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303
EE+EEE

Jharkhand University of Technology, Ranchi

Diploma 3rd Semester Examination, 2024 (NEP)

Subject : Switchgear & Protection **Subject Code : EEE-303**

Time Allowed : 3 Hours **Full Marks : 70**

Answer in your own words.

Answer any five *questions in which* Question No. 1 *is compulsory.*

The figure in the margin indicate full marks.

All questions carry equal marks.

1. Answer each of the question appropriately: 2×7=14

(i) A 100 : 5 current transformer has secondary winding and lead resistance of 0.2 Ω and the secondary burden is 5 VA. The VA output is

(a) 5 VA (b) 10 VA
(c) 7.5 VA (d) 2.5 VA

(ii) A Buchholz relay is used for

(a) protection of a transformer against all internal faults.
(b) protection of a transformer against all external faults.
(c) protection of a transformer against both internal and external faults.
(d) protection of induction motors.

(iii) Match *List I* with *List II* and select the correct answer using the codes given below the lists:

List I	*List II*
A. Circuit Breaker	1. Transmission line
B. Lightning Arrester	2. Transformer
C. Buchholz relay	3. Overvoltage protection
D. Distance Relay	4. Overcurrent protection

Codes:

(a) A B C D 1 2 3 4 (b) A B C D 4 1 2 3
(c) A B C D 2 3 4 1 (d) A B C D 4 3 2 1

(iv) *Consider the following statements*:

To provide reliable protection for a distribution transformer against over voltage using lightning arresters, it is essential that the

I. lead resistance is high.
II. distance between the transformer and the arrester is small.
III. transformer and the arrester have a common inter-connecting ground.
IV. spark overvoltage of the arrester is greater than the residual voltage.

Of these statements

(a) I, III and IV are correct. (b) II and III are correct.
(c) II, III and IV are correct. (d) I and IV are correct.

(v) Rated breaking capacity (MVA) of a circuit breaker is equal to
  (a) the product of rated breaking current (kA) and rated voltage (kV).
  (b) the product of rated symmetrical breaking current (kA) and rated voltage (kV).
  (c) the product of breaking current (kA) and fault voltage (kV).
  (d) twice the value of rated current (kA) and rated voltage (kV).

(vi) A power system is subjected to a fault which makes the zero sequence component of current equal to zero. The nature of fault is
  (a) double line to ground fault
  (b) double line fault
  (c) line of ground fault
  (d) three-phase to ground fault

(vii) Which one of the following relays has the capability of anticipating the possible major fault in a transformer?
  (a) Overcurrent relay
  (b) Differential relay
  (c) Buchholz relay
  (d) Over fluxing relay

2. (a) Explain the need of power system protection. Mention different types of protective devices used in power system protection.

(b) Explain the following terms related to fuse 7+7
- Fusing Current
- Fusing Factor
- Cut-off Current
- Pre-Arcing Time
- Arcing Time
- Breaking Capacity
- Total Operating Time

3. (a) Explain briefly the working principle of Miniature Circuit Breaker. What are the different types of MCB? How can you classify MCB based on the tripping characteristics?

(b) Discuss the construction, working principle and application of Induction type Electro-mechanical Over Current relay. 7+7

4. (a) What is a protective relay? Draw basic connection diagram of a protective relay and explain its working.

(b) Describe the construction and working of SF_6 circuit breaker. Also mention the merits, demerits and applications of SF_6. 6+8

5. (a) What is Lightening Arrestor? Discuss briefly the working principle of Lightening arrestor. What is the difference between Lightening arrestor and Surge arrestor?

(b) Draw and explain briefly the block diagram of static relay. Differentiate between static relay and electromagnetic relay. 7+7

6. (a) Explain in detail the construction and working of Balanced Earth Fault Protection for Alternatives.

(b) Determine the actual time of operation of a 5A, 3 second over current relay having a current setting of 125% and a time setting multiplier of 0.6 connected to supply circuit through a 400/5 current transformer when a circuit carries a fault current of 4000A. Time of operation is 3.5s for the estimated value of PSM. 8+6

7. Write short notes on the following (*any four*): 3.5×4=14

(a) Time Graded Over Current Protection on transmission line

(b) Routine Tests of a Circuit Breaker

(c) Thermal Overload Relays

(d) APFC (Automatic Power Factor Control panel)

(e) Scope of IEC standard IEC 60947-4-1

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304
EEE/EE

Jharkhand University of Technology, Ranchi

Diploma 3rd Semester Examination, 2024 (NEP)

Subject : Analog and Digital Electronics Jharkhand **Subject Code : EEE-304**

Time Allowed : 3 Hours **Full Marks : 70**

Pass Marks : 21

Answer in your own words.
Answer any five *questions in which* Question No. 1 *is compulsory.*
The figure in the margin indicate full marks.
All questions carry equal marks.

1. Choose the correct answer: 2×7=14

(i) The knee voltage of a silicon diode is approximately
(a) 0.3 V
(b) 0.7 V
(c) 1.0 V
(d) 1.7 V

(ii) Addition of trivalent impurity to a semiconductor creates many _____.
(a) holes
(b) valence electrons
(c) free electrons
(d) bound electrons

(iii) A Digital to Analog Converter converts
(a) analog signals to digital signals
(b) digital signals to analog signals
(c) AC signals to DC signals
(d) None of these

(iv) The binary equivalent of decimal 27 is
(a) 10101
(b) 11001
(c) 11101
(d) 11011

(v) According to De Morgan's theorem, $(A + B)'$ is equal to
(a) $A' + B'$
(b) $A' \cdot B'$
(c) $A + B$
(d) $A \cdot B$

(vi) A digital circuit that can store only one bit is a
(a) Register
(b) NOR Gate
(c) Flip-Flop
(d) Multiplexing circuit

(vii) A NAND gate produces a LOW output only when
(a) all inputs are HIGH.
(b) all inputs are LOW.
(c) any input is HIGH.
(d) any input is LOW.

2. (a) Explain the working principle of a PN junction diode. Draw its V-I characteristics and discuss the significance of the knee voltage.

(b) Explain the working principle of a Zener diode. Draw its V-I characteristics and discuss the reverse bias characteristics. 7+7

3. (a) Explain rectifier and its types. Explain the concept of rectification in case of half-wave rectifier.

(b) What are the different biasing configurations of a bipolar junction transistor? 7+7

4. (a) State and prove De Morgan's theorem.

(b) Simplify the following Boolean expression using Boolean algebra:

(i) $Y = A.B + A(B + C) + B.(B + C)$ (ii) $Y = B + A.B + AB'$ 7+7

5. (a) Explain the working of a JK flip-flop with the help of a truth table. Discuss its applications.

(b) Convert the following numbers:

(i) $(101101)_2$ to decimal

(ii) $(47)_{10}$ to binary

(iii) $(3A)_{16}$ to decimal

(iv) $(159)_{10}$ to octal 7+7

6. (a) Explain half Adder and Full Adder with truth table and neat sketch using basic logic gates (AND, OR, XOR).

(b) What do you mean by sequential circuit? How it is different from combinational circuit? 7+7

7. Write short notes on *any four*:

(a) Shift Register

(b) Decoder

(c) LASER

(d) MOSFET

(e) OP-AMP 3.5x4=14

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301
ALL

Jharkhand University of Technology, Ranchi

Diploma 3rd Semester Examination, 2024 (NEP)

Subject : Professional Skills **Subject Code : AUC-301**

Time Allowed : 3 Hours **Full Marks : 70**

Answer in your own words.

Answer any five *questions in which* Question No. 1 *is compulsory.*

All questions carry equal marks.

1. Choose the correct option / answer of the following: 2×7= 14

(i) Your resume is a tool with one specfic purpuse

(a) to get a job (b) to discuss salary

(c) to win an interview (d) to know about the work

(ii) The word interview refers to a conversation between

(a) Interviwer (b) Interviwee

(c) Both (a) and (b) (d) Interview

(iii) In a group discussion, one must communicate with _____.

(a) Hostility (b) Ignorance

(c) knowledge (d) long sentence

(iv) Which of these is not important in an oral presentation?

(a) Words (b) Body language

(c) Gestures (d) The number of people as audience

(v) How much listening effect on our communication?

(a) 20-35% (b) 5-15%

(c) 25-40% (d) 40-70%

(vi) A group technique used to develop many ideas in a relatively short line—

(a) Brainstroming (b) Compromise

(c) conflict (d) Consenses

(vii) When a fixed list of questions is administered to all the participants in the same order, it is known as

(a) Summative interview (b) Formative interview

(c) Structured interview (d) Fixed question interview

2. (a) Why do we need to prepare a good resume or CV? A resume is a mirror reflection of a person's pursuits. Explain. 7

   (b) What is Group Discussion? Explain the process of Group Discussion. 7

3. (a) How far is body language important to succeed in the interview? Discuss in detail. 7

   (b) What do you mean by Career Exploration? Explain basic components of career planning. 7

4. (a) What do you mean by presentation skills? What are strategies would you adopt to make presentation. 7

   (b) What is listening skills? What are the different types of listening skills? 7

5. (a) What are different types of non-cognitive skills and strategies? 7

   (b) What are the roles of social Etiquette in promotibg team work? 7

6. (a) What is brainstorming? What are types of brainstorming? 7

   (b) Define Trust? Explain the impotance of trust in creating a collaborative team. 7

7. Write short notes on *any four* of the following: 3.5×4=14

   (a) Technical interview

   (b) Cultural Etiquette

   (c) Group Meeting

   (d) Group Brainstorming

   (e) Non-Cognitive skills

   (f) Verbal communication

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301

EEE

Jharkhand University of Technology, Ranchi

Diploma 3rd Semester Examination, 2024 (NEP)

Subject : Basic of Electrical Power System **Subject Code : EEE 301**

Time Allowed : 3 Hours **Full Marks : 70**

Candidates are required to give their answers in their own words as far as practicable.
The figures in the margin indicate full marks.
Answer any five *questions (*Question 1 *is compulsory).*

1. Choose the correct answer: 2×7=14

(i) Diversity factor is always

(a) less than 1 (b) more than 1

(c) 1 (d) 0

(ii) Economiser is used to heat

(a) water (b) air

(c) fuel gas (d) None of these

(iii) Belt conveyor can be used to transport coal at inclinations upto ____ degree.

(a) 60 (b) 45

(c) 90 (d) 30

(iv) The annual depreciation of a hydro power plant is about

(a) 10 – 20% (b) 5 – 10%

(c) 0.5 – 1.5% (d) 30 – 40%

(v) The air-fuel ratio by weight required in a gas turbine is

(a) 30 : 1 (b) 60 : 1

(c) 90 : 1 (d) None of these

(vi) Solar cell is made of

(a) copper (b) silicon

(c) aluminium (d) silver

(vii) India's first nuclear power plant was installed at

(a) Kota (b) Kalpakkam

(c) Tarapur (d) Vishakhapatnam

2. (a) What are the different factors to be considered while selecting the site for hydroelectric power plant?

   (b) Give the layout of a diesel power plant. 7+7

3. (a) The annual peak load on a 30 MW power station is 25 MW. The power station supplies loads having maximum demands of 10 MW, 8.5 MW, 5 MW and 4.5 MW. The annual load factor is 45%.

   Find:

   (i) Average load

   (ii) Energy supplied per year

   (iii) Diversity factor

   (iv) Demand factor

   (b) What is meant by load curve? What is its significance in power generation? 7+7

4. (a) What do you mean by chain reaction? How it is controlled?

   (b) Write short notes on the following:

   (i) Solar energy

   (ii) Solar radiation measurement

   (iii) Solar constant 7+7

5. (a) Discuss the merits and limitations of wind energy.

   (b) Explain the mechanism of photoconduction in a PV cell. 7+7

6. (a) What are the advantages and disadvantages of DC transmission line?

   (b) Draw and explain the single line diagram of 66/11 kV substation. 7+7

7. Write short notes on *any two* of the following: 7×2=14

   (a) Environmental impact of Hydel power plant

   (b) Gas turbine power plant

   (c) AC transmission and distribution system

   (d) PV-Wind hybrid system

Jharkhand University of Technology, Ranchi

Diploma 3rd Semester Examination, 2024 (NEP)

Subject : Transmission and Distribution **Subject Code : EEE 302**

Time Allowed : 3 Hours **Full Marks : 70**

Answer in your own words.

Answer five *questions in which* Question No. 1 *is compulsory.*

All questions carry equal marks.

2×7=14

1. Choose the correct option:

(i) Sheaths are used in cable to

(a) provide proper insulation.
(b) provide mechanical strength.
(c) prevent ingress of moisture.
(d) None of these

(ii) Bundled conductors are mainly used

(a) to increase the shunt capacitance.
(b) to decrease the shunt capacitance.
(c) to increase the series reactance.
(d) to decease the series reactance.

(iii) Which of the following equipment in not installed in a substation?

(a) Exciters
(b) Shunt reactors
(c) Voltage transformers
(d) Series capacitors

(iv) Corona loss increases with

(a) increase in supply frequency and conductor size.
(b) increase in supply frequency and reduction in conductor size.
(c) decrease in supply frequency and reduction in conductor size.
(d) decrease in supply frequency and increase in conductor size.

(v) The function of steel wire in an ACSR conductor is

(a) to take care of surges.
(b) to prevent corona.
(c) to reduce inductance.
(d) to provide additional mechanical strength.

(vi) The presence of earth in case of overhead lines

(a) increase the capacitance.
(b) increases the inductance.
(c) decreases the capacitance and increases the induction.
(d) does not effect any of the line constants.

(vii) In a long transmission line under no-load condition

(a) the receiving end voltage is less than the sending end voltage.

(b) the sending end voltage is less than the receiving end voltage.

(c) the sending end voltage is equal to the receiving end voltage.

(d) None of the above

2. (a) Find the value as per conversion: 6

(i) $-59-j25$ (Convert from rectangular to polar)

(ii) $-12+j16$ (Convert from rectangular to polar)

(iii) $25\angle 88°$ (Convert from polar to rectangular)

(iv) $0.80\angle -5°$ (Convert from polar to rectangular)

(v) $(2-j10)-(1-j10)$ (Determine the difference)

(vi) $(10\ 90° + (8-j2)$ (Determine the sum)

(b) State and explain KCL and KVL. 8

3. (a) State and explain superposition theorem. 6

(b) Compare HVAC and HVDC system. 8

4. (a) Explain the phenomenon of corona. How may the effects of corona be minimised? 7

(b) Give the classification of transmission lines. Explain the influence of power factor on the performance of a transmission line. 7

5. (a) What do you understand by the generalized A-B-C-D constants of a transmission line? State the units of these constants. 6

(b) Describe a pin type insulator with the help of a sketch and discuss its limitations. 8

6. (a) Name the various types of distribution systems. Give the relative merits and demerits of ring main system and radial distribution system. 6

(b) Name different components of an overhead line. Also explain the purpose for which they are used. Deduce an expression for sag in an overhead line. 4+4

7. Write short notes on *any four*: 3.5×4=14

(a) Ferranti effect

(b) Transformer parts and their functions

(c) Outdoor Substations

(d) Voltage Regulation of a transmission line

(e) Potential Transformer

(f) Classification of UG Cables