

**BOARD OF DEPARTMENTAL EXAMINATION, HIMACHAL PRADESH  
DEPARTMENTAL EXAMINATION SESSION, APRIL, 2023**

**PAPER: A: Rules Regulations, Procedures and Acts for Engineering Officers  
(Electrical) of H.P.S.E.B.Ltd.**

**TIME ALLOWED: 3 HOURS**

**MAXIMUM MARKS: 100**

**Notes:**

- i) *Attempt any five questions.*
- ii) *Indicate the same question number & its part (s) in the answers.*
- iii) *Marks are indicated against each question.*
- iv) *Only bare Acts/Notifications/approved reference books are allowed. Help books, text books, handouts, guides, made easy editions are not allowed.*
- v) *Quote rule (s) in support of your answer where necessary.*
- vi) *Attempt all parts of a question in a consecutive order.*

Q.No. (1) What is "Social Impact Assessment Study" in context with Land Acquisition for Hydel Power Projects in HP? What are the provisions and procedures for undertaking such study according to "The Right To Fair Compensation And Transparency In Land Acquisition, Rehabilitation And Resettlement Act, 2013"?

(8+12=20)

Q.No.(2) (i) What are the Security provisions regarding handling of official documents and information in the HPSEBL?  
(ii) How the classified information is handled in an office and what precautions are to be taken while the classified information is dealt at different stages in the office?

(10+10=20)

Q.No.(3) Write short notes on the following:

- (i) Judicial intervention in arbitral proceeding.
- (ii) Difference between arbitration and Mediation.
- (iii) Challenge of appointment of an Arbitrator and procedure to challenge under the Arbitration and Conciliation Act, 1996.
- (iv) Voluntary Arbitration -Agreement under section 7 of Arbitration & Conciliation Act 1996.

(4\*5=20)

Q.No.(4) What are the general principles of fixation of seniority of the employees of the Himachal Pradesh State Electricity Board Limited?

(20)

Q.No.(5) What is the procedure of imposition of Major Penalty on the employees of the HPSEBL? Explain the procedure of inquiry in such cases in detail?

(8+12=20)

Q.No.(6) What are the various provisions of the Transmission of Electricity at various levels i.e. Inter-State, regional and inter-regional transmission according to the provisions of the Electricity Act 2003? Also describe in brief the Duties of transmission licensees as per the Act *ibid*.

(12+8=20)

Q.No.(7) Define following with reference to the provisions of concerned rules applicable in HPSEB Ltd. ;

- (i) Paternity Leave
- (ii) Hospital leave
- (iii) Lien
- (iv) Joining Time and Joining Time Rules

(4\*5=20)

Q.No.(8) What is New Pension System? Describe in brief the salient features of this System in context with HP State Government/HPSEBL. Also explain pros and cons of NPS as compare to Old Pension Scheme so far as social security of work force of the Govt./HPSEBL is concerned.

(4+8+8=20)

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**BOARD OF DEPARTMENTAL EXAMINATION, HIMACHAL PRADESH**  
**DEPARTMENTAL EXAMINATION,**  
**SESSION- April,2023**

PAPER A: RULES, REGULATIONS, PROCEEDURE & ACTS  
(FOR ENGINEERING OFFICERS (CIVIL & MECHANICAL) OF H.P.S.E.B.LTD.)  
(With Books)

Time Allowed: 03 hours

Maximum Marks: 100

- Notes:
- i) Attempt any five questions.
  - ii) Attempt all parts of question consecutively and indicate the same question number and its part as assigned in the question number while answering the same.
  - iii) Only Bare Acts, Bare Rules, Notifications/orders and reference books are allowed. Help books, text books, handouts, made easy editions are not allowed.
  - iv) Marks are indicated against each question.
  - v) Quote relevant Rule(s) in support of your answers, where necessary.

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Q.No.I Define the following:

- i) Lien
- ii) Tenure Post.
- iii) Subsistence Grant
- iv) Probationer
- v) Local Fund

(5\*4=20)

Q.No.II Discuss the provision of the rules for regulating the following:

- i) Signing of Sanction
- ii) Contract Contingencies
- iii) Maintenance of Accounts
- iv) Proposals which require to be sent to the Finance department for its concurrence.

(4\*5=20)

Q.No.III (A) Distinguish any Five between the following:

- i) Fee and Honorarium.
- ii) Internal Audit & Statutory Audit.
- iii) Personal Pay and presumptive Pay.
- iv) Tenure Post and supernumerary Post.
- v) Dismissal & Removal.
- vi) Probationer and One on Probation.
- vii) Leave not due & Extra Ordinary leave.

(5\*4=20)

P.T.O.

Q.No. IV A Government Officer retired on superannuation at the age of 58 years after rendering service of 25 years, 6 months and 16 days. He was drawing pay level of Rs. 135900, Dearness allowance @ of 31%. During his service an extra ordinary leave of 134 days was sanction in his favor without leave salary. As per leave accounts on his superannuation, 242 days earned leave and 136 days half pay leave was at his credit. On the basis of above information, calculate the following pensionary benefits in his case:

- i) Pension on Superannuation.
- ii) Family pension.
- iii) Retirement gratuity.
- iv) Commuted Value.
- v) Leave encashment.

(5\*4=20)

Q.NO.V Write a short note on any FIVE of the followings:

- i) Re-appropriation of Budget
- ii) Delegation of Financial Powers (DOFP)
- iii) Classification of Revenue & Capital expenditure
- iv) Electricity Trader
- viii) HPERC
- ix) Cash Flow Statement

(5\*4=20)

Q.No. VI i) Define different forms of official communications enshrined in HPSBL Manual of Office Procedure.

ii) Write a brief note on Contract. Distinguish between Contract and Agreement.

(2\*10=20)

H.P. BOARD OF DEPARTMENTAL EXAMINATION

DEPARTMENTAL EXAMINATION FOR OFFICERS OF HPSEBL 4/2023

PAPER B (PART-1) (A)

MARKS:-100

ELECTRICAL

Time allowed:- 03hours

**Consumers / Company accounts and accounting procedures**

**(Attempt Any 5 Questions)**

- Q1 (A) What is the classification of revenue and expenditures? Briefly describe their main features. (10 Marks)
- (B) Briefly explain the classification of expenditure i.e. Capital and Revenue with justification. (2 Marks Each)
1. Replacement of existing computer with a new computer.
  2. Renovation of office building incurring heavy expenditure.
  3. Purchasing of toner/cartridge for the printer.
  4. Repair of officer furniture.
  5. Purchase of pen drives and DVDs for office use.
- Q2. (A) What do you understand by the Surplus stores, 'Unserviceable Stores' and Obsolete Stores'? Also, describe the procedure prescribed for the condemnation of these stores. (10 Marks)
- (B) What are the main points to be observed while the opening of the Tender of a work? (10 Marks)
- Q3 What is a Bank Reconciliation statement? Describe the process of bank reconciliation at the Sub-Division and Division levels of HPSEBL. (10 Marks)
- (a) Explain the following briefly:- (Attempt any 5, 2 Marks Each)
- (i) R & M Expenses
  - (ii) CWIP
  - (iii) Capitalisation of Fixed Assets
  - (iv) Government-e-Material (GeM Portal)
  - (v) Revenue Sanction
  - (vi) Cash Book
  - (vii) Security Deposits
- Q4 A) What are the components of a cost of Fixed assets and describe the primary requirements of conversion of CWIP into Fixed Assets? (10 Marks)

B) How will you define the term "financial concurrence" from HPSEB Ltd.'s perspective and why it is an essential parameter to obtain financial concurrence before the execution of new schemes/projects in the company? (10 Marks)

Q5 A) What is the standard procedure to operate the bank accounts in HPSEB Ltd.? Describe the instructions for the operation of the Drawing account in brief. (10 Marks)

B) What do you understand about the term 'Budget' from the perspective of HPSEB Ltd.? Describe the duties of disbursing and controlling officers during budget estimation. (10 Marks)

Q6 A) What is the significance of the Internal controls in the company? And what major audits are being executed by HPSEB Ltd. as a measure of internal controls? (10 Marks)

B) Describe the "Canon of Financial Property" in new DOFPs, 2022 of HPSEBL. (10 Marks)

Q7 Prepare the Office Order for sanctioning the following expenditure incurred by the Company as per new DOFPs, 2022 of HPSEBL:-

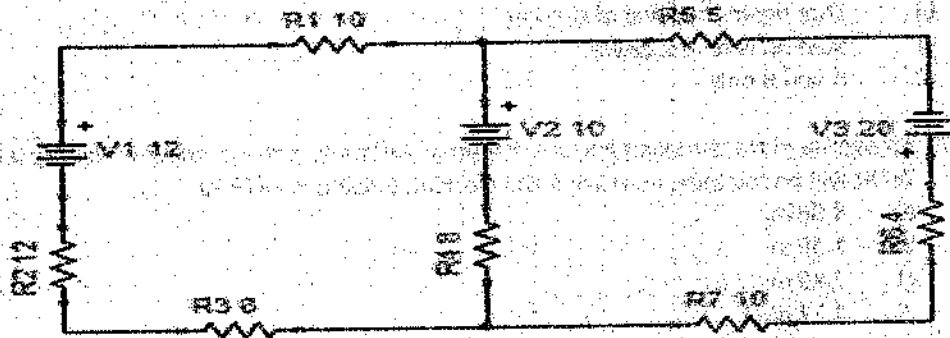
- (i) Purchasing of a new Photocopier Machine of Rs. 1,50,000/- for official use in HPSEBL.
- (ii) Purchasing of a new Toner/Cartridge for Printer for Rs.4,500/-- for official use in HPSEBL.

(10 X 2 = 20)

Paper-B (Part-2)  
Electrical Engineering Basics  
No-Books Allowed  
Maximum Marks-100

100 Questions - 1 Marks Each

- 1) For the circuit given below, current flowing through each branch is—



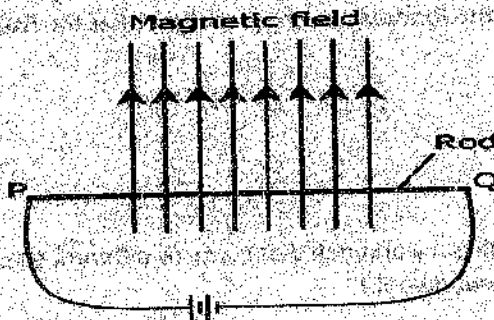
- a) 0.9 Amperes, 0.4 Amperes  
b) 0.89 Amperes, 0.304 Amperes  
c) 1 Ampere, 1 Amperes  
d) 0.60 Amperes, 0.5 Amperes
- 2) According to Thevenin's theorem, any bilateral network can be replaced by a network with—
- a) An independent current source in parallel to the equivalent resistance  
b) An independent voltage source in series with the equivalent resistance  
c) An independent voltage source in parallel to the resistance  
d) None of these
- 3) Alternators are also called Synchronous generators because \_\_\_\_\_?
- a) They must run at a constant speed irrespective of desired frequency.  
b) They must run at synchronous speed to give the desired frequency.  
c) They must run at a speed which varies with frequency.  
d) They must run at a speed equal to the desired frequency.
- 4) For an Alternator connected to a load, the terminal voltage per phase will \_\_\_\_\_?
- a) Be equal to the induced EMF  
b) Vary with the load  
c) Constant irrespective of the load  
d) None of these
- 5) What will happen if the primary of a transformer is connected to D.C supply?
- a) Transformer will operate with low efficiency  
b) Transformer will operate with high efficiency  
c) No effect  
d) Transformer may start to smoke and burn
- 6) What is the effect of rise in temperature on sag when Ice and wind effect are eliminated?
- a) Sag decreases  
b) Sag increases  
c) Sag remains constant  
d) Sag becomes zero

- 7) What is the relation between length of span and sag?
- sag  $\propto$   $\sqrt{\text{span}}$
  - sag  $\propto$  (1/span)
  - sag  $\propto$  span<sup>2</sup>
  - Sag  $\propto$  span<sup>3</sup>A
- 8) Step Up transformer
- Step Up the level of Voltage.
  - Step down the level of current.
  - Step up level the power.
  - A and B only.
- 9) An overhead transmission line has a span of 220 metres the conductor weighting 0.604 kg/m. What will be the maximum sag if the working tension is 2879 kg.
- 8.96 m
  - 1.86 m
  - 7.85 m
  - 1.27 m
- 10) Induced currents in the sheaths are
- Induction current
  - Sheath circuit eddy current
  - Sheath eddy current
  - None of these
- 11) Grading of cable is done to
- Increase its conduction efficiency
  - Increase its strength
  - Achieve a uniform stress distribution
  - All of these
- 12) Underground cable have large charging current which
- Lags the voltage by 90°
  - Leads the voltage by 90°
  - Is in phase with voltage
  - Is out of phase by 180° with voltage
- 13) Safe value of current carrying capacity of cables is determined by
- Maximum voltage
  - Maximum temperature
  - Power factor
  - Maximum pressure
- 14) Synchronous motors installed at sub-station give
- Unity power factor
  - Lagging power factor
  - Loading power factor
  - None of these



- 15) The voltage rating of the transformer in a pole-mounted Sub Station is.....
- a) 11 KV / 400 V
  - b) 11 KV / 240 V
  - c) 33 KV / 400 V
  - d) None of the above
- 16) Which among these uses a low voltage DC source?
- a) Remote indication
  - b) Emergency lighting system
  - c) Remote position control
- 17) All of these  
Which among these is a type of surge arrestor?
- a) Conventional gapped arrestors
  - b) Metal oxide arrestors
  - c) Both (A) and (B)
  - d) None of these
- 18) For voltage boosting in distribution networks the capacitors used is
- a) Series capacitors
  - b) Shunt capacitors
  - c) Both (a) and (b)
  - d) None of these
- 19) How do you display current date only in MS Excel?
- a) Date ()
  - b) Today ()
  - c) Now ()
  - d) Time ()
- 20) What does COUNTA () function do in MS-Excel?
- a) Counts cells having alphabets
  - b) Counts empty cells
  - c) Counts cells having number
  - d) Counts non-empty cells
- 21) In MS-Excel the formula, which symbol specifies the fixed columns or rows?
- a) \$
  - b) \*
  - c) %
  - d) ;
- 22) Each excel file is a workbook that contains different sheets. Which of the following cannot be a sheet in workbook?
- a) Work sheet
  - b) Chart sheet
  - c) Macro sheet
  - d) Data sheet

- 23) The most suitable material for making the core of an electromagnet is:
- Steel
  - Iron
  - Soft iron
  - Aluminium
- 24) When a straight conductor is carrying current:
- There are circular magnetic field lines around it
  - There are magnetic field lines parallel to the conductor
  - There are no magnetic field lines
  - None of the above
- 25) The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:
- Clockwise
  - Anticlockwise
  - Towards North
  - Towards South
- 26) The strength of the magnetic field inside a long current carrying straight solenoid is:
- More at the ends than at the centre
  - Minimum in the middle
  - Same at all points
  - Found to increase from one end to the another
- 27) Which option explains Fleming's left-hand rule to understand the working of a motor?
- When a current carrying conductor is moved with force, it creates a magnetic field.
  - When a conductor is moved inside a magnetic field, the current is produced in the conductor.
  - When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
  - When a current carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.
- 28) A metal rod PQ is placed in the magnetic field. The ends of the rod are connected to a battery using wires.



Where will the rod move?

- Upward
- Downwards
- into the field
- Out of the field

- 29) In impedance relay, current element torque should be
- a) Equal to voltage element torque
  - b) Greater than voltage element torque
  - c) Less than voltage element torque
  - d) None of these
- 30) Distance relays are generally
- a) Impedance type
  - b) MHO type
  - c) Reactance type
  - d) All of these
- 31) Buchholz relay is used to protect against
- a) Inter-turn fault
  - b) External faults
  - c) Rotor faults
  - d) Every internal faults.
- 32) Good relay should possess
- a) Speed & reliability
  - b) Sensitivity
  - c) Adequateness & selectivity
  - d) All of these
- 33) Earthing transformer is used to
- a) Improve neutral wire's current capacity.
  - b) Avoid overheating of transformer.
  - c) Provide artificial earthing.
  - d) Avoid harmonics.
- 34) Percentage differential protection is used to prevent against
- a) Inter-turn faults
  - b) Heavy Loads
  - c) External Faults
  - d) Magnetizing current inrush
- 35) Directional relays responds to
- a) Power
  - b) Voltage
  - c) Current
  - d) Reactance
- 36) Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?
- a) Capacitors
  - b) Inductors
  - c) Transistors
  - d) Resistance
- 37) What kind of quantity is an Electric potential?
- a) Vector quantity
  - b) Tensor quantity
  - c) Scalar quantity
  - d) Dimensionless quantity



- 38) What is the magnitude of mutually induced emf,  $E_s$ , in a transformer?
- directly proportional to rate of change of flux and number of secondary turns
  - inversely proportional to rate of change of flux and number of secondary turns
  - proportional to rate of change of flux and inversely proportional to number of secondary turns
  - inversely proportional to the rate of change of flux and proportional to number of secondary turns
- 39) Which of the following will happen in a transformer when the number of secondary turns is less than the number of primary turns?
- The voltage gets stepped up.
  - The voltage gets stepped down.
  - The power gets stepped up.
  - The power gets stepped down.
- 40) How many electrons will constitute 2 Coulombs of electric charge?
- $6.24 \times 10^{18}$  electrons
  - $12.48 \times 10^{18}$  electrons
  - $1.602 \times 10^{19}$  electrons
  - $3.204 \times 10^{19}$  electrons
- 41) Which of the following according to KCL must be zero?
- Algebraic sum of currents in closed-loop
  - Algebraic sum of power in closed-loop
  - Algebraic sum of currents entering and leaving a junction
  - Algebraic sum of voltages across the input and output
- 42) Which of these PowerPoint features would allow any user to create a given simple presentation quicker?
- Animations
  - Chart Wizard
  - Transition Wizard
  - AutoContent Wizard
- 43) Which of these font effects is NOT available in the PowerPoint Font dialogue box?
- Shadow
  - Underline
  - Strikethrough
  - Emboss
- 44) On which load power factor zero voltage regulation will be achieved?
- 0
  - 1
  - Leading
  - Lagging
- 45) On which factors transformer routine efficiency depends upon?
- Supply frequency
  - Load current
  - Power factor of load
  - Load current and power factor of load

- 46) At which load condition maximum efficiency of a distribution transformer will be achieved?
- At no load
  - At 60% full load
  - At 80% full load
  - At full load
- 47) Why efficiency of a transformer, under heavy loads, is comparatively low?
- Copper loss becomes high in proportion to the output
  - Iron loss is increased considerably
  - Voltage drop both in primary and secondary becomes large
  - Secondary output is much less as compared to primary input
- 48) The efficiencies of transformers compared to electric motors of the same power are
- About the same
  - Much smaller
  - Much higher
  - Can't comment
- 49) A transformer having maximum efficiency at 75% full load will have ratio of iron loss and full load copper loss equal to \_\_\_\_\_
- 4/3
  - 3/4
  - 9/16
  - 16/9
- 50) A V-V connected transformer can be connected in parallel to delta-delta connected transformer but not to \_\_\_\_\_
- delta-star
  - star-delta
  - star-V
- 51) What is the working principle of a Transformer?
- Transformer works on the principle of self-induction
  - Transformer works on the principle of mutual induction
  - Transformer works on the principle of ampere law
  - Transformer works on the principle of coulomb law
- 52) Which of the following transformer, Buchholz's relay can be fixed on?
- Welding transformers
  - Oil-cooled transformers
  - Auto-transformers
  - Air-cooled transformers
- 53) For a power transformer operating at full load it draws voltage and current equal to 200 V and 100 A respectively at 0.8 pf. Iron and copper losses are equal to 120 kW and 300kW. What is efficiency?
- 97.44%
  - 99.12%
  - 86.44%
  - 96.44%

- 54) What will happen if the secondary of a current transformer is open-circuited?
- depends on other parameters
  - cool as there is no secondary current
  - hot because primary will carry heavy current
  - hot because of heavy iron losses
- 55) Variations in a hysteresis loss in a transformer ( $B_{max}$  = maximum flux density)
- $B_{max}$
  - $B_{max}^{1.6}$
  - $B_{max}^{3.83}$
  - $B_{max}/2$
- 56) A shell-type transformer has \_\_\_\_\_
- High eddy current losses
  - Reduced magnetic leakage
  - Negligible hysteresis losses
  - Cannot be determined
- 57) When tripping of the transformer from the main circuit is required?
- Local overheating
  - Short-circuited core laminations
  - Core-bolt insulation failure
  - Puncture of bushings
- 58) A 25 KVA transformer is constructed to a turns ratio of  $N_1/N_2 = 10$ . The impedance of primary winding is  $3+j5$  ohms and of secondary winding is  $0.5+j0.8$  ohms. What will be the impedance of transformer when referred to primary?
- $53 + 85j$  ohms
  - $53j + 85$  ohms
  - Can't be calculated
  - $3.5 + 5.8j$  ohms
- 59) Which of the following neutral earthing method is disadvantageous?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 60) Which method will reduce the cost of insulation between earth and cables?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally

- 61) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 62) If two transformers' secondaries are connected to each other with unequal primary voltage ratio then, \_\_\_\_\_
- no circulating current will flow
  - very high short circuit current will flow
  - small circulating current will flow
  - insufficient information
- 63) The circulating current flowing through the circuit at no-load condition depends on \_\_\_\_\_
- total leakage impedance of the two transformers
  - difference in their voltage ratios
  - difference in voltage ratios, leakage impedance of 2 transformers
  - other parameters
- 64) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 65) Two identical loops, one that is made up of copper and another made up of aluminium are rotated at the same speed in the same magnetic field; then (a)
- The induced EMF will be equal in both the loops.
  - Induced EMF will be more in Copper than Aluminium.
  - The induced current will be more in the copper wire due to its low resistance.
- I & III are correct
  - II & III are correct
  - All are correct
  - None is correct
- 66) The instantaneous current flowing from an a.c source is  $i = 6 \sin 314 t$ . What is the rms value of current? (b)
- 3.173 A
  - 4.242 A
  - 1.414 A
  - 6.432 A
- 67) A heating element is marked 210 V, 630 W. What will be the value of current drawn by the element when it is connected to a 210 V DC source? (c)
- 2 A
  - 1.73 A
  - 3 A
  - 1.41 A



68) Core of a transformer is laminated because

- (i) To minimize eddy currents in the iron core
- (ii) To reduce energy loss in the form of heat
- (iii) To increase ease of construction & maintenance

- a) I & II are correct
- b) I & III are correct
- c) II & III are correct
- d) All are correct

69) We prefer AC voltage over DC voltage because

- b) It can be stepped up and stepped down using a transformer
- c) The carrying loss is very much less in an AC circuit
- d) Generation and transmission is economical than DC
- e) All of above

70) The voltage across the circuit breaker pole after final current zero is

- a) Restriking voltage
- b) Supply voltage
- c) Recovery voltage
- d) None of these

71) In a power system, the rate of rise of restriking voltage depends upon

- a) Circuit power factor only
- b) Switching condition only
- c) Both (a) and (b) above
- d) None of these

72) Fault diverters are basically

- a) Circuit breakers
- b) Fast switches
- c) Relays
- d) Fuses

73) Lightning arrestor should be located

- a) Away from the circuit breaker
- b) Near the transformer
- c) Away from the transformer
- d) Near the circuit breaker

74) For remote operation, circuit breaker must be equipped with

- a) inverse time trip
- b) Shunt trip
- c) Time delay trip
- d) Both (a) and (c) above

75) The power factor of the arc in a circuit breaker is

- a) Zero leading
- b) Zero lagging
- c) Unity
- d) Any value from zero to unity



76) Which among the following quantities are to be determined in voltage controlled bus?

- a. P and Q
- b. Q and  $|V|$
- c.  $|V|$  and  $\delta$
- d. Q and  $\delta$

77) Single line diagram of which of the following power system is possible?

- a) Power system with LG fault
- b) Balanced power system
- c) Power system with LL fault
- d) Power system with LLG fault

78) In impedance diagram different power system elements are represented by symbols.

- a) False
- b) True

79) The area under the load curve represents \_\_\_\_\_

- a) maximum demand
- b) load factor
- c) the average load on power system
- d) number of units generated

80) Which of the following is not a requirement for site selection of hydroelectric power plant?

- a) Large catchment area
- b) Rocky land
- c) Sedimentation
- d) Availability of water

81) Which of the following element of hydroelectric power plant prevents the penstock from water hammer phenomenon?

- a) Surge Tank
- b) Draft tubes
- c) Spillway
- d) Valves and Gates

82) Which of the following part of thermal power plant causes maximum energy losses?

- a) Alternator
- b) Ash and unburnt carbon
- c) Boiler
- d) Condenser

83) What of the below mentioned statements are incorrect as compared to the HVDC system?

- a) Distance limitation
- b) Back to back connection is possible
- c) Extra reactive power compensation
- d) More corona losses

- 84) A power system has a maximum load of 15 MW. Annual load factor is 50%. The reserve capacity of plant is \_\_\_\_\_. If the plant capacity factor is 40%.
- 3.75 MW
  - 7.75 MW
  - 46.75 MW
  - 8.75 MW
- 85) During Ferranti effect the voltage drop across line resistance \_\_\_\_\_.
- in phase with receiving end voltage
  - lags behind receiving end voltage
  - lead the receiving end voltage
  - lags behind sending end voltage
- 86) Ferranti effect is not a problem for \_\_\_\_\_.
- long transmission lines
  - Medium transmission lines
  - short transmission lines
  - Transmission line having high capacitance
- 87) What is the main reason for maintaining consumer end voltage within prescribed limit?
- Because it is declared by the supplier
  - For satisfactory operation of electrical equipment
  - For easy calculation of units supplied
  - To reduce the line losses
- 88) On which side of the transformer tap changer is provided?
- On High Voltage side
  - On low voltage side
  - On high voltage and low voltage side
  - in core
- 89) Transmission efficiency of a transmission line increases with the \_\_\_\_\_.
- decrease in power factor and voltage
  - increase in power factor and voltage
  - increase in power factor but the decrease in voltage
  - increase in voltage only power factor remains constant
- 90) If the transmission line is lossless, then its characteristic impedance will be \_\_\_\_\_.
- $\sqrt{L/C}$
  - $\sqrt{LC}$
  - $\sqrt{L+C}$
  - $\sqrt{C/L}$
- 91) The surge impedance of multiple conductor lines as compared to single line is \_\_\_\_\_.
- higher
  - lower
  - same
  - length dependent



- 92) It is intended to increase the power despatch of the existing transmission line. Then what can be the most appropriate solution for improving it?
- a) Installing series capacitors
  - b) Installing shunt capacitor
  - c) Installing shunt reactor
  - d) Installing series reactor
- 93) Reactive power requirement of a power transmission system depends on \_\_\_\_
- a) Power angle  $\delta$
  - b)  $|V_s| - |V_r|$
  - c)  $V_s$
  - d)  $V_r$
- 94) The system unit that contains the most vital part of the personal computer is called
- (a) CPU
  - (b) BIOS chip
  - (c) Motherboard
  - (d) Monitor
- 95) Which of the following is primarily responsible for converting input (data) into meaningful output (information)?
- (a) RAM
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  - (c) Storage device
  - (d) Input and Output device
- 96) Central Processing Unit in a computer consists of which major components?
- (a) Arithmetic logic unit (ALU) and Control Unit
  - (b) Control Unit (CU)
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- 97) Which among the following is the fastest memory in a computer that holds information?
- (a) Register
  - (b) Cache
  - (c) Main memory
  - (d) RAM

98) Computer gets the input with the help of

- (a) mouse and keyboard
- (b) joystick
- (c) printer
- (d) both a and b

99) Where on the MS Word screen you can locate the horizontal split bar?

- (a) On the vertical scroll bar's top
- (b) On the vertical scroll bar's bottom
- (c) The horizontal scroll bar's left side
- (d) the horizontal scroll bar's right side
- (e) None of the above

100) Kirchhoff's laws are useful in determining—

- i. Current flowing in a circuit
- ii. EMFs and Voltage drops in a circuit
- iii. Power in a circuit
- iv. All the above

# H.P. BOARD OF DEPARTMENTAL EXAMINATION

## DEPARTMENTAL EXAMINATION FOR OFFICERS OF HPSEBL 4/2023

PAPER B (PART-1) (B)

MARKS:-100

ELECTRICAL

Time allowed:- 03hours

### **Consumers / Company accounts and accounting procedures**

#### **(Attempt Any 5 Questions)**

- Q1. (A) What is the classification of revenue and expenditures? Briefly describe their main features. (10 Marks)
- (B) Briefly explain the classification of expenditure i.e. Capital and Revenue with justification. (2 Marks Each)
1. Replacement of existing computer with a new computer.
  2. Renovation of office building incurring heavy expenditure.
  3. Purchasing of toner/cartridge for the printer.
  4. Repair of officer furniture.
  5. Purchase of pen drives and DVDs for office use.
- Q2. (A) What do you understand by the Surplus stores, 'Unserviceable Stores' and Obsolete Stores'? Also, describe the procedure prescribed for the condemnation of these stores. (10 Marks)
- (B) What are the main points to be observed while the opening of the Tender of a work? (10 Marks)
- Q3. What is a Bank Reconciliation statement? Describe the process of bank reconciliation at the Sub-Division and Division levels of HPSEBL. (10 Marks)
- (a) Explain the following briefly:- (Attempt any 5, 2 Marks Each)
- (i) R & M Expenses
  - (ii) CWIP
  - (iii) Capitalisation of Fixed Assets
  - (iv) Government-e-Material (GeM Portal)
  - (v) Revenue Sanction
  - (vi) Cash Book
  - (vii) Security Deposits
- Q4. A) What are the components of a cost of Fixed assets and describe the primary requirements of conversion of CWIP into Fixed Assets? (10 Marks)

B) How will you define the term "financial concurrence" from HPSEB Ltd.'s perspective and why it is an essential parameter to obtain financial concurrence before the execution of new schemes/projects in the company? (10 Marks)

Q5 A) What is the standard procedure to operate the bank accounts in HPSEB Ltd.? Describe the instructions for the operation of the Drawing account in brief. (10 Marks)

B) What do you understand about the term 'Budget' from the perspective of HPSEB Ltd.? Describe the duties of disbursing and controlling officers during budget estimation. (10 Marks)

Q6 A) What is the significance of the Internal controls in the company? And what major audits are being executed by HPSEB Ltd. as a measure of internal controls? (10 Marks)

B) Describe the "Canon of Financial Property" in new DOFPs, 2022 of HPSEBL. (10 Marks)

Q7 Prepare the Office Order for sanctioning the following expenditure incurred by the Company as per new DOFPs, 2022 of HPSEBL:-

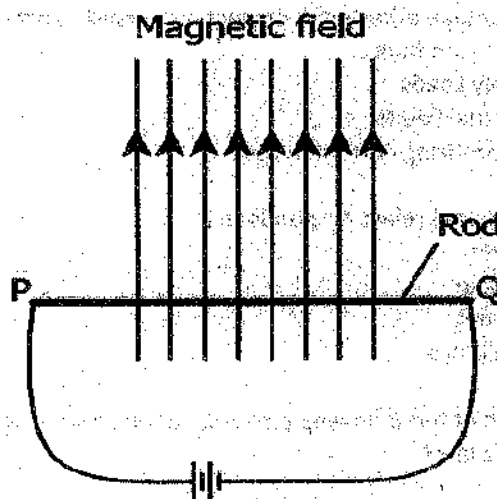
- (i) Purchasing of a new Photocopier Machine of Rs. 1,50,000/- for official use in HPSEBL
- (ii) Purchasing of a new Toner/Cartridge for Printer for Rs.4,500/-- for official use in HPSEBL

(10 X 2 = 20)

**Paper-B (Part-2)**  
**Electrical Engineering Basics**  
**No-Books Allowed**  
**Maximum Marks-100**

100 Questions - 1 Marks Each

- 1) The strength of the magnetic field inside a long current carrying straight solenoid is:
  - i. More at the ends than at the centre
  - ii. Minimum in the middle
  - iii. Same at all points
  - iv. Found to increase from one end to the another
  
- 2) Which option explains Fleming's left-hand rule to understand the working of a motor?
  - i. When a current carrying conductor is moved with force, it creates a magnetic field.
  - ii. When a conductor is moved inside a magnetic field, the current is produced in the conductor.
  - iii. When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
  - iv. When a current carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.
  
- 3) A metal rod PQ is placed in the magnetic field. The ends of the rod are connected to a battery using wires.



Where will the rod move?

- i. Upward
  - ii. Downwards
  - iii. Into the field
  - iv. Out of the field
- 
- 4) In impedance relay, current element torque should be
    - i. Equal to voltage element torque
    - ii. Greater than voltage element torque
    - iii. Less than voltage element torque
    - iv. None of these

- 5) Distance relays are generally
- Impedance type
  - MHO type
  - Reactance type
  - All of these

- 6) Buchholz relay is used to protect against
- Inter-turn fault
  - External faults
  - Rotor faults
  - Every internal faults.

- 7) Good relay should possess
- Speed & reliability
  - Sensitivity
  - Adequateness & selectivity
  - All of these

- 8) Earthing transformer is used to
- Improve neutral wire's current capacity.
  - Avoid overheating of transformers.
  - Provide artificial earthing.
  - Avoid harmonics.

- 9) Percentage differential protection is used to prevent against
- Inter-turn faults
  - Heavy Loads
  - External Faults
  - Magnetizing current in rush

- 10) Directional relays responds to
- Power
  - Voltage
  - Current
  - Reactance

11) Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?

- Capacitors
- Inductors
- Transistors
- Resistance

12) What kind of quantity is an Electric potential?

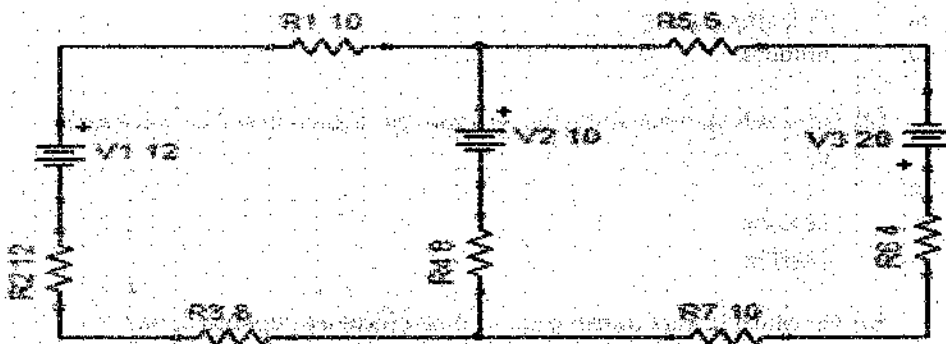
- Vector quantity
- Tensor quantity
- Scalar quantity
- Dimensionless quantity



- 13) What is the magnitude of mutually induced emf,  $E_2$  in a transformer?
- directly proportional to rate of change of flux and number of secondary turns
  - inversely proportional to rate of change of flux and number of secondary turns
  - proportional to rate of change of flux and inversely proportional to number of secondary turns
  - inversely proportional to the rate of change of flux and proportional to number of secondary turns
- 14) Which of the following will happen in a transformer when the number of secondary turns is less than the number of primary turns?
- The voltage gets stepped up.
  - The voltage gets stepped down.
  - The power gets stepped up.
  - The power gets stepped down.
- 15) How many electrons will constitute 2 Coulombs of electric charge?
- $6.24 \times 10^{18}$  electrons
  - $12.48 \times 10^{18}$  electrons
  - $1.602 \times 10^{19}$  electrons
  - $3.204 \times 10^{19}$  electrons
- 16) Which of the following according to KCL must be zero?
- Algebraic sum of currents in closed-loop
  - Algebraic sum of power in closed-loop
  - Algebraic sum of currents entering and leaving a junction
  - Algebraic sum of voltages across the input and output
- 17) Which of these PowerPoint features would allow any user to create a given simple presentation quicker?
- Animations
  - Chart Wizard
  - Transition Wizard
  - AutoContent Wizard
- 18) Which of these font effects is NOT available in the PowerPoint Font dialogue box?
- Shadow
  - Underline
  - Strikethrough
  - Emboss
- 19) On which load power factor zero voltage regulation will be achieved?
- 0
  - 1
  - Leading
  - Lagging
- 20) On which factors transformer routine efficiency depends upon?
- Supply frequency
  - Load current
  - Power factor of load
  - Load current and power factor of load

- 21) At which load condition maximum efficiency of a distribution transformer will be achieved?
- At no load
  - At 60% full load
  - At 80% full load
  - At full load
- 22) Why efficiency of a transformer, under heavy loads, is comparatively low?
- Copper loss becomes high in proportion to the output
  - Iron loss is increased considerably
  - Voltage drop both in primary and secondary becomes large
  - Secondary output is much less as compared to primary input
- 23) The efficiencies of transformers compared to electric motors of the same power are
- About the same
  - Much smaller
  - Much higher
  - Can't comment
- 24) A transformer having maximum efficiency at 75% full load will have ratio of iron loss and full load copper loss equal to \_\_\_\_\_
- 4/3
  - 3/4
  - 9/16
  - 16/9
- 25) A V-V connected transformer can be connected in parallel to delta-delta connected transformer but not to \_\_\_\_\_
- delta-star
  - star-delta
  - star-V

26) For the circuit given below, current flowing through each branch is—



- 0.9 Amperes, 0.4 Amperes
- 0.89 Amperes, 0.304 Amperes
- 1 Ampere, 1 Amperes
- 0.60 Amperes, 0.5 Amperes

- 27) According to Thevenin's theorem, any bilateral network can be replaced by a network with—
- An independent current source in parallel to the equivalent resistance
  - An independent voltage source in series with the equivalent resistance
  - An independent voltage source in parallel to the resistance
  - None of these
- 28) Alternators are also called Synchronous generators because \_\_\_\_\_?
- They must run at a constant speed irrespective of desired frequency.
  - They must run at synchronous speed to give the desired frequency.
  - They must run at a speed which varies with frequency.
  - They must run at a speed equal to the desired frequency.
- 29) For an Alternator connected to a load, the terminal voltage per phase will \_\_\_\_\_?
- Be equal to the induced EMF
  - Vary with the load
  - Constant irrespective of the load
  - None of these
- 30) What will happen if the primary of a transformer is connected to D.C supply?
- Transformer will operate with low efficiency
  - Transformer will operate with high efficiency
  - No effect
  - Transformer may start to smoke and burn
- 31) What is the effect of rise in temperature on sag when ice and wind effect are eliminated?
- Sag decreases
  - Sag increases
  - Sag remains constant
  - Sag becomes zero
- 32) What is the relation between length of span and sag?
- $\text{sag} \propto \sqrt{\text{span}}$
  - $\text{sag} \propto (1/\text{span})$
  - $\text{sag} \propto \text{span}^2$
  - $\text{sag} \propto \text{span}^3$
- 33) Step Up transformer \_\_\_\_\_
- Step Up the level of Voltage.
  - Step down the level of current.
  - Step up level the power.
  - A and B only.
- 34) An overhead transmission line has a span of 220 metres, the conductor weight 0.604 kg/m. What will be the maximum sag if the working tension is 2879 kg.
- 8.96 m
  - 1.86 m
  - 7.85 m
  - 1.27 m

- 35) Induced currents in the sheaths are
- a) Induction current
  - b) Sheath circuit eddy current
  - c) Sheath eddy current
  - d) None of these
- 36) Grading of cable is done to
- a) Increase its conduction efficiency
  - b) Increase its strength
  - c) Achieve a uniform stress distribution
  - d) All of these
- 37) Underground cable have large charging current which
- a) Lags the voltage by  $90^\circ$
  - b) Leads the voltage by  $90^\circ$
  - c) Is in phase with voltage
  - d) Is out of phase by  $180^\circ$  with voltage
- 38) Safe value of current carrying capacity of cables is determined by
- a) Maximum voltage
  - b) Maximum temperature
  - c) Power factor
  - d) Maximum pressure
- 39) Synchronous motors installed at sub-station give
- a) Unity power factor
  - b) Lagging power factor
  - c) Leading power factor
  - d) None of these
- 40) The voltage rating of the transformer in a pole-mounted Sub Station is.....
- i. 11 KV / 400 V
  - ii. 11 KV / 240 V
  - iii. 33 KV / 400 V
  - iv. None of the above
- 41) Which among these uses a low voltage DC source?
- i. Remote indication
  - ii. Emergency lighting system
  - iii. Remote position control
  - iv. All of these
- 42) Which among these is a type of surge arrester?
- a) Conventional gapped arrestors
  - b) Metal oxide arrestors
  - c) Both (A) and (B)
  - d) None of these



- 43) For voltage boosting in distribution networks, the capacitors used is
- Series capacitors
  - Shunt capacitors
  - Both (a) and (b)
  - None of these
- 44) How do you display current date only in MS Excel?
- Date ()
  - Today ()
  - Now ()
  - Time ()
- 45) What does COUNTA () function do in MS-Excel?
- Counts cells having alphabets
  - Counts empty cells
  - Counts cells having number
  - Counts non-empty cells
- 46) In MS-Excel the formula, which symbol specifies the fixed columns or rows?
- \$
  - \*
  - %
  - ;
- 47) Each excel file is a workbook that contains different sheets. Which of the following cannot be a sheet in workbook?
- Work sheet
  - Chart sheet
  - Macro sheet
  - Data sheet
- 48) The most suitable material for making the core of an electromagnet is:
- Steel
  - Iron
  - Soft iron
  - Aluminium
- 49) When a straight conductor is carrying current:
- There are circular magnetic field lines around it
  - There are magnetic field lines parallel to the conductor
  - There are no magnetic field lines
  - None of the above
- 50) The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:
- Clockwise
  - Anticlockwise
  - Towards North
  - Towards South

- 51) Which among the following quantities are to be determined in voltage controlled bus?
- P and Q
  - Q and  $|V|$
  - $|V|$  and  $\delta$
  - Q and  $\delta$
- 52) Single line diagram of which of the following power system is possible?
- Power system with LG fault
  - Balanced power system
  - Power system with LL fault
  - Power system with LLG fault
- 53) In Impedance diagram different power system elements are represented by symbols.
- False
  - True
- 54) The area under the load curve represents \_\_\_\_\_
- maximum demand
  - load factor
  - the average load on power system
  - number of units generated
- 55) Which of the following is not a requirement for site selection of hydroelectric power plant?
- Large catchment area
  - Rocky land
  - Sedimentation
  - Availability of water
- 56) Which of the following element of hydroelectric power plant prevents the penstock from water hammer phenomenon?
- Surge Tank
  - Draft tubes
  - Spillway
  - Valves and Gates
- 57) Which of the following part of thermal power plant causes maximum energy losses?
- Alternator
  - Ash and unburnt carbon
  - Boiler
  - Condenser

58) What of the below mentioned statements are incorrect as compared to the HVDC system?

- a) Distance limitation
- b) Back to back connection is possible
- c) Extra reactive power compensation
- d) More corona losses

59) A power system has a maximum load of 15 MW. Annual load factor is 50%. The reserve capacity of plant is \_\_\_\_\_ if the plant capacity factor is 40%.

- a) 3.75 MW
- b) 7.75 MW
- c) 46.75 MW
- d) 8.75 MW

60) During Ferranti effect the voltage drop across line resistance \_\_\_\_\_

- a) In phase with receiving end voltage
- b) lags behind receiving end voltage
- c) lead the receiving end voltage
- d) lags behind sending end voltage

61) Ferranti effect is not a problem for \_\_\_\_\_

- a) Long Transmission lines
- b) Medium Transmission lines
- c) Short Transmission lines
- d) Transmission line having high capacitance

62) What is the main reason for maintaining consumer end voltage within prescribed limit?

- a) Because it is declared by the supplier
- b) For satisfactory operation of electrical equipment
- c) For easy calculation of units supplied
- d) To reduce the line losses

63) On which side of the transformer tap changer is provided?

- a) On High Voltage side
- b) On low voltage side
- c) On high voltage and low voltage side
- d) In core

64) Transmission efficiency of a transmission line increases with the \_\_\_\_\_

- a) decrease in power factor and voltage
- b) increase in power factor and voltage
- c) increase in power factor but the decrease in voltage
- d) increase in voltage only power factor remains constant

- 65) If the transmission line is lossless, then its characteristic impedance will be \_\_\_\_\_
- a)  $\sqrt{L/C}$
  - b)  $\sqrt{LC}$
  - c)  $\sqrt{L+C}$
  - d)  $\sqrt{C/L}$
- 66) The surge impedance of multiple conductor lines as compared to single line is \_\_\_\_\_
- a) higher
  - b) lower
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- 75) Kirchhoff's laws are useful in determining—
- i. Current flowing in a circuit
  - ii. EMFs and Voltage drops in a circuit
  - iii. Power in a circuit
  - iv. All the above
- 76) What is the working principle of a Transformer?
- a) Transformer works on the principle of self-induction
  - b) Transformer works on the principle of mutual induction
  - c) Transformer works on the principle of ampere law
  - d) Transformer works on the principle of coulomb law
- 77) Which of the following transformer, Buchholz's relay can be fixed on?
- a) Welding transformers
  - b) Oil cooled transformers
  - c) Auto-transformers
  - d) Air-cooled transformers
- 78) For a power transformer operating at full load it draws voltage and current equal to 200 V and 100 A respectively at 0.8 pf. Iron and copper losses are equal to 120 kW and 300kW. What is efficiency?
- a) 97.44%
  - b) 99.12%
  - c) 86.44%
  - d) 96.44%
- 79) What will happen if the secondary of a current transformer is open-circuited?
- a) depends on other parameters
  - b) cool as there is no secondary current
  - c) hot because primary will carry heavy current
  - d) hot because of heavy iron losses

- 80) Variations in a hysteresis loss in a transformer ( $B_{max}$  = maximum flux density) \_\_\_\_\_
- $B_{max}$
  - $B_{max}^{1.6}$
  - $B_{max}^{3.83}$
  - $B_{max}/2$
- 81) A shell-type transformer has \_\_\_\_\_
- High eddy current losses
  - Reduced magnetic leakage
  - Negligible hysteresis losses
  - Cannot be determined
- 82) When tripping of the transformer from the main circuit is required?
- Local overheating
  - Short-circuited core laminations
  - Core-bolt insulation failure
  - Puncture of bushings
- 83) A 25 KVA transformer is constructed to a turns ratio of  $N_1/N_2 = 10$ . The impedance of primary winding is  $3 + j5$  ohms and of secondary winding is  $0.5 + j0.8$  ohms. What will be the impedance of transformer when referred to primary?
- $53 + 85j$  ohms
  - $53j + 85$  ohms
  - Can't be calculated
  - $3.5 + 5.8j$  ohms
- 84) Which of the following neutral earthing method is disadvantageous?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 85) Which method will reduce the cost of insulation between earth and cables?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 86) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 87) If two transformers' secondaries are connected to each other with unequal primary voltage ratio then, \_\_\_\_\_
- no circulating current will flow
  - very high short circuit current will flow
  - small circulating current will flow
  - insufficient information

- 88) The circulating current flowing through the circuit at no-load condition depends on
- total leakage impedance of the two transformers
  - difference in their voltage ratios
  - difference in voltage ratios, leakage impedance of 2 transformers
  - other parameters
- 89) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 90) Two identical loops, one that is made up of copper and another made up of aluminium are rotated at the same speed in the same magnetic field, then
- The induced EMF will be equal in both the loops.
  - Induced EMF will be more in Copper than Aluminium.
  - The induced current will be more in the copper wire due to its low resistance.
- I & III are correct
  - II & III are correct
  - All are correct
  - None is correct
- 91) The instantaneous current flowing from an a.c source is  $i = 6 \sin 314 t$ . What is the rms value of current?
- 3.173 A
  - 4.242 A
  - 1.414 A
  - 6.432 A
- 92) A heating element is marked 210 V, 630 W. What will be the value of current drawn by the element when it is connected to a 210 V DC source?
- 2A
  - 1.73A
  - 3A
  - 1.41A
- 93) Core of a transformer is laminated because
- To minimize eddy currents in the iron core
  - To reduce energy loss in the form of heat.
  - To increase ease of construction & maintenance
- I & II are correct.
  - I & III are correct.
  - II & III are correct.
  - All are correct.

- 94) We prefer AC voltage over DC voltage because
- It can be stepped up and stepped down using a transformer.
  - The carrying loss is very much less in an AC circuit.
  - Generation and transmission is economical than DC.
  - All of above.

- 95) The voltage across the circuit breaker pole after final current zero is
- Restriking voltage
  - Supply voltage
  - Recovery voltage
  - None of these

- 96) In a power system, the rate of rise of restriking voltage depends upon
- Circuit power factor only
  - Switching condition only
  - Both (a) and (b) above
  - None of these

- 97) Fault diverters are basically
- Circuit breakers
  - Fast switches
  - Relays
  - Fuses

- 98) Lightning arrester should be located
- Away from the circuit breaker
  - Near the transformer
  - Away from the transformer
  - Near the circuit breaker

- 99) For remote operation, circuit breaker must be equipped with
- Inverse time trip
  - Shunt trip
  - Time delay trip
  - Both (a) and (c) above

- 100) The power factor of the arc in a circuit breaker is
- Zero leading
  - Zero lagging
  - Unity
  - Any value from zero to unity

H.P. BOARD OF DEPARTMENTAL EXAMINATION (C)

DEPARTMENTAL EXAMINATION FOR OFFICERS OF HPSEBL 4/2023

PAPER B (PART-1)

MARKS:-100

ELECTRICAL

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**(Attempt Any 5 Questions)**

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- Q3 What is a Bank Reconciliation statement? Describe the process of bank reconciliation at the Sub-Division and Division levels of HPSEBL. (10 Marks)
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  - (ii) CWIP
  - (iii) Capitalisation of Fixed Assets
  - (iv) Government-e-Material (GeM Portal)
  - (v) Revenue Sanction
  - (vi) Cash Book
  - (vii) Security Deposits
- Q4 A) What are the components of a cost of Fixed assets and describe the primary requirements of conversion of CWIP into Fixed Assets? (10 Marks)

B) How will you define the term "financial concurrence" from HPSEB Ltd.'s perspective and why it is an essential parameter to obtain financial concurrence before the execution of new schemes/projects in the company? (10 Marks)

Q5 A) What is the standard procedure to operate the bank accounts in HPSEB Ltd.? Describe the instructions for the operation of the Drawing account in brief. (10 Marks)

B) What do you understand about the term 'Budget' from the perspective of HPSEB Ltd.? Describe the duties of disbursing and controlling officers during budget estimation. (10 Marks)

Q6 A) What is the significance of the Internal controls in the company? And what major audits are being executed by HPSEB Ltd. as a measure of internal controls? (10 Marks)

B) Describe the "Canon of Financial Property" in new DOFPs, 2022 of HPSEBL. (10 Marks)

Q7 Prepare the Office Order for sanctioning the following expenditure incurred by the Company as per new DOFPs, 2022 of HPSEBL:-

- (i) Purchasing of a new Photocopier Machine of Rs. 1,50,000/- for official use in HPSEBL.
- (ii) Purchasing of a new Tonner/Cartridge for Printer for Rs.4,500/-- for official use in HPSEBL

(10 X 2 = 20)

Paper-B (Part-2)

Electrical Engineering Basics

No-Books Allowed

Maximum Marks-100

100 Questions - 1 Marks Each

- 1) Which among the following quantities are to be determined in voltage-controlled bus?
  - a. P and Q
  - b. Q and  $|V|$
  - c.  $|V|$  and  $\delta$
  - d. Q and  $\delta$
  
- 2) Single line diagram of which of the following power system is possible?
  - a) Power system with LG fault
  - b) Balanced power system
  - c) Power system with LL fault
  - d) Power system with LLG fault
  
- 3) In impedance diagram different power system elements are represented by symbols.
  - a) False
  - b) True
  
- 4) The area under the load curve represents \_\_\_\_\_
  - a) maximum demand.
  - b) load factor.
  - c) the average load on power system.
  - d) number of units generated.
  
- 5) Which of the following is not a requirement for site selection of hydroelectric power plant?
  - a) Large catchment area.
  - b) Rocky land.
  - c) Sedimentation.
  - d) Availability of water.
  
- 6) Which of the following element of hydroelectric power plant prevents the penstock from water hammer phenomenon?
  - a) Surge Tank.
  - b) Draft tubes.
  - c) Spillway.
  - d) Valves and Gates.
  
- 7) Which of the following part of thermal power plant causes maximum energy losses?
  - a) Alternator.
  - b) Ash and unburnt carbon.
  - c) Boiler.
  - d) Condenser.

- 8) What of the below mentioned statements are incorrect as compared to the HVDC system?
- a) Distance limitation.
  - b) Back-to-back connection is possible.
  - c) Extra reactive power compensation.
  - d) More corona losses.
- 9) A power system has a maximum load of 15 MW. Annual load factor is 50%. The reserve capacity of plant is \_\_\_\_\_ if the plant capacity factor is 40%.
- a) 3.75 MW
  - b) 7.75 MW
  - c) 46.75 MW
  - d) 8.75 MW
- 10) During Ferranti effect the voltage drop across line resistance \_\_\_\_\_
- a) In phase with receiving end voltage
  - b) lags behind receiving end voltage
  - c) lead the receiving end voltage
  - d) lags behind sending end voltage
- 11) Ferranti effect is not a problem for \_\_\_\_\_
- a) Long Transmission lines
  - b) Medium Transmission lines
  - c) Short Transmission lines
  - d) Transmission line having high capacitance
- 12) What is the main reason for maintaining consumer end voltage within prescribed limit?
- a) Because it is declared by the supplier
  - b) For satisfactory operation of electrical equipment
  - c) For easy calculation of units supplied
  - d) To reduce the line losses
- 13) On which side of the transformer tap changer is provided?
- a) On High Voltage side
  - b) On low voltage side
  - c) On high voltage and low voltage side
  - d) In core
- 14) Transmission efficiency of a transmission line increases with the \_\_\_\_\_
- a) decrease in power factor and voltage
  - b) increase in power factor and voltage
  - c) increase in power factor but the decrease in voltage
  - d) increase in voltage only power factor remains constant
- 15) If the transmission line is lossless, then its characteristic impedance will be \_\_\_\_\_
- a)  $\sqrt{L/C}$
  - b)  $\sqrt{LC}$
  - c)  $\sqrt{L+C}$
  - d)  $\sqrt{C/L}$



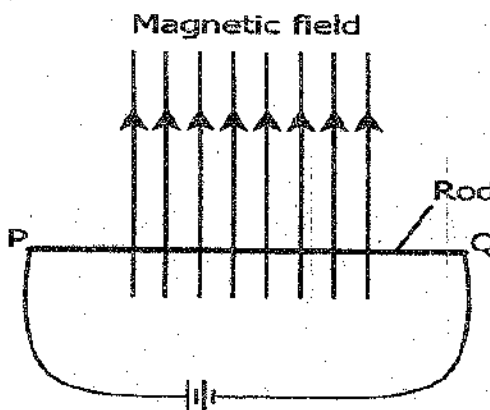
- 16) The surge impedance of multiple conductor lines as compared to single line is \_\_\_\_\_
- a) higher
  - b) lower
  - c) same
  - d) length dependent
- 17) It is intended to increase the power despatch of the existing transmission line. Then what can be the most appropriate solution for improving it?
- a) Installing series capacitors
  - b) Installing shunt capacitor
  - c) Installing shunt reactor
  - d) Installing series reactor
- 18) Reactive power requirement of a power transmission system depends on \_\_\_\_
- a) Power angle  $\delta$
  - b)  $|V_s| - |V_r|$
  - c)  $V_s$
  - d)  $V_r$
- 19) The system unit that contains the most vital part of the personal computer is called
- (a) CPU
  - (b) BIOS chip
  - (c) Motherboard
  - (d) Monitor
- 20) Which of the following is primarily responsible for converting input (data) into meaningful output (information)?
- (a) RAM
  - (b) CPU
  - (c) Storage device
  - (d) Input and Output device
- 21) Central Processing Unit in a computer consists of which major components?
- (a) Arithmetic logic unit (ALU) and Control Unit
  - (b) Control Unit (CU)
  - (c) Registers
  - (d) ALU, Control Unit, and Registers
- 22) Which among the following is the fastest memory in a computer that holds information?
- (a) Register
  - (b) Cache
  - (c) Main memory
  - (d) RAM
- 23) Computer gets the input with the help of
- (a) mouse and keyboard
  - (b) joystick
  - (c) printer
  - (d) both a and b

- 24) Where on the MS Word screen you can locate the horizontal split bar?
- On the vertical scroll bar's top
  - On the vertical scroll bar's bottom
  - The horizontal scroll bar's left side
  - the horizontal scroll bar's right side
  - None of the above
- 25) Kirchhoff's laws are useful in determining—
- Current flowing in a circuit
  - EMFs and Voltage drops in a circuit
  - Power in a circuit
  - All the above
- 26) What is the working principle of a Transformer?
- Transformer works on the principle of self-induction
  - Transformer works on the principle of mutual induction
  - Transformer works on the principle of ampere law
  - Transformer works on the principle of coulomb law
- 27) Which of the following transformer, Buchholz's relay can be fixed on?
- Welding transformers
  - Oil cooled transformers
  - Auto-transformers
  - Air-cooled transformers
- 28) For a power transformer operating at full load it draws voltage and current equal to 200 V and 100 A respectively at 0.8 pf. Iron and copper losses are equal to 120 kW and 300kW. What is efficiency?
- 97.44%
  - 99.12%
  - 86.44%
  - 96.44%
- 29) What will happen if the secondary of a current transformer is open-circuited?
- depends on other parameters
  - cool as there is no secondary current
  - hot because primary will carry heavy current
  - hot because of heavy iron losses
- 30) Variations in a hysteresis loss in a transformer ( $B_{max}$  = maximum flux density)
- $B_{max}$
  - $B_{max}^{1.6}$
  - $B_{max}^{3.83}$
  - $B_{max}/2$
- 31) A shell-type transformer has \_\_\_\_\_
- High eddy current losses
  - Reduced magnetic leakage
  - Negligible hysteresis losses
  - Cannot be determined

- 32) When tripping of the transformer from the main circuit is required?
- Local overheating
  - Short-circuited core laminations
  - Core-bolt insulation failure
  - Puncture of bushings
- 33) A 25 KVA transformer is constructed to a turns ratio of  $N_1/N_2 = 10$ . The impedance of primary winding is  $3+j5$  ohms and of secondary winding is  $0.5+j0.8$  ohms. What will be the impedance of transformer when referred to primary?
- $53 + 85j$  ohms
  - $53j + 85$  ohms
  - Can't be calculated
  - $3.5 + 5.8j$  ohms
- 34) Which of the following neutral earthing method is disadvantageous?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 35) Which method will reduce the cost of insulation between earth and cables?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 36) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 37) If two transformers' secondaries are connected to each other with unequal primary voltage ratio then, \_\_\_\_\_
- no circulating current will flow
  - very high short circuit current will flow
  - small circulating current will flow
  - insufficient information
- 38) The circulating current flowing through the circuit at no load condition depends on \_\_\_\_\_
- total leakage impedance of the two transformers
  - difference in their voltage ratios
  - difference in voltage ratios, leakage impedance of 2 transformers
  - other parameters
- 39) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
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  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$

- 40) Two identical loops, one that is made up of copper and another made up of aluminium are rotated at the same speed in the same magnetic field, then
- The induced EMF will be equal in both the loops.
  - Induced EMF will be more in Copper than Aluminium.
  - The induced current will be more in the copper wire due to its low resistance.
- I & III are correct.
  - II & III are correct
  - All are correct
  - None is correct
- 41) The instantaneous current flowing from an a.c source is  $i = 6 \sin 314 t$ . What is the rms value of current?
- 3.173 A
  - 4.242 A
  - 1.414 A
  - 6.432A
- 42) A heating element is marked 210 V, 630 W. What will be the value of current drawn by the element when it is connected to a 210 V DC source?
- 2A
  - 1.73A
  - 3A
  - 1.41A
- 43) Core of a transformer is laminated because
- To minimize eddy currents in the iron core
  - To reduce energy loss in the form of heat.
  - To increase ease of construction & maintenance
- I & II are correct.
  - I & III are correct.
  - II & III are correct.
  - All are correct.
- 44) We prefer AC voltage over DC voltage because
- It can be stepped up and stepped down using a transformer.
  - The carrying loss is very much less in an AC circuit.
  - Generation and transmission is economical than DC.
  - All of above.
- 45) The voltage across the circuit breaker pole after final current zero is
- Restriking voltage
  - Supply voltage
  - Recovery voltage
  - None of these
- 46) In a power system, the rate of rise of restriking voltage depends upon
- Circuit power factor only
  - Switching condition only
  - Both (a) and (b) above
  - None of these

- 47) Fault diverters are basically
- a) Circuit breakers
  - b) Fast switches
  - c) Relays
  - d) Fuses
- 48) Lightning arrestor should be located
- a) Away from the circuit breaker
  - b) Near the transformer
  - c) Away from the transformer
  - d) Near the circuit breaker
- 49) For remote operation, circuit breaker must be equipped with
- a) Inverse time trip
  - b) Shunt trip
  - c) Time delay trip
  - d) Both (a) and (c) above
- 50) The power factor of the arc in a circuit breaker is
- a) Zero leading
  - b) Zero lagging
  - c) Unity
  - d) Any value from zero to unity
- 51) The strength of the magnetic field inside a long current carrying straight solenoid is:
- i. More at the ends than at the centre
  - ii. Minimum in the middle
  - iii. Same at all points
  - iv. Found to increase from one end to the another
- 52) Which option explains Fleming's left-hand rule to understand the working of a motor?
- i. When a current carrying conductor is moved with force, it creates a magnetic field.
  - ii. When a conductor is moved inside a magnetic field, the current is produced in the conductor.
  - iii. When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
  - iv. When a current carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.
- 53) A metal rod PQ is placed in the magnetic field. The ends of the rod are connected to a battery using wires.



Where will the rod move?

- i. Upward
- ii. Downwards
- iii. Into the field
- iv. Out of the field

54) In impedance relay, current element torque should be

- i. Equal to voltage element torque
- ii. Greater than voltage element torque
- iii. Less than voltage element torque
- iv. None of these

55) Distance relays are generally

- i. Impedance type
- ii. MHO type
- iii. Reactance type
- iv. All of these

56) Buchholz relay is used to protect against

- i. Inter-turn fault
- ii. External faults
- iii. Rotor faults
- iv. Every internal faults.

57) Good relay should possess

- i. Speed & reliability
- ii. Sensitivity
- iii. Adequateness & selectivity
- iv. All of these

58) Earthing transformer is used to

- i. Improve neutral wire's current capacity.
- ii. Avoid overheating of transformer.
- iii. Provide artificial earthing.
- iv. Avoid harmonics.

59) Percentage differential protection is used to prevent against

- i. Inter-turn faults
- ii. Heavy Loads
- iii. External Faults
- iv. Magnetizing current in rush

60) Directional relays responds to

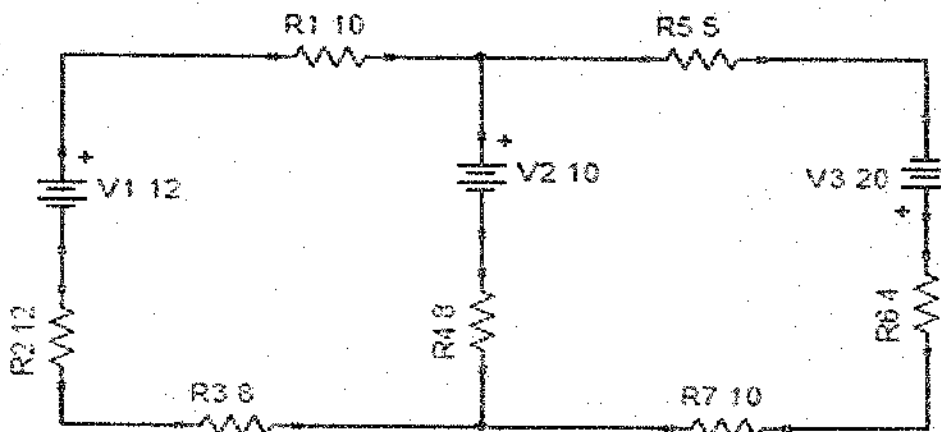
- i. Power
- ii. Voltage
- iii. Current
- iv. Reactance

61) Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?

- a) Capacitors
- b) Inductors
- c) Transistors
- d) Resistance

- 62) What kind of quantity is an Electric potential?
- Vector quantity
  - Tensor quantity
  - Scalar quantity
  - Dimensionless quantity
- 63) What is the magnitude of mutually induced emf,  $E_2$  in a transformer?
- directly proportional to rate of change of flux and number of secondary turns
  - inversely proportional to rate of change of flux and number of secondary turns
  - proportional to rate of change of flux and inversely proportional to number of secondary turns
  - inversely proportional to the rate of change of flux and proportional to number of secondary turns
- 64) Which of the following will happen in a transformer when the number of secondary turns is less than the number of primary turns?
- The voltage gets stepped up.
  - The voltage gets stepped down.
  - The power gets stepped up.
  - The power gets stepped down.
- 65) How many electrons will constitute 2 Coulombs of electric charge?
- $6.24 \times 10^{18}$  electrons
  - $12.48 \times 10^{18}$  electrons
  - $1.602 \times 10^{19}$  electrons
  - $3.204 \times 10^{19}$  electrons
- 66) Which of the following according to KCL must be zero?
- Algebraic sum of currents in closed-loop
  - Algebraic sum of power in closed-loop
  - Algebraic sum of currents entering and leaving a junction
  - Algebraic sum of voltages across the input and output
- 67) Which of these PowerPoint features would allow any user to create a given simple presentation quicker?
- Animations
  - Chart Wizard
  - Transition Wizard
  - AutoContent Wizard
- 68) Which of these font effects is NOT available in the PowerPoint Font dialogue box?
- Shadow
  - Underline
  - Strikethrough
  - Emboss
- 69) On which load power factor zero voltage regulation will be achieved?
- 0
  - 1
  - Leading
  - Lagging
- 70) On which factors transformer routine efficiency depends upon?
- Supply frequency
  - Load current
  - Power factor of load
  - Load current and power factor of load

- 71) At which load condition maximum efficiency of a distribution transformer will be achieved?
- At no load
  - At 60% full load
  - At 80% full load
  - At full load
- 72) Why efficiency of a transformer, under heavy loads, is comparatively low?
- Copper loss becomes high in proportion to the output
  - Iron loss is increased considerably
  - Voltage drop both in primary and secondary becomes large
  - Secondary output is much less as compared to primary input
- 73) The efficiencies of transformers compared to electric motors of the same power are \_\_\_\_\_
- About the same
  - Much smaller
  - Much higher
  - Can't comment
- 74) A transformer having maximum efficiency at 75% full load will have ratio of iron loss and full load copper loss equal to \_\_\_\_\_
- $4/3$
  - $3/4$
  - $9/16$
  - $16/9$
- 75) A V-V connected transformer can be connected in parallel to delta-delta connected transformer but not to \_\_\_\_\_
- delta-star
  - star-delta
  - star-V
- 76) For the circuit given below, current flowing through each branch is—



- 0.9 Amperes, 0.4 Amperes
- 0.89 Amperes, 0.304 Amperes
- 1 Ampere, 1 Amperes
- 0.60 Amperes, 0.5 Amperes



77) According to Thevenin's theorem, any bilateral network can be replaced by a network with—

- i. An independent current source in parallel to the equivalent resistance
- ii. An independent voltage source in series with the equivalent resistance
- iii. An independent voltage source in parallel to the resistance
- iv. None of these

78) Alternators are also called Synchronous generators because \_\_\_\_\_?

- i. They must run at a constant speed irrespective of desired frequency.
- ii. They must run at synchronous speed to give the desired frequency.
- iii. They must run at a speed which varies with frequency.
- iv. They must run at a speed equal to the desired frequency.

79) For an Alternator connected to a load, the terminal voltage per phase will \_\_\_\_\_?

- i. Be equal to the induced EMF
- ii. Vary with the load
- iii. Constant irrespective of the load
- iv. None of these

80) What will happen if the primary of a transformer is connected to D.C supply?

- i. Transformer will operate with low efficiency
- ii. Transformer will operate with high efficiency
- iii. No effect
- iv. Transformer may start to smoke and burn

81) What is the effect of rise in temperature on sag when ice and wind effect are eliminated?

- a) Sag decreases
- b) Sag increases
- c) Sag remains constant
- d) Sag becomes zero

82) What is the relation between length of span and sag?

- a)  $\text{sag} \propto \sqrt{\text{span}}$
- b)  $\text{sag} \propto (1/\text{span})$
- c)  $\text{sag} \propto \text{span}^2$
- d)  $\text{sag} \propto \text{span}^3$

83) Step Up transformer \_\_\_\_\_

- i. Step Up the level of Voltage.
- ii. Step down the level of current.
- iii. Step up level the power.
- iv. A and B only.

84) An overhead transmission line has a span of 220 metres: the conductor weight 0.604 kg/m. What will be the maximum sag if the working tension is 2879 kg.

- a) 8.96 m
- b) 1.86 m
- c) 7.85 m
- d) 1.27 m

85) Induced currents in the sheaths are

- a) Induction current
- b) Sheath circuit eddy current
- c) Sheath eddy current
- d) None of these

86) Grading of cable is done to

- a. Increase its conduction efficiency
- b. Increase its strength
- c. Achieve a uniform stress distribution
- d. All of these

87) Underground cable have large charging current which

- a. Lags the voltage by  $90^\circ$
- b. Leads the voltage by  $90^\circ$
- c. Is in phase with voltage
- d. Is out of phase by  $180^\circ$  with voltage

88) Safe value of current carrying capacity of cables is determined by

- a. Maximum voltage
- b. Maximum temperature
- c. Power factor
- d. Maximum pressure

89) Synchronous motors installed at sub-station give

- a. Unity power factor
- b. Lagging power factor
- c. Leading power factor
- d. None of these

90) The voltage rating of the transformer in a pole-mounted Sub Station is.....

- i. 11 KV / 400 V
- ii. 11 KV / 240 V
- iii. 33 KV / 400 V
- iv. None of the above

91) Which among these uses a low voltage DC source?

- i. Remote indication
- ii. Emergency lighting system
- iii. Remote position control
- iv. All of these

92) Which among these is a type of surge arrestor?

- a) Conventional gapped arrestors
- b) Metal oxide arrestors
- c) Both (A) and (B)
- d) None of these

93) For voltage boosting in distribution networks the capacitors used is

- i. Series capacitors
- ii. Shunt capacitors
- iii. Both (a) and (b)
- iv. None of these

94) How do you display current date only in MS Excel?

- a. Date ()
- b. Today ()
- c. Now ()
- d. Time ()

95) What does COUNTA () function do in MS-Excel?

- a. Counts cells having alphabets
- b. Counts empty cells
- c. Counts cells having number
- d. Counts non-empty cells

96) In MS-Excel the formula, which symbol specifies the fixed columns or rows?

- a. \$
- b. \*
- c. %
- d. ;

97) Each excel file is a workbook that contains different sheets. Which of the following cannot be a sheet in workbook?

- a. Work sheet
- b. Chart sheet
- c. Macro sheet
- d. Data sheet

98) The most suitable material for making the core of an electromagnet is:

- i. Steel
- ii. Iron
- iii. Soft iron
- iv. Aluminium

99) When a straight conductor is carrying current:

- i. There are circular magnetic field lines around it
- ii. There are magnetic field lines parallel to the conductor
- iii. There are no magnetic field lines
- iv. None of the above

100) The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:

- i. Clockwise
- ii. Anticlockwise
- iii. Towards North
- iv. Towards South

H.P. BOARD OF DEPARTMENTAL EXAMINATION (D)  
DEPARTMENTAL EXAMINATION FOR OFFICERS OF HPSEBL 4/2023

PAPER B (PART-1)

MARKS:-100

ELECTRICAL

Time allowed:- 03hours

**Consumers / Company accounts and accounting procedures**

**(Attempt Any 5 Questions)**

- Q1. (A) What is the classification of revenue and expenditures? Briefly describe their main features. (10 Marks)
- (B) Briefly explain the classification of expenditure i.e. Capital and Revenue with justification. (2 Marks Each)
1. Replacement of existing computer with a new computer.
  2. Renovation of office building incurring heavy expenditure.
  3. Purchasing of toner/cartridge for the printer.
  4. Repair of officer furniture.
  5. Purchase of pen drives and DVDs for office use.
- Q2. (A) What do you understand by the Surplus stores, 'Unserviceable Stores' and Obsolete Stores? Also, describe the procedure prescribed for the condemnation of these stores. (10 Marks)
- (B) What are the main points to be observed while the opening of the Tender of a work? (10 Marks)
- Q3. What is a Bank Reconciliation statement? Describe the process of bank reconciliation at the Sub-Division and Division levels of HPSEBL. (10 Marks)
- (a) Explain the following briefly:- (Attempt any 5, 2 Marks Each)
- (i) R & M Expenses
  - (ii) CWIP
  - (iii) Capitalisation of Fixed Assets
  - (iv) Government-e-Material (GeM Portal)
  - (v) Revenue Sanction
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  - b) Reduced magnetic leakage
  - c) Negligible hysteresis losses
  - d) Cannot be determined
  
- 7) When tripping of the transformer from the main circuit is required?
  - a) Local overheating
  - b) Short-circuited core laminations
  - c) Core-bolt insulation failure
  - d) Puncture of bushings

- 8) A 25 KVA transformer is constructed to a turns ratio of  $N_1/N_2 = 10$ . The impedance of primary winding is  $3+j5$  ohms and of secondary winding is  $0.5+j0.8$  ohms. What will be the impedance of transformer when referred to primary?
- $53 + 85j$  ohms
  - $53j + 85$  ohms
  - Can't be calculated
  - $3.5 + 5.8j$  ohms
- 9) Which of the following neutral earthing method is disadvantageous?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 10) Which method will reduce the cost of insulation between earth and cables?
- Neutral solidly earthed
  - Neutral earthed via an impedance
  - Neutral isolated
  - Neutrally
- 11) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 12) If two transformers' secondaries are connected to each other with unequal primary voltage ratio then, \_\_\_\_\_
- no circulating current will flow
  - very high short circuit current will flow
  - small circulating current will flow
  - insufficient information
- 13) The circulating current flowing through the circuit at no load condition depends on \_\_\_\_\_
- total leakage impedance of the two transformers
  - difference in their voltage ratios
  - difference in voltage ratios, leakage impedance of 2 transformers
  - other parameters
- 14) Which is the correct formula for current flowing through the transformer 1, when they're having equal voltage ratio?
- $I_1 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_2 = Z_2 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_1 / (Z_1 + Z_2) * I_L$
  - $I_1 = Z_2 / (Z_1 - Z_2) * I_L$
- 15) Two identical loops, one that is made up of copper and another made up of aluminium are rotated at the same speed in the same magnetic field, then
- The induced EMF will be equal in both the loops.
  - Induced EMF will be more in Copper than Aluminium.
  - The induced current will be more in the copper wire due to its low resistance.
- I & III are correct
  - II & III are correct
  - All are correct
  - None is correct

- 16) The instantaneous current flowing from an a.c source is  $i = 6 \sin 314 t$ . What is the rms value of current?
- 3.173 A
  - 4.242 A
  - 1.414 A
  - 6.432A
- 17) A heating element is marked 210 V, 630 W. What will be the value of current drawn by the element when it is connected to a 210 V DC source?
- 2A
  - 1.73A
  - 3A
  - 1.41A
- 18) Core of a transformer is laminated because
- To minimize eddy currents in the iron core
  - To reduce energy loss in the form of heat.
  - To increase ease of construction & maintenance
- I & II are correct.
  - I & III are correct.
  - II & III are correct.
  - All are correct.
- 19) We prefer AC voltage over DC voltage because
- It can be stepped up and stepped down using a transformer.
  - The carrying loss is very much less in an AC circuit.
  - Generation and transmission is economical than DC.
  - All of above.
- 20) The voltage across the circuit breaker pole after final current zero is
- Restriking voltage
  - Supply voltage
  - Recovery voltage
  - None of these
- 21) In a power system, the rate of rise of restriking voltage depends upon
- Circuit power factor only
  - Switching condition only
  - Both (a) and (b) above
  - None of these
- 22) Fault diverters are basically
- Circuit breakers
  - Fast switches
  - Relays
  - Fuses
- 23) Lightning arrester should be located
- Away from the circuit breaker
  - Near the transformer
  - Away from the transformer
  - Near the circuit breaker

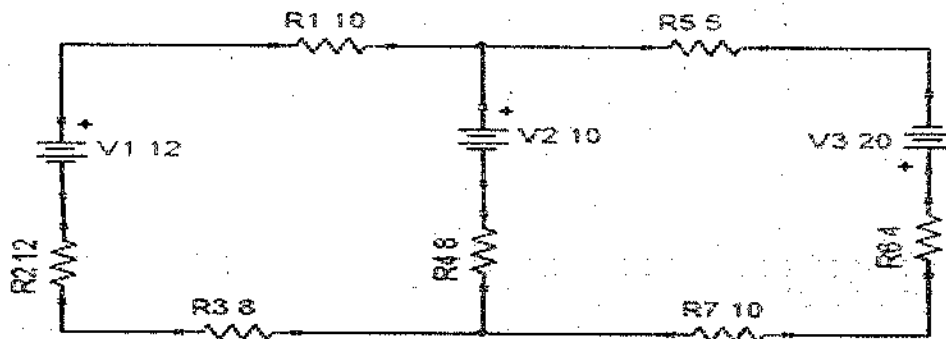


- 24) For remote operation, circuit breaker must be equipped with
- a) Inverse time trip
  - b) Shunt trip
  - c) Time delay trip
  - d) Both (a) and (c) above
- 25) The power factor of the arc in a circuit breaker is
- a) Zero leading
  - b) Zero lagging
  - c) Unity
  - d) Any value from zero to unity
- 26) Which among the following quantities are to be determined in voltage controlled bus?
- a. P and Q
  - b. Q and  $|V|$
  - c.  $|V|$  and  $\delta$
  - d. Q and  $\delta$
- 27) Single line diagram of which of the following power system is possible?
- a) Power system with LG fault
  - b) Balanced power system
  - c) Power system with LL fault
  - d) Power system with LLG fault
- 28) In impedance diagram different power system elements are represented by symbols.
- a) False
  - b) True
- 29) The area under the load curve represents \_\_\_\_\_
- a) maximum demand
  - b) load factor
  - c) the average load on power system
  - d) number of units generated
- 30) Which of the following is not a requirement for site selection of hydroelectric power plant?
- a) Large catchment area
  - b) Rocky land
  - c) Sedimentation
  - d) Availability of water
- 31) Which of the following element of hydroelectric power plant prevents the penstock from water hammer phenomenon?
- a) Surge Tank
  - b) Draft tubes
  - c) Spillway
  - d) Valves and Gates

- 32) Which of the following part of thermal power plant causes maximum energy losses?
- a) Alternator
  - b) Ash and unburnt carbon
  - c) Boiler
  - d) Condenser
- 33) What of the below mentioned statements are incorrect as compared to the HVDC system?
- a) Distance limitation
  - b) Back to back connection is possible
  - c) Extra reactive power compensation
  - d) More corona losses
- 34) A power system has a maximum load of 15 MW. Annual load factor is 50%. The reserve capacity of plant is \_\_\_\_\_ if the plant capacity factor is 40%.
- a) 3.75 MW
  - b) 7.75 MW
  - c) 46.75 MW
  - d) 8.75 MW
- 35) During Ferranti effect the voltage drop across line resistance \_\_\_\_\_
- a) In phase with receiving end voltage
  - b) lags behind receiving end voltage
  - c) lead the receiving end voltage
  - d) lags behind sending end voltage
- 36) Ferranti effect is not a problem for \_\_\_\_\_
- a) Long Transmission lines
  - b) Medium Transmission lines
  - c) Short Transmission lines
  - d) Transmission line having high capacitance
- 37) What is the main reason for maintaining consumer end voltage within prescribed limit?
- a) Because it is declared by the supplier
  - b) For satisfactory operation of electrical equipment
  - c) For easy calculation of units supplied
  - d) To reduce the line losses
- 38) On which side of the transformer tap changer is provided?
- a) On High Voltage side
  - b) On low voltage side
  - c) On high voltage and low voltage side
  - d) In core
- 39) Transmission efficiency of a transmission line increases with the \_\_\_\_\_
- a) decrease in power factor and voltage
  - b) increase in power factor and voltage
  - c) increase in power factor but the decrease in voltage
  - d) increase in voltage only power factor remains constant

- 40) If the transmission line is lossless, then its characteristic impedance will be \_\_\_\_\_
- a)  $\sqrt{L/C}$
  - b)  $\sqrt{LC}$
  - c)  $\sqrt{L+C}$
  - d)  $\sqrt{C/L}$
- 41) The surge impedance of multiple conductor lines as compared to single line is \_\_\_\_\_
- a) higher
  - b) lower
  - c) same
  - d) length dependent
- 42) It is intended to increase the power despatch of the existing transmission line. Then what can be the most appropriate solution for improving it?
- a) Installing series capacitors
  - b) Installing shunt capacitor
  - c) Installing shunt reactor
  - d) Installing series reactor
- 43) Reactive power requirement of a power transmission system depends on \_\_\_\_
- a) Power angle  $\delta$
  - b)  $|V_s| - |V_r|$
  - c)  $V_s$
  - d)  $V_r$
- 44) The system unit that contains the most vital part of the personal computer is called
- (a) CPU
  - (b) BIOS chip
  - (c) Motherboard
  - (d) Monitor
- 45) Which of the following is primarily responsible for converting input (data) into meaningful output (information)?
- (a) RAM
  - (b) CPU
  - (c) Storage device
  - (d) Input and Output device
- 46) Central Processing Unit in a computer consists of which major components?
- (a) Arithmetic logic unit (ALU) and Control Unit
  - (b) Control Unit (CU)
  - (c) Registers
  - (d) ALU, Control Unit, and Registers
- 47) Which among the following is the fastest memory in a computer that holds information?
- (a) Register
  - (b) Cache
  - (c) Main memory
  - (d) RAM

- 48) Computer gets the input with the help of
- mouse and keyboard
  - joystick
  - printer
  - both a and b
- 49) Where on the MS Word screen you can locate the horizontal split bar?
- On the vertical scroll bar's top
  - On the vertical scroll bar's bottom
  - The horizontal scroll bar's left side
  - the horizontal scroll bar's right side
  - None of the above
- 50) Kirchhoff's laws are useful in determining—
- Current flowing in a circuit
  - EMFs and Voltage drops in a circuit
  - Power in a circuit
  - All the above
- 51) For the circuit given below, current flowing through each branch is—



- 0.9 Amperes, 0.4 Amperes
  - 0.89 Amperes, 0.304 Amperes
  - 1 Ampere, 1 Amperes
  - 0.60 Amperes, 0.5 Amperes
- 52) According to Thevenin's theorem, any bilateral network can be replaced by a network with—
- An independent current source in parallel to the equivalent resistance
  - An independent voltage source in series with the equivalent resistance
  - An independent voltage source in parallel to the resistance
  - None of these
- 53) Alternators are also called Synchronous generators because \_\_\_\_\_?
- They must run at a constant speed irrespective of desired frequency.
  - They must run at synchronous speed to give the desired frequency.
  - They must run at a speed which varies with frequency.
  - They must run at a speed equal to the desired frequency.
- 54) For an Alternator connected to a load, the terminal voltage per phase will \_\_\_\_\_?
- Be equal to the induced EMF
  - Vary with the load
  - Constant irrespective of the load
  - None of these

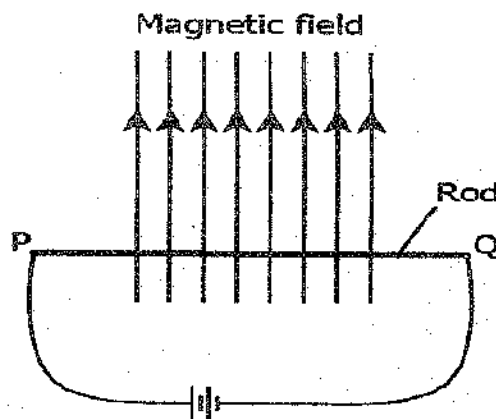
- 55) What will happen if the primary of a transformer is connected to D.C supply?
- Transformer will operate with low efficiency
  - Transformer will operate with high efficiency
  - No effect
  - Transformer may start to smoke and burn
- 56) What is the effect of rise in temperature on sag when Ice and wind effect are eliminated?
- Sag decreases
  - Sag increases
  - Sag remains constant
  - Sag becomes zero
- 57) What is the relation between length of span and sag?
- $\text{sag} \propto \sqrt{\text{span}}$
  - $\text{sag} \propto (1/\text{span})$
  - $\text{sag} \propto \text{span}^2$
  - $\text{Sag} \propto \text{span}^3$
- 58) Step Up transformer \_\_\_\_\_
- Step Up the level of Voltage.
  - Step down the level of current.
  - Step up level the power.
  - A and B only.
- 59) An overhead transmission line has a span of 220 metres the conductor weight 0.604 kg/m. What will be the maximum sag if the working tension is 2879 kg.
- 8.96 m
  - 1.86 m
  - 7.85 m
  - 1.27 m
- 60) Induced currents in the sheaths are
- Induction current
  - Sheath circuit eddy current
  - Sheath eddy current
  - None of these
- 61) Grading of cable is done to
- Increase its conduction efficiency
  - Increase its strength
  - Achieve a uniform stress distribution
  - All of these
- 62) Underground cable have large charging current which
- Lags the voltage by  $90^\circ$
  - Leads the voltage by  $90^\circ$
  - Is in phase with voltage
  - Is out of phase by  $180^\circ$  with voltage
- 63) Safe value of current carrying capacity of cables is determined by
- Maximum voltage
  - Maximum temperature
  - Power factor
  - Maximum pressure



- 64) Synchronous motors installed at sub-station give
- Unity power factor
  - Lagging power factor
  - Leading power factor
  - None of these
- 65) The voltage rating of the transformer in a pole-mounted Sub Station is.....
- 11 KV / 400 V
  - 11 KV / 240 V
  - 33 KV / 400 V
  - None of the above
- 66) Which among these uses a low voltage DC source?
- Remote indication
  - Emergency lighting system
  - Remote position control
  - All of these
- 67) Which among these is a type of surge arrestor?
- Conventional gapped arrestors
  - Metal oxide arrestors
  - Both (A) and (B)
  - None of these
- 68) For voltage boosting in distribution networks the capacitors used is
- Series capacitors
  - Shunt capacitors
  - Both (a) and (b)
  - None of these
- 69) How do you display current date only in MS Excel?
- Date ()
  - Today ()
  - Now ()
  - Time ()
- 70) What does COUNTA () function do in MS-Excel?
- Counts cells having alphabets
  - Counts empty cells
  - Counts cells having number
  - Counts non-empty cells
- 71) In MS-Excel the formula, which symbol specifies the fixed columns or rows?
- \$
  - \*
  - %
  - ;

- 72) Each excel file is a workbook that contains different sheets. Which of the following cannot be a sheet in workbook?
- Work sheet
  - Chart sheet
  - Macro sheet
  - Data sheet
- 73) The most suitable material for making the core of an electromagnet is:
- Steel
  - Iron
  - Soft iron
  - Aluminium
- 74) When a straight conductor is carrying current:
- There are circular magnetic field lines around it
  - There are magnetic field lines parallel to the conductor
  - There are no magnetic field lines
  - None of the above
- 75) The front face of a circular loop of a wire is the North Pole, the direction of current in this face of the loop will be:
- Clockwise
  - Anticlockwise
  - Towards North
  - Towards South
- 76) The strength of the magnetic field inside a long current carrying straight solenoid is:
- More at the ends than at the centre
  - Minimum in the middle
  - Same at all points
  - Found to increase from one end to the another
- 77) Which option explains Fleming's left-hand rule to understand the working of a motor?
- When a current carrying conductor is moved with force, it creates a magnetic field.
  - When a conductor is moved inside a magnetic field, the current is produced in the conductor.
  - When the magnetic field is moved relative to the conductor, the current is produced in the conductor.
  - When a current carrying conductor is placed in a magnetic field, it experiences a force from the magnetic field.

- 78) A metal rod PQ is placed in the magnetic field. The ends of the rod are connected to a battery using wires.



- Where will the rod move?
- a) Upward
  - b) Downwards
  - c) Into the field
  - d) Out of the field
- 79) In impedance relay, current element torque should be
- a) Equal to voltage element torque
  - b) Greater than voltage element torque
  - c) Less than voltage element torque
  - d) None of these
- 80) Distance relays are generally
- a) Impedance type
  - b) MHO type
  - c) Reactance type
  - d) All of these
- 81) Buchholz relay is used to protect against
- a) Inter-turn fault
  - b) External faults
  - c) Rotor faults
  - d) Every internal faults.
- 82) Good relay should possess
- a) Speed & reliability
  - b) Sensitivity
  - c) Adequateness & selectivity
  - d) All of these
- 83) Earthing transformer is used to
- a) Improve neutral wire's current capacity.
  - b) Avoid overheating of transformer.
  - c) Provide artificial earthing.
  - d) Avoid harmonics.
- 84) Percentage differential protection is used to prevent against
- a) Inter-turn faults
  - b) Heavy Loads
  - c) External Faults
  - d) Magnetizing current in rush
- 85) Directional relays responds to
- a) Power
  - b) Voltage
  - c) Current
  - d) Reactance
- 86) Which of the following elements of electrical engineering cannot be analyzed using Ohm's law?
- a) Capacitors
  - b) Inductors
  - c) Transistors
  - d) Resistance

- 87) What kind of quantity is an Electric potential?
- Vector quantity
  - Tensor quantity
  - Scalar quantity
  - Dimensionless quantity
- 88) What is the magnitude of mutually induced emf,  $E_2$  in a transformer?
- directly proportional to rate of change of flux and number of secondary turns
  - inversely proportional to rate of change of flux and number of secondary turns
  - proportional to rate of change of flux and inversely proportional to number of secondary turns
  - inversely proportional to the rate of change of flux and proportional to number of secondary turns
- 89) Which of the following will happen in a transformer when the number of secondary turns is less than the number of primary turns?
- The voltage gets stepped up.
  - The voltage gets stepped down.
  - The power gets stepped up.
  - The power gets stepped down.
- 90) How many electrons will constitute 2 Coulombs of electric charge?
- $6.24 \times 10^{18}$  electrons
  - $12.48 \times 10^{18}$  electrons
  - $1.602 \times 10^{19}$  electrons
  - $3.204 \times 10^{19}$  electrons
- 91) Which of the following according to KCL must be zero?
- Algebraic sum of currents in closed-loop
  - Algebraic sum of power in closed-loop
  - Algebraic sum of currents entering and leaving a junction
  - Algebraic sum of voltages across the input and output
- 92) Which of these PowerPoint features would allow any user to create a given simple presentation quicker?
- Animations
  - Chart Wizard
  - Transition Wizard
  - AutoContent Wizard
- 93) Which of these font effects is NOT available in the PowerPoint Font dialogue box?
- Shadow
  - Underline
  - Strikethrough
  - Emboss
- 94) On which load power factor zero voltage regulation will be achieved?
- 0
  - 1
  - Leading
  - Lagging
- 95) On which factors transformer routine efficiency depends upon?
- Supply frequency
  - Load current
  - Power factor of load
  - Load current and power factor of load

- 96) At which load condition maximum efficiency of a distribution transformer will be achieved?
- a) At no load
  - b) At 60% full load
  - c) At 80% full load
  - d) At full load
- 97) Why efficiency of a transformer, under heavy loads, is comparatively low?
- a) Copper loss becomes high in proportion to the output
  - b) Iron loss is increased considerably
  - c) Voltage drop both in primary and secondary becomes large
  - d) Secondary output is much less as compared to primary input
- 98) The efficiencies of transformers compared to electric motors of the same power are \_\_\_\_\_
- a) About the same
  - b) Much smaller
  - c) Much higher
  - d) Can't comment
- 99) A transformer having maximum efficiency at 75% full load will have ratio of iron loss and full load copper loss equal to \_\_\_\_\_
- a)  $4/3$
  - b)  $3/4$
  - c)  $9/16$
  - d)  $16/9$
- 100) A V-V connected transformer can be connected in parallel to delta-delta connected transformer but not to \_\_\_\_\_
- a) delta-star
  - b) star-delta
  - c) star-V



# HP Board of Departmental Examination

## Departmental Examination of Engineering Officers of HPSEBL Ltd

### Session March, 2023 (Paper-B)

Time allowed: 3(three) hours.

Maximum Marks: 200

#### Part -1: Consumer/Company Accounts and Accounting Procedures (100 marks) (Open books, Bare Acts/ Rules & manuals)

Attempt any 4 (four) questions

Q.I Write note on any five of the following:

- i) Financial concurrence, ii) Measurement Books, iii) Different types of Funding of Projects, iii) Commencement of work in the absence of sanction to a detailed estimate, iv) Technical sanction, v) Canons of Financial Propriety, vi) Security Deposits, vii) Earnest Money, viii) Two stage bidding. (5x5 marks)

Q.II a) Explain "Re-appropriation of Budget". (10 marks)

b) Write short notes on any three of the following:

- i) Capital and ordinary expenditures, ii) Maintenance of Cash Book, iii) Survey and investigation expenses, iv) Double entry system of accounting, v) Temporary Imprest. (3x5 marks)

Q.III a) Write short note on "Guidelines for processing of Tenders for Procurement of Goods/Hiring of services including Turnkey Projects in HPSEBL". (15 marks)

b) What are the "Guidelines for preparation of estimates for Turnkey projects in HPSEBL". (10 marks)

Q.IV a) What is the procedure for processing of Tenders? (10 marks)

b) Write short notes on any three of the following:

- i) Time and cost over runs in construction works, ii) e-Reverse tendering, iii) purchasing through GeM Portal, iv) variation and deviation of quantities in item rate contracts, v) Difference between estimated and justified cost. (3x5marks)

Q.V a) What is a fixed asset? List out any five categories of the fixed assets in HPSEBL along with their respective account codes. (10 marks)

b) Write short notes on any three of the following:

- i) Capitalization of assets, ii) physical verification of assets, iii) Depreciation, iv) Grants and subsidies towards cost of capital assets, v) Award of Deposit works to Govt. Agencies. (3x5marks)

P.T.O.

**Part -2 Civil and Mechanical Engineering (100 marks) (open books and Manuals)**

Attempt any 4 questions

- Q.I a) What is a Run of river Hydropower project? Explain with a free hand sketch. (08 marks)  
b) Explain the requirement of small storages provided in the Run of river hydropower Projects. (07 marks)  
c) Describe the various components of the intake of run of river projects along with their function(s). (10 marks)
- Q.II a) Explain the importance of providing instrumentation in Hydropower projects? (10 marks)  
b) What's the purpose of geological explorations in Head Race tunnels? (08 marks)  
c) What all factors are required to be considered while selecting the diameter of a penstock? (07 marks)
- Q.III a) Describe any three of the following:  
i) Rock bolting in Tunnels, ii) Rock participation in the design of head race tunnel lining or steel liner of pressure shafts, iii) Ultrasonic and radiographic testing of weld, iv) Losses generally occurring in water conductor system, v) Construction Adits, vi) Bonnet gates. (3x5 marks)  
b) Explain the need for assessment of dynamic pressure rise in penstocks due to water hammer. (10 marks)
- Q.IV a) What all details of a hydropower project are generally included in its Detailed Project Report (DPR)? (10 marks)  
b) Why and where a Surge Shaft is required to be provided in the Hydropower projects? (10 marks)  
c) Enumerate the types of power stations based on location considerations. (05 marks)
- Q.V a) What all types of gates are generally used in hydropower projects? (07 marks)  
b) Enumerate the essential features of a gate? (08 marks)  
c) What is the difference between fixed wheel and sliding type vertical lift gates? (10 marks)
- Q.VI a) What is a trash rack? Where is it provided in hydropower projects and why? (10 marks)  
b) Explain any three of the following components:  
i) Forebay ii) cavitation, iii) types of Desanding arrangements iv) type of valves generally provided in hydropower projects, v) Maintenance of gates, vi) Gate seals. (3x5 marks)
- Q.VII Differentiate between the following (attempt any five):  
i) Design discharge for power generation and the flood discharge in the river, ii) Consolidation and contact grouting in tunnels, iii) Pressurized and free flowing water conductor system, iv) Pumps & Turbines, v) Gross head and net head, vi) velocity head and pressure head vii) Stop log and Gate. (5x5 marks)