UNIT-III

Q.3 (a) Discuss different types of faults that occur in a generator. [8]

(b) Explain:-

(i) Protection against inter-turn fault in generator. [4]

(ii) Stator overheating protection. [4]

### OR

Q.3 (a) Describe the rotor earth fault protection & loss of excitation protection schemes for generator. [8]

(b) Explain the protection of a generator against unbalanced currents. [8]

### UNIT-IV

Q.4 Explain the principle of Merz-prize system of protection used for power transformers.

What are the limitations of this scheme & how are they overcome? Explain the basic principle of differential scheme of protection & state its advantages. Discuss differential protection for 3-phase delta/star transformer. [16]

### OR

Q.4 (a) Explain differential protection of a bus using a high-impedance relay. [8]

(b) What is the frame leakage protection of bus bars? Discuss its principle & field of application. [8]



523

## UNIT-V

Q.5 What is universal torque equation? Using this equation derive the following characteristics: [16]

- (a) Impedance relay
- (b) Reactance relay
- (c) mho relay.

Draw the characteristics and indicate clearly the zones of operation and no-operation and explain how you provide directional feature to:

- (i) Impedance and
- (ii) Reactance relay.

Explain why the directional features provided for impedance relay cannot be used for a reactance relay.

### OR

Q.5 (a) Explain stepped time-distance characteristic of three distance relaying units used for first, second and third zones of protection. [10]

(b) Explain the term 'single phasing'. In what form protection is provided against single phasing. [6]

8E8042

Roll No. \_\_\_\_\_

Total No of Pages: 4

**8E8042**

**B. Tech. VIII Sem. (Main / Back) Exam., April – May 2018**

**Electrical & Electronics Engineering**

**8EX2A Electric Drives and Their Control**

**EE, EX**

**Time: 3 Hours**

**Maximum Marks: 80**

**Min. Passing Marks: 26**

*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.*

1. NIL

2. NIL

### **UNIT-I**

Q.1 (a) Explain the multi-quadrant operation of an electric motor driving a hoist load?

Also discuss the different modes of operations of an electric drive? [8]

(b) How do you define passive and active load torques? What are the differences between the two? [8]

### **OR**

Q.1 (a) Explain steady state stability? What is the main assumption? [8]

(b) Explain the concept of load equalization in electrical drives? [8]

## UNIT-II

Q.2 (a) Explain dynamic braking and plugging in dc series motor with speed torque curves. [8]

(b) A 200 V, 875 rpm, 150A separately excited dc motor has an armature resistance of  $0.06 \Omega$ . It is fed from a single phase fully controlled rectifier with an AC source voltage of 220 V, 50 Hz. Assuming continuous conduction, Calculate [8]

(i) Firing angle for rated motor torque and 750 rpm.

(ii) Motor speed for  $\alpha = 160^\circ$  and rated torque.

### OR

Q.2 (a) Explain speed control of DC separately excited motor by single phase fully controlled rectifier in discontinuous conduction? Also Draw speed torque characteristic. [8]

(b) A 220 V, 970 rpm, 100A DC separately excited motor has an armature resistance of  $0.05\Omega$ . It is braked by plugging from an initial speed of 1000 rpm. Calculate: [8]

(i) Resistance to be placed in armature circuit to limit braking current to twice the full load value.

(ii) Braking torque, and

(iii) Torque when the speed has fallen to zero



### UNIT-III

- Q.3 (a) Explain the AC dynamic braking in Induction Motor Drives. [8]
- (b) Why stator voltage control is suitable for speed control of induction motor in fan and pump drives? Draw the various configuration of AC Voltage controller for three phase induction motor. [8]

#### OR

- Q.3 (a) Discuss plugging and Regenerative braking in induction motor drives? [8]
- (b) Discuss the variable frequency control method of an induction motor and explain. [8]
- (i) For speed above base speed, the terminal voltage is maintained constant, why?

### UNIT-IV

- Q.4 (a) Why the current source inverter fed induction motor drive is operated at a constant rated flux? Explain it. [8]
- (b) Explain static rotor resistance control of induction motor drive. [8]

#### OR

- Q.4 (a) Explain Static Scherbius Drive of Induction motor drives. [8]
- (b) Write short note on cycloconverter fed induction motor drives. [8]

## UNIT-V

Q.5 (a) Write short note on closed loop control of synchronous motor. [8]

(b) Explain in detail the dynamic and regenerative braking of synchronous motor with voltage source inverter. [8]

### OR

Q.5 (a) Distinguish between cylindrical rotor and salient pole type synchronous motor drive. [8]

(b) Explain the control of synchronous motor with current source inverter. [8]

-----

528

8E8041

Roll No. \_\_\_\_\_

Total No of Pages: **3****8E8041****B. Tech. VIII Sem. (Main / Back) Exam., April – May 2018****Electrical & Electronics Engineering****8EX1A EHV AC/DC Transmission****EE, EX****Time: 3 Hours****Maximum Marks: 80****Min. Passing Marks: 26***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.*

1. NIL2. NIL

### **UNIT-I**

Q.1 (a) What are the need of EHV transmission and Explain problem associated with it? [8]

(b) Describe in brief the surge impedance loading of a transmission line. [8]

**OR**

Q.1 (a) Explain audio and radio noise. [8]

(b) Explain the properties of the bundled conductors. How electrostatic field of EHV lines effects human, animals and plants? [8]



529

## UNIT-II

- Q.2 (a) Describe the Automatic generation control. [8]
- (b) Define the concept of load sharing between parallel operating generators. [8]

### OR

- Q.2 (a) Explain Tie line and Flat tie line load bias control methods. [8]
- (b) Describe the speed governing system to control the real power flow with the help of neat diagram. [8]

## UNIT-III

- Q.3 (a) Describe thyristorised static VAR compensators TCR, FC-TCR and TSC-TCR in detail. [8]
- (b) What do you mean by shunt compensation? How it is different from series compensation. [8]

### OR

- Q.3 (a) What do you mean by reactive power? Give various sources of reactive power. [8]
- (b) Briefly explain the various types of shunt reactors used to limit voltage rise. [8]

## UNIT-IV

- Q.4 Describe various types of FACTS controllers and explain usefulness in Power System. [16]

### OR

- Q.4 (a) Draw and explain the V-I characteristics of the STATCOM. [8]  
(b) Explain static VAR compensator with the help of schematic diagram. [8]

### **UNIT-V**

- Q.5 (a) What are the advantages and disadvantages of HVDC transmission system? [8]  
(b) Draw and explain the converter control steady state characteristics. [8]

### **OR**

- Q.5 (a) Describe types of HVDC links with the help of diagrams. [8]  
(b) Explain with schematic diagram operation of D.C. converter. [8]
-