

EE-L

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3E1216	Roll No. _____	[Total No. of Pages : 3]
	<b>3E1216</b>	
	<b>B.Tech. III-Sem. (Main &amp; Back) Examination, January/February - 2024</b>	
	<b>Electrical &amp; Electronics Engg.</b>	
	<b>3EX2-01 Advance Mathematics</b>	
<b>EE,EX</b>		

**Time : 3 Hours****Maximum Marks : 70***Instructions to Candidates:*

*Attempt All Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used Calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No.205)*

**PART - A**

(Answer should be given up to 25 words only)

**ALL questions are compulsory.****(10×2=20)**

1. Prove that  $\delta \equiv E^{\frac{1}{2}} - E^{-\frac{1}{2}}$ .
2. Write Newton-Gregory forward and backward interpolation formula.
3. What is numerical integration formula in Simpson's '1/3' rule?
4. Find the first approximation to a real root of the equation  $x^3 - 3x^2 - 2 = 0$  by Regula Falsi method between 3 to 4.
5. Find Laplace transform of Dirac Delta function.
6. If  $H(t)$  is Heaviside unit step function and  $L\{f(t)\} = F(s)$ , then identify the value of  $L\{f(t-a)H(t-a)\}$ .
7. If Fourier transform of  $f(t)$  is  $F(\omega)$ , then write the fourier transform of  $e^{-i\omega_0 t} f(t)$ .
8. Find Z-transform of the sequence  $u_n = \{2, -4, 6, -8\}$ .

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9. Check the function  $f(z) = \bar{z}$  is analytic or not?  
 10. What do you mean by harmonic function?

**PART - B**

(Analytical/Problem solving questions)

Attempt any FIVE questions.

(5×4=20)

1. If  $y = a(3)^x + b(-2)^x$  and  $h = 1$ , then prove that  $(\Delta^2 + \Delta - 6)y = 0$   
 2. Using Lagrange's interpolation formula find the cubic polynomial, which holds the following values:

$x$	0	1	2	3
$f(x)$	1	2	1	10

Hence or otherwise evaluate  $f(4)$ .

3. The simple trapezoidal rule applied to  $\int_1^3 f(x) dx$  gives the value 8 and simple Simpson's one-third rule gives the value 4. What is  $(2)$ ?  
 4. Using convolution theorem, find inverse Laplace transform of  $\frac{1}{(s^2 + a^2)^2}$ .  
 5. Find the function, if Fourier transforms is  $e^{-|p|}$ .  
 6. If  $Z\{u_n\} = \frac{2z^2 + 3z + 12}{(z-1)^4}$ , then find the values of  $u_0$ ,  $u_1$  and  $u_2$ .  
 7. Prove that the function  $u = e^x(x \cos y - y \sin y)$  satisfies Laplace's equation and find the corresponding analytic function  $f(z) = u + iv$ .

**PART - C**

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any three questions.

(3×10=30)

1. Use Stirling's formula to find  $u_{28}$ , given that

$$u_{20} = 49225, u_{25} = 48316, u_{30} = 47236, u_{35} = 45926, u_{40} = 44306.$$

2. Find the value of  $\log_e 2$  from  $\int_0^1 \frac{x^2}{1+x^3} dx$ , using Simpson's '1/3' and '3/8' rules by dividing the range into seven ordinates.
3. Using Laplace transform solve the differential equation  $(D^2+25)y = 10 \cos 5x$  with  $y(0) = 2, y'(0) = 4$ .
4. Using Z-transform, solve the difference equation  $u_{n+2} - 2u_{n+1} + u_n = 2^n$ , given that  $u(0) = 2, u(1) = 1$ .
5. Prove that the function defined by

$$f(z) = \begin{cases} \frac{x^2 y^5 (x + iy)}{x^4 + y^{10}}, & z \neq 0 \\ 0 & , z = 0 \end{cases}$$

is not analytic at the origin although Cauchy-Riemann equations are satisfied at the origin.

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**3E1200**

**3E1200**

B.Tech. III-Sem. (Main & Back) Examination, January/February- 2024  
Agricultural Engineering  
3AG1-03 Managerial Economics and Financial Accounting  
All Branches

Time : 3 Hours

Maximum Marks : 70

*Instructions to Candidates:*

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

**PART - A**

(Answer should be given up to 25 words only)

All questions are compulsory (10×2=20)

1. Explain Gross Domestic Product (GDP).
2. Draw circular flow of economic activities
3. Draw graph to show
  - a) Perfectly Inelastic Demand
  - b) Perfectly elastic demand
4. What is Giffen Paradox?
5. Give mathematical form of Cobb - Douglas production function.
6. Define Explicit and implicit costs with example.
7. Draw a chart to show different market structures.
8. List four important features of Monopoly market.

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9. What is golden rule of accounting for real accounts? (1 + 1 =2)

10. Define payback period.

**PART - B**

(Analytical/Problems solving questions)

Attempt any Five questions

(5×4 =20)

1. Define National Income. Explain steps involved in the estimation of national income by income method. (1+3=4)
2. Explain economies and diseconomies of scale with examples. (2+2=4)
3. How will you calculate cash flows from operating activities by direct and indirect method. Explain with example. (2+2=4)
4. a) Why is the demand curve of a firm under monopolistic competition more elastic than under monopoly? Explain. (2+2=4)  
b) Explain 'freedom of entry and exit to firms in industry' feature of monopolistic competition. (1×4=4)
5. Explain following with help of suitable graph.
  - a) Zero income elasticity
  - b) Negative Income elasticity
  - c) Unit income elasticity
  - d) Income elasticity greater than unity
6. Give brief answer of following Questions on Balance Sheet: (1×4=4)
  - a) On balance sheet, accruals, notes payable, and account payable are listed under which category?
  - b) Inventories, cash and equivalents, and accounts receivables are listed as?
  - c) A firm buys products but does not pay to suppliers instantly. This is recorded as?
  - d) In a balance sheet, the total of common stock and retained earnings are denoted as?
7. Explain following ratios: (Formula is must) (2+2=4)
  - a) Liquidity Ratio
  - b) Solvency Ratio

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**PART - C**

(Descriptive/Analytical/Problems Solving/Design question)

**Attempt any Three questions (3×10=30)**

**1 a) Complete the following table: (0.25×30=7.5)**

QTY (UNITS)	TFC (Rs.)	TVC (Rs.)	TC (Rs.)	AVC (Rs.)	ATC (Rs.)	MC (Rs.)
0	60	.....	.....	.....	.....	.....
1	.....	30	.....	.....	.....	.....
2	.....	.....	100	.....	.....	.....
3	.....	.....	.....	.....	.....	5
4	.....	.....	.....	.....	28.75	.....
5	.....	.....	.....	15	.....	.....

**b) Draw graph/graphs showing relationship between any five Costs with Quantity (Units).  
You can show them in single graph or in separate five graphs. (0.5×5=2.5)**

**2. Calculate and also comment on degree of elasticity: (4×2.5=10)**

- a) The price of tea per cup is decreased from Rs. 4 to Rs.3 and the demand of coffee is increased from 2 cups per day to 4 cups per day. Calculate Cross Elasticity of Demand.
  - b) Mr. Gupta's income is raised from Rs. 10,000 to Rs. 15,000 and the demand for good A is raised from 500 to 800 units. Calculate Income Elasticity of Demand.
  - c) The demand of commodity X is raised from 200 to 250 units when price decreased from Rs. 8 to Rs. 6. Calculate Price Elasticity of Demand.
  - d) If the price rises of good A rises from Rs. 20 to Rs. 30. Its supply increases from 200 to 800 units. Calculate Elasticity of Supply.
- 3. "Economics is an art." Elaborate this statement by explaining meaning, nature and scope of Economics. (2+4+4=10)**
- 4. "A competitive firm is not a price maker, but adjustor." Explain this statement with reference to price determination in long and short term under perfect competition. (4+6=10)**

**3E1200 (3) [Contd....]**

**5. From the following balance sheet of Brown and co. Ltd. as on 31<sup>st</sup> Dec. 2020 and 31<sup>st</sup>Dec.2021:**

	2020 (Rs.)	2021 (Rs)	Asset	2020 (Rs.)	2021 (Rs.)
<b>Liabilities</b>					
Share capital	5,00,000	7,00,000	Land & Building	80,000	1,20,000
Profit & loss a/c	1,00,000	1,60,000	Plant & Machinery	5,00,000	8,00,000
General Reserve	50,000	70,000	Stock	1,00,000	75,000
Sundry creditors	1,53,000	1,90,000	Sundry Debtors	1,50,000	1,60,000
Bills payable	40,000	50,000	Cash at Bank	20,000	20,000
Expenses O/S	7,000	5,000			
<b>TOTAL</b>	<b>8,50,000</b>	<b>11,75,000</b>	<b>TOTAL</b>	<b>8,50,000</b>	<b>11,75,000</b>

**Additional Information:**

- a) Rs. 50,000 depreciation has been charged on Plant and Machinery during 2021.
- b) A piece of Machinery was sold for Rs. 8,000 during the year 2021. It had cost Rs. 12,000; depreciation of Rs. 7,000 had been provided on it.  
Prepare a Schedule of changes in Working Capital and a Statement showing the Sources and Application of Funds for 2021. (3+3+2+2=10)  
(Show Adjusted Profit & Loss Account and Plant & Machinery Account in working notes.)

**3E1200 (4)**

<b>3E1250</b>	Roll No. _____	[Total No. of Pages] <span style="border: 1px solid black; padding: 2px;">2</span>
	<b>3E1250</b>	
	<b>B.Tech. III-Sem. (Main &amp; Back) Examination, January/February - 2024</b>	
	<b>Agricultural Engineering</b>	
	<b>3AG1-02/Technical Communication</b>	
	<b>All Branches</b>	

**Time : 3 Hours****Maximum Marks : 70****Instructions to Candidates:**

*Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.*

*Use of following supporting material is permitted during examination. (Mentioned in form No. 205)*

**PART - A****(Answer should be given up to 25 words only)****All questions are compulsory.****(10×2=20)**

1. What are various aspects of technical communication?
2. Write two importance of technical communication.
3. Define style in technical communication.
4. What are various steps to read a technical text?
5. List the benefits of note - making.
6. Name different technical texts.
7. Correct the following sentences.
  - i) Both the sister were seen at the party.
  - ii) She is one of the best student in our class.
8. Form two words by using the each prefix - in and - un.

9. Underline and rewrite the noun phrase in the following sentences.
- i) The cat with the stripes tried to trip me.
  - ii) My green gym socks are in the hamper.
10. Write a short note on Linguistic Ability.

### PART - B

(Analytical/Problem solving questions)

Attempt any Five questions.

(5×4=20)

1. Explain ERRQ and SQ3R Reading Technique.
2. Reading makes a man complete Francis Bacon. How can you develop effective reading skills?
3. What is the process of reading a technical manual?
4. Elaborate various ways to collect information.
5. Enlist various factors which affect designing of a document.
6. What are various types of technical articles? Explain.
7. Enumerate the different characteristics of technical project proposal.

### PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions.

(3×10=30)

1. Explain various types of note-making.
2. Describe various features of style in technical communication.
3. Assume yourself as the cultural secretary, you are organizing an instrument playing programme in your Institute/College/ University. Draft an e-mail informing all the teachers, students and staff members of your College about the event and invite them to attend the event. Invent the necessary details.
4. Assuming yourself a hostler, write minutes of the meeting, which you have attended with the hostel wardern and chief warden to improve the quality of food served in the hostel mess.
5. Prepare a report on the Campus placement Drive organized in your College on 12<sup>th</sup> Jan. 2023.

Total No. of Questions:

Total No. of Pages:

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**B.Tech. III-Sem (Back) Exam 2024  
HSMCAeronautical Engineering  
3AN1-02Technical Communication**

3E1102

All branches

Time: 2 Hours

Maximum Marks: 80

Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

1. \_\_\_\_\_ 2. \_\_\_\_\_  
Part A (Answer should be given up to 25 words only)  
All questions are compulsory

Q.1 what is the meaning of Technical communication?

Q.2 Write Down the Various Communication Skills?

Q.3 What is the importance of Conference?

Q.4 why do we take notes from a long passage? What is its utility?

Q.5 Rewrite the name of the following book as you would put it in a bibliographical reference: 1979, 3rd edition, Macmillian. The Elements of Style written by W. Strunk and E. B. White.

5 x 2 = 10

**Part B Analytical/Problem solving questions  
Attempt any four questions**

Q.1 Write an oral presentation for a debate on "Modern Technology is doing more harm than good to man". You are to speak for one minute in favour of the topic.

Q.2 How is technical paper written?

Q.3 What do you understand by the term technical communication? How is it different from general purpose communication?

Q.4 What is group discussion? Discuss the importance of group discussion and how it is helpful in interviews?

Q.5 should email replace the communication forms such as memos and letters? Explain your answer?

Q.6 What is Report? Discuss various sections of a formal report in detail.

4 x 10 = 40

**Part C (Descriptive/Analytical/Problem Solving/Design Question)  
Attempt any two questions**

Q.1 As the purchase officer of a company, write a complaint letter to comfort Home Appliances, New Delhi, pointing out the damage which was discovered after checking the consignment containing Refrigerators sent to you by supplier

Q.2 Write the difference between the following terms with suitable examples:-

- (a) Memos and reports.
- (b) Press release and newsletters
- (c) Dissertation and thesis
- (d) References and bibliography

Q.3 Write an essay on one of the following:-

- a) India in 20-20
- b) Role of youth society.

2 x 15 = 30



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Total No. of Questions: \_\_\_\_\_

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

Total No. of Pages: \_\_\_\_\_

**B.Tech.III Sem (Back) Exam 2024**  
**HSMCAeronautical Engineering**  
**3ANI-03Managerial Economics & Financial Accounting**  
**3E1103**

All branches

Time: 2 Hours

Maximum Marks: 80  
Min. Passing Marks: 28

Attempt all five questions from Part A, four questions out of six questions from Part B and two questions out of three from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.

Use of following supporting material is permitted during examination.  
(Mentioned in form No.205)

1. \_\_\_\_\_
  2. \_\_\_\_\_
- Part A (Answer should be given up to 25 words only)  
All questions are compulsory

Q. 1 Define Managerial Economics?

Q.2 What is Normative Theory of Economics?

Q.3 What are the features of Oligopoly?

Q.4 Define Time Value of Money?

Q.5 Mention the concept of Demand?  
5 x 2 = 10

**Part B Analytical/Problem solving questions**  
Attempt any four questions

Q.1 Describe fully the concept of price elasticity of demand?

Q.2 State the relationship of managerial economics with Other Subjects?

Q.3 What is Perfect Competition State its features?

Q.4 Explain the Different Features of Business Cycle?

Q.5 Explain Capital Budgeting?

Q.6 Calculate the BEP in units and rupees using the following details: • Selling price per unit Rs. 100 • Variable cost per unit Rs. 60 • Fixed costs Rs. 20,000 • Actual sales Rs. 2,00,000

4 x 10 = 40

**Part C (Descriptive/Analytical/Problem Solving/Design Question)**  
Attempt any two questions

Q. 1 Explain the concept of Managerial Economics? List out the applications and importance of Managerial Economics?

Q.2 How is price and output determination under monopoly different from that under perfect competition?

Q.3. A Company prepares a budget to produce 3,00,000 Units, with fixed costs as Rs. 15,00,000 and average variable cost of Rs.10 per unit. The selling price is to Yield 20% profit on Cost. You are required to calculate

- (a) BEP in Rupees
- (b) P/V Ratio
- (c) Margin of Safety

2 x 15 = 30

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<b>3E1221</b>	
<b>3E1221</b>	
B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024	
Electrical & Electronics Engineering	
3EX3-04 Power generation Process	
EE, EX	

Time : 3 Hours

**Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions, out of Seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly. Use of following supporting material is permitted during examination (As mentioned in form No.205)

**PART - A**

(Answer should be given up to 25 words only)

(10×2=20)

All questions are compulsory.

1. Enlist the classification of Hydroelectric Power Plant.
2. What do you mean by fissile and fertile materials?
3. What do you mean by cold, hot and sipping reserve capacity of power plant?
4. What are the impacts of thermal power plant on environment?
5. Define diversity factor, capacity factor and load factor.
6. What is Tariff and write their general form of tariff?
7. What do you mean by base load and peak load power plant. Write the names of these.
8. Write the causes and effect of low power factor.
9. What do you mean by cogeneration?
10. Write the any four difference between renewable and non-renewable energy sources.

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**PART - B**

(Analytical/Problem solving questions)

Attempt any Five questions

(5×4=20)

1. Explain the economic power factor when kW demand is constant.
2. Write objectives and desirable characteristics of a tariff and also define power factor dependent tariffs.
3. Explain the power factor improvement using shunt capacitor with their: advantages and disadvantages.
4. What do you mean by depreciation? Explain straight line method for calculation of depreciation fund.
5. Explain Green House Effect with their causes and effects on environment.
6. Write the consideration which governed plant location of thermal power plant.
7. Write about the Indian Energy Scenario.

**PART - C**

(Descriptive/Analytical/Problem Solving/Design questions)

(3×10=30)

Attempt any Three questions.

1. Draw the block diagram of thermal power plant. Also explain the working of its various components.
2. A steam station has 110 MW unit. The cost data is as under
 

Unit cost (UCI)	Rs 30,000 per kWh
Fixed Cost Rate (FCR1)	10%
Capacity Factor (CFI)	0.60
Fuel consumption	0.65 kg/kWh
Fuel Cost	Rs. 1500 per 1000 kg
Operation & Maintenance Cost	15% of annual fuel cost
Utilization Factor	1

Calculate annual plant cost and generation cost.

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3. The load on a power plant on a typical day is as under:

Time	12-5AM	5AM-9AM	9AM-6PM	6PM-10 <sup>PM</sup>	10PM-12AM
Load (MW)	20 MW	40 MW	80MW	100MW	20MW

Plot the chronological load curve and load duration curve.

4. Compare comparative study of thermal, hydro and nuclear power plant in tabular way.

5. How to do planning for conservation of natural resources and sustainable energy system?

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B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024		
Electrical & Electronics Engg.		
3EX4-05 Electrical Circuit Analysis		
EE, EX		

Time : 3 Hours  
Maximum Marks : 70

**Instructions to Candidates:**

Attempt all Ten questions from Part A, Five questions out of Seven questions from Part B and Three questions out of Five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly.

Use of following supporting material is permitted during examination. (Mentioned in form No.205)

**PART - A**

(Answer should be given up to 25 words only)

(10×2=20)

1. Write the statement of kirchoff's voltage Law (KVL). (2)
2. What is the difference between an active and passive circuit element? (2)
3. What is the principle of superposition? (2)
4. When does maximum power transfer occur in a network? (2)
5. Define time constant in R-L and R-C networks. (2)
6. What do you mean by natural and forced response? (2)
7. What is a unit-step function? (2)
8. How overdamped, Critically-damped and under damped circuits are differentiated? (2)
9. Define complex power in Ac networks. (2)
10. Write the defining equations in terms of h-parameters for analyzing a two-port network. (2)

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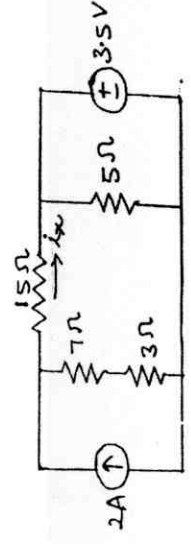
**PART - B**

(Analytical/Problem solving questions)

(5×4 =20)

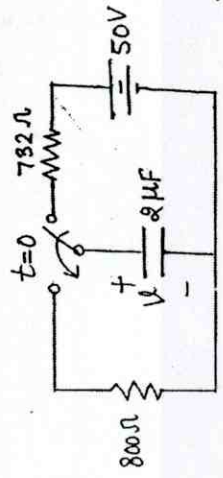
Attempt any Five questions.

1. For the circuit of fig (1), Use superposition to compute the current in. (4)



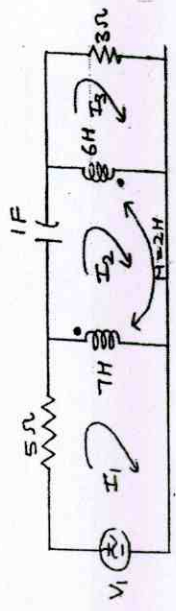
2+2=(4)

2. Find  $v(t=0)$  and  $v(t=2\text{msec})$  for the circuit of fig (2).



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3. Write a correct set of equations for the circuit of fig. (3).

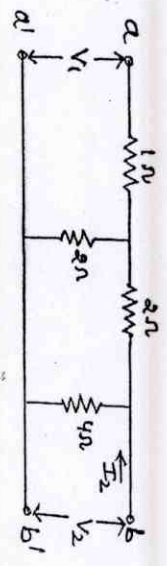


4. Calculate numerical values of resonant frequency ( $\omega_0$ ), exponential damping coefficient ( $\alpha$ ), natural resonant frequency ( $\omega_d$ ) and resistance (R) for a parallel resonant circuit having  $L = 2.5\text{mH}$ ,  $Q = 5$ , and  $C = 0.01 \mu\text{F}$ .  $1+1+1+1=(4)$

(2)

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5. Find the Y-parameters for the network shown in fig (4). (4)



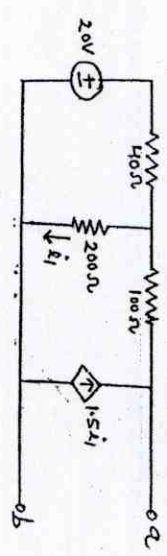
6. Explain Maximum power Transfer theorem with the help of an example. (4)  
 7. Write short note on cascade interconnection of two-port networks. (4)

PART - C

(Descriptive/Analytical/Problem Solving/Design question)

Attempt any Three questions. (3×10=30)

1. a) Find the Thevenin's equivalent of the network shown in fig. (5) (5)  
 b) What power would be delivered to a load of 100 Ω at a and b terminals? (5)



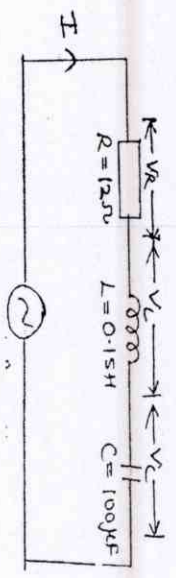
2. For the circuit shown in fig (6), calculate  
 a) The impedance (1)  
 b) The current (1)  
 c) The phase angle (1)  
 d) The voltage across each element (1)  
 e) The power factor (1)  
 f) The apparent power (2)  
 g) The average power (2)

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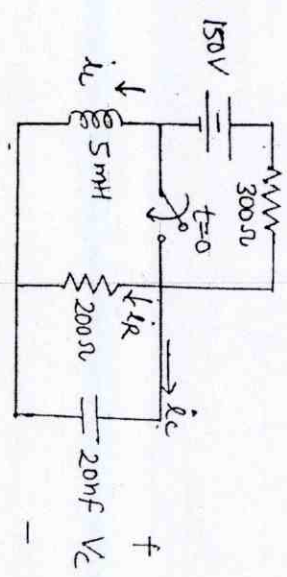
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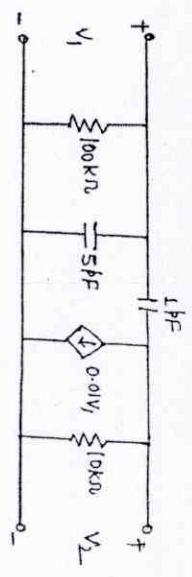
Also draw the phaser diagram for the circuit. (1)



3. Find an expression for  $v_c(t)$  valued for  $t > 0$  in the circuit of fig (7). (10)



4. Find the four z-parameters at  $\omega = 10^8$  rad/sec for the transistor high frequency equivalent circuit shown in fig (8). (10)



5. Write short notes on the following:- (5+5=10)  
 a) Ideal transformer  
 b) Series and parallel resonance.

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Roll No. _____	[Total No. of Pages : 2]
<b>3E1217</b>	<b>3E1217</b>
B.Tech. III-Sem. (Main and Back) Examination, January/February - 2024	
Electrical & Electronic Engg.	
3EX4-06 Analog Electronics	
EE, EX	

Time : 3 Hours Maximum Marks : 70

**Instructions to Candidates:**

Attempt all ten questions from Part A, five questions out of seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/ Calculated must be stated clearly. Use of following supporting material is permitted during examination. (Mentioned in form No.205)

**PART - A**

(Answer should be given up to 25 words only)

All questions are compulsory. (10×2=20)

1. Define the meaning of ideal diode.
2. Write down the applications of zener diode.
3. Define peak inverse voltage of bridge rectifies.
4. Why transistor is called current controlled devices.
5. What are the three regions of operation of a transistor?
6. Define pinch-off voltage for MOSFET.
7. Why MOSFET is called as Voltage controlled device?
8. Write down the characteristics of an ideal op-amp.
9. Define the concept of virtual ground.
10. What are the applications of peak detector?

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(1)

[Contd....

**PART - B**

(Analytical/Problem solving questions)

Attempt any Five questions

(5×4=20)

1. Draw the circuit of Wein bridge oscillator using op-amp and derive the expression for frequency of oscillation.
2. What is the purpose of using multistage amplifier?
3. How does NPN transistor work? Explain with the help of circuit diagram.
4. Mention the difference between transistor and MOSFET.
5. Draw the diagram of bridge rectifier and explain its working.
6. Explain the analog to digital conversion process with circuit diagram.
7. Explain the effect of temperature on V-I characteristics of PN junction diode.

**PART - C**

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. Describe the construction of N-channel depletion type MOSFET and also explain its working.
2. Connect the op-amp in non-inverting mode of operation and deduce the expression for its clear loop gain.
3. Explain how zener diode act as a voltage regulator? Explain with suitable circuit.
4. What do you mean by
  - i) Positive clamping and
  - ii) Negative clamping list the uses of clamping circuits.
5. Explain the working of square wave and triangular wave generators.

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<b>3E1219</b>	
B.Tech. III-Sem. (Main & Back) Examination, January/February - 2024	
Electrical and Electronics Engineering	
3EX4-07 Electrical Machine - I	
EE, EX	

Time : 3 Hours

Maximum Marks : 70

**Instructions to Candidates:**

Attempt all Ten questions from Part A. Five questions out of Seven questions from Part B and three questions out of five questions from Part C.

Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.

Use of following supporting material is permitted during examination. (mentioned in form No.205)

**PART - A**

(Answer should be given up to 25 words only)

(10×2=20)

All questions are compulsory.

1. Define all day efficiency of a Transformer.
2. Make Comparison between Magnetic and electric circuit.
3. What is the purpose of MICA strip between two adjacent commutator segments in DC Machine?
4. What is the need for parallel operation for of transformer?
5. Define Energy and co-energy. What is the significance of co-energy?
6. Elucidate the role of Interpoles and compensation winding in DC Machines.
7. What is the condition for zero voltage regulation in case of Transformer?
8. What are the methods to eliminate armature reaction effect in DC Machines?

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9. Specify the conditions for voltage build up in DC Shunt Generator.

10. For a 60 KVA  $1-\phi$  Transformer with a primary voltage of 2,400V and a secondary voltage of 240V, calculate the rated current on the secondary side.

**PART - B**

(Analytical/Problem solving questions)

Attempt any Five questions

(5×4=20)

1. For an electromagnetic system, the  $\lambda-i$  relation is given by  $\lambda = i^2/g$ . ( $g$ =air gap length). Determine the mechanical force on the moving part of the system using energy and co-energy of the field, for a given length  $g=5\text{cm}$  and current  $i = 3\text{A}$ .
2. Develop an expression for the de-magnetizing and cross magnetizing armature ampere-turns in a DC generator.
3. Explain Scott Connection with proper circuit diagram.
4. A short-shunt compound generator delivers a load current of 30 A at 220V, and has armature, series field and shunt field resistances of  $0.05\Omega$ ,  $0.30\Omega$  and  $200\Omega$  respectively. Calculate the induced EMF and the armature current. allow 1.0V per brush for contact drop.
5. Draw the phasor diagram of a transformer at lagging powerfactor load and no-load conditions.
6. Explain the phenomena of commutation in DC Machines.
7. Define an auto transformer. Derive the expression showing the saving of copper when a 2 winding transformer is connected into an auto transformer.

**PART - C**

(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any Three questions.

(3×10=30)

1. A 220V DC shunt Motor has an armature and field resistances of  $0.2\Omega$  and  $220\Omega$  respectively. The Motor is driving load torque,  $T_{em}$  and running at 1000 rpm drawing 10A current from the supply. Calculate the new speed and armature current if an external armature resistance of  $5\Omega$  is inserted in the armature circuit. Neglect armature reaction and saturation.

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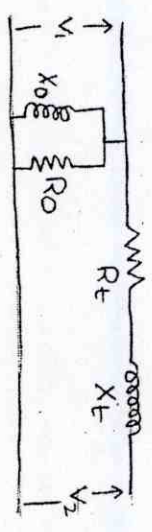
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2. In a 25 KVA 2000/200V transformer the iron and copper losses are 350 and 400W respectively. Calculate the efficiency of a unity PF at

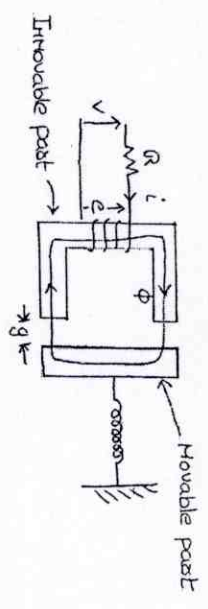
- a) Full load and
- b) Half load
- c) Determine the load for maximum efficiency and the iron and copper loss in this case.

3. Discuss the Swinburne's test and explain the procedure to predetermine the efficiency of a DC motor. Also mention the advantages and disadvantages of this test.

4. Calculate the values of  $R_{\phi}$ ,  $X_{\phi}$ ,  $R_t$  and  $X_t$  for the equivalent circuit of a  $L-\phi$  4KVA, 200/400V 50 Hz transformer of which following are the test results  
 OC test: 200V 0.7A, 70W on LV side  
 SC test: 15V 10A, 80W on HV side



5. For the electro mechanical system shown in the figure, the movable part is held in static equilibrium by the spring. For the system given derive the expression to evaluate the energy stored in the field.



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<b>3E1220</b>	
B.Tech. III Sem. (Main & Back) Examination, January/February - 2024	
Electrical and Electronics Engineering	
3EX4-08 Electromagnetic Fields	
EE, EX	

Time : 3 Hours

Maximum Marks : 70

**Instructions to Candidates:**

*Attempt all Ten questions from Part A. Five questions out of Seven questions from Part B and three questions out of five questions from Part C.*

*Schematic diagrams must be shown wherever necessary. Any data missing suitably be assumed and stated clearly. Units of quantities used/ calculated must be stated clearly.*

*Use of following supporting material is permitted during examination (As mentioned in form No.205)*

**PART - A**

(Answer should be given up to 25 words only)

(10×2=20)

ALL questions are Compulsory.

1. Write the del operator in Cylindrical Co-ordinate system.
2. Convert Point P(-2, 4, -1) in spherical Co-ordinates.
3. State Gauss's law.
4. What are the various types of Charge distribution.
5. What do you mean by Poisson's equation.
6. State continuity equation of current.
7. What is magnetic flux density and magnetic flux.
8. What is the Biot-Savart Law?

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9. Write the Maxwell's first equation in integral form.
10. What are uniform Plane waves?

**PART - B**

(Analytical/Problem solving questions)

Attempt any FIVE questions. (5×4=20)

1. Determine divergence of following functions.
  - a)  $P = xy^2z \hat{ax} + 2yz \hat{ay} + y \hat{az}$
  - b)  $Q = \cos^2 x \hat{ax} + \sin^2 y \hat{ay} + e^z \hat{az}$
  - c)  $P = (x^2 + 3y) \hat{ax} + (y^2 + 2z) \hat{ay} + 2xz^2 \hat{az}$
2. If potential  $V = 3x^2yz + 2Ay^2z$ 
  - a) Determine 'A' so that Laplace equation satisfies
  - b) Find electric field at (3, 2, -1)
3. Derive boundary condition of electric field for dielectric-dielectric interface.
4. Derive the expression of Magnetic field due to infinitely long current carrying conductor.
5. State and explain the Maxwell's equation in differential and integral form, also define the displacement current and depth of penetration.
6. Explain Power flow and Poynting vector.
7. Write short notes on :
  - a) Cylindrical Co-ordinate system.
  - b) Spherical co-ordinate system.

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PART - C

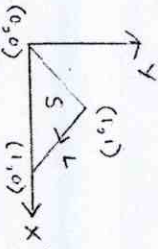
(Descriptive/Analytical/Problem Solving/Design questions)

Attempt any THREE questions. (3×10=30)

1. A Vector is given as  $F = x^2 y^2 \hat{a}_x - y^2 \hat{a}_y$ . Calculate

- a)  $\oint_L F \cdot ds$
- b)  $\oint_S (\nabla \times F) \cdot ds$

Where 'L' is shown in below figure and 'S' is area bounded by 'L', also verify Stoke's theorem



- 2. Derive the expression of electric field and electric potential due to dipole.
- 3. Describe the magnetic boundary conditions and compare with that of electric boundary conditions.
- 4. Describe the solution of Wave equation for free space.

5. For the potential,  $V = \frac{10}{r^2} \sin \theta \cos \phi$

Find:

- a) Flux density 'D' at point  $(3, \pi/4, 0)$
- b) Work done to move 10  $\mu c$  charge from point A(1, 30°, 120°) to point B(4, 90°, 60°).

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