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5E1361

Roll No. _____ [Total No. of Pages : 2

# 5E1361

## B.Tech. V- Semester (Main) Examination, November - 2019
## ESC Electrical Engg.
## 5EE3-01 Electrical Materials

**Time : 2 Hours** **Maximum Marks : 80**

**Min. Passing Marks : 28**

***Instructions to Candidates:***

*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.*

## PART - A

(Answer should be given up to **25** words only)

**All** questions are **compulsory** **(5×2=10)**

1. Define and explain magnetic domain in ferromagnetic materials? **(2)**
2. Define diffusion current in a semiconductor? **(2)**
3. What is meant by polarisation? **(2)**
4. What is crystalline state? State their defects. **(2)**
5. Explain briefly carrier density and energy gap in semi conductor? **(2)**

## PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions **(4×10=40)**

1. Discuss the effects of 'temperature' and 'frequency of applied field' on the dielectric constant of materials. **(10)**
2. Define piezoelectricity. Explain the uses of any three piezoelectric materials. **(10)**
3. Explain the effect of critical magnetic field, critical current and isotopic mass on critical temperature of a super conducting material. **(10)**
4. Enumerate different types of semi conductors show that the fermi level for a pure germanium lies in the middle of its forbidden gap. **(10)**

5. Define Hall effect with necessary sketch. Explain the concept of Hall effect and arrive at an equation for hall voltage $V_H$. **(10)**

6. What is Curie law, Curie temperature and Curie Weiss law explain? **(10)**

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **two** questions **(2×15=30)**

1. Draw a typical hysterisis loop for a ferromagnetic material. Show which part is reversible and which is not. Define residual magnetism and coercive force. How are all these properties explained in terms of the microscopic structure of the solid. **(15)**

2. a) List of characteristics of good insulating material. **(5)**

   b) A parallel plate capacitor has an area of 8 $cm^2$ with a separation of 0.08 mm. The space is filled with polysterone. the real part of relative dielectric constant is 2.56 and the loss tangent $0.7\times10^{-14}$ at a frequency of 1MHz. Calculate the capacitance and parallel loss resistance. **(10)**

3. a) What is atomic packing factor? Calculate its value for simple cube and body centered cube. **(7)**

   b) Describe in brief the basic seven crystal system? What is meant by imperfections in a crystal? **(8)**

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5E1362

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# 5E1362

## B.Tech. V- Semester (Main) Examination, Nov. - 2019
## PCC/PEC Electrical Engg.
## 5EE4-02 Power System - I
## (Common for EE,EX)

**Time : 3 Hours**

**Maximum Marks : 120**
**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** 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.*

## PART - A

(Answer should be given up to **25** words only)

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

1. Why transmission lines are 3 phase 3 wire circuits while distribution lines are 3 phase 4 wire circuits?
2. What are standard Transmission and Distribution voltages in India?
3. Why skin effect is absent in DC system?
4. What is difference between feeder and distributor?
5. What is meant by symmetrical fault?
6. What is Ferranti effect?
7. What is the reason for transients during short circuits?
8. What is meant by transposition of line conductors?
9. Define per unit value.
10. What is the drawback in series connected capacitor?

## PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. a) Describe the various methods for reducing corona effect in an overhead transmission line.

   b) A 3 - phase, 220kV, 50 Hz transmission line consists of 1.5 cm radius conductor spaced 2 meters apart in equilateral triangular formation. If the temperature is 40°C and atmospheric pressure is 76 cm, calculate the corona loss per km of the line. Take $m_o = 0.85$.

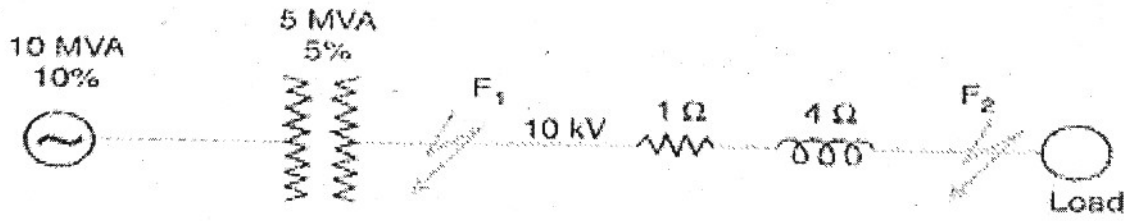
2. Explain different types of distribution systems.

3. Derive an expression for inductance of three phase transmission line.

4. A 3 - phase transmission line operating at 10 kV and having a resistance of $1\Omega$ and reactance of $4\Omega$ is connected to the generating station bus - bars through 5 MVA step - up transformers having a reactance of 5%. The bus - bars are supplied by a 10 MVA alternator having 10% reactance. Calculate the short - circuit kVA fed to symmetrical fault between phases if it occurs

   i) at the load end of transmission line

   ii) at the high voltage terminals of the transformer




5. With the help of block diagrams explain the operations of standalone and grid interactive Solar PV systems.

6. What is a nominal $\pi(\rho i)$ circuit? Find the ABCD constants for nominal $\pi$ circuit.

7. What is meant by insulation coordination? How are the protective devices chosen for optimal insulation level in power system?

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **Four** questions **(4×15=60)**

1. a) What is the effect of transmission voltage on line performance? Derive mathematical expressions to validate the answer. **(6)**

   b) A single phase AC system supplies a load of 200 kW. If this system is converted into 3 phase 3 wire AC system by running a third similar conductor then calculate the 3 phase load than can now be supplied if the voltage between the conductor is same. Assume power factor and transmission efficiency to be same in both cases. **(9)**

2. A 3 - phase, 50 Hz transmission line 100 km long delivers 20 MW at 0.9 p.f. lagging and at 110 kV. The resistance and reactance of the line per phase per km are $0.2\Omega$ and $0.4\Omega$ respectively, while capacitance admittance is $2.5\times10^{-6}$ siemen/km/phase. Calculate :

   i) the current and voltage at the sending end

   ii) efficiency of transmission. Use nominal T method. **(15)**

3. a) Derive an expression for fault current for single line - to - ground fault by symmertrical components method. **(7)**

   b) The per unit values of positive, negative and zero sequence reactance of a network at fault are 0.08, 0.07 and 0.05. Determine the fault current if the fault is

      i) double line - to ground

      ii) Line to line

      iii) Line to ground **(8)**

4. a) Write short notes on

      i) Distributed Generation

      ii) Surge Impedance loading. **(2×3=6)**

   b) A 50 hp induction motor has pf 0.9 & 90% efficiency at full load, at half load 0.6 pf and 70% efficiency. At no load the current is 25% of the full load current and 0.1 pf. Shunt capacitors are installed in circuit to make the line pf 0.8 at half load. Determine the line power factor at

      (i) Full load

      (ii) No load. **(9)**

5. a) Discuss merits and demerits of HVDC transmission system. **(7)**

   b) A delta connected load is supplied from a 3 - phase supply. The fuse in the B line is removed and current in the other two lines is 20 A. Find the symmetrical components of line currents. **(8)**

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5E1363

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**5E1363**

# B.Tech. V - Semester (Main) Examination, Nov. - 2019
## PCC/PEC Electrical Engg.
## 5EE4-03 Control System
## (Common with EE, EX)

**Time : 3 Hours** **Maximum Marks : 120**

**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** 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.*

## PART - A

(Answer should be given up to **25** words only)

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

**1.** Explain open loop and closed loop control system with examples. **(2)**

**2.** State and explain D.Alembert's principle. **(2)**

**3.** Explain different types of mechanical system. **(2)**

**4.** Briefly explain different type of standard test signals. **(2)**

**5.** With the help of a block diagram explain time response of a first order control system when the input is a unit step function. **(2)**

**6.** Derive peak time ($t_p$) and Rise time ($t_r$) of transient response of a second order underdamped system. **(2)**

**7.** Explain the correlation time and frequency domain response. **(2)**

**8.** Write main features of PID controller. **(2)**

**9.** A system is described by the following equations

$$\dot{x}(t)=\begin{bmatrix}-1 & 1\\ 0 & -2\end{bmatrix}x(t)+\begin{bmatrix}1 & 0 & 1\\ 0 & 1 & 1\end{bmatrix}u(t) \quad y(t)=\begin{bmatrix}1 & 2\\ 1 & 0\\ 1 & 1\end{bmatrix}x(t)$$

Find the transfer function of the system. **(2)**

**10.** Explain multi variable control system. **(2)**

## PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

**1.** Using Mason's gain formula method, determine the ratio C/R for the system represented by the block diagram as shown in fig. 1. **(8)**

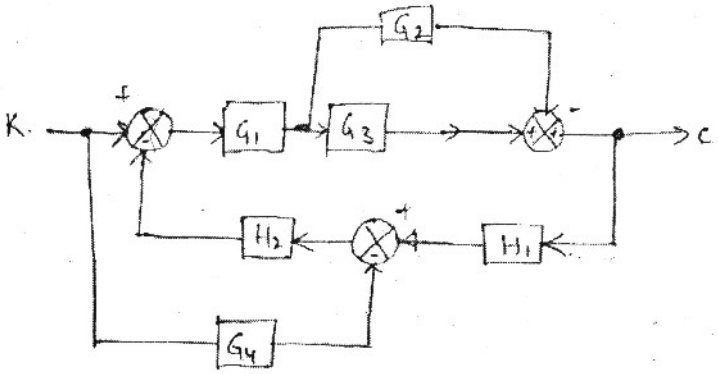


**fig. 1**

**2.** Determine the mathematical mode equations for a mechanical system shown in fig. 2 and hence determine the transfer functions relating to $x_1(s)$ to $F(s)$. **(8)**

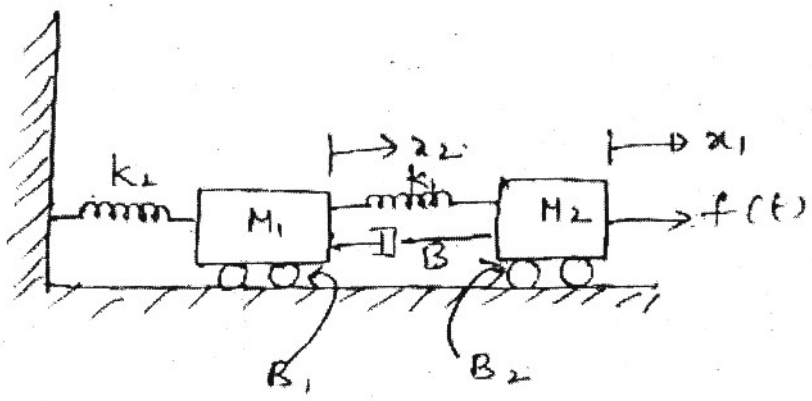


**fig. 2**

**3.** A unity feed back servo – driven instrument has an open loop transfer functions.

$$G(s)=\frac{10}{s(s+2)}$$

Find

i) The natural frequency of oscillation ($\omega_n$) and damping ratio ($\delta$).

ii) Maximum overshoot ($M_p$) and Peak time ($T_p$)

iii) Steady state error to an input (1+4t). **(8)**

4. Determine the open loop transfer function from the Bode plot shown in fig. 3. **(8)**

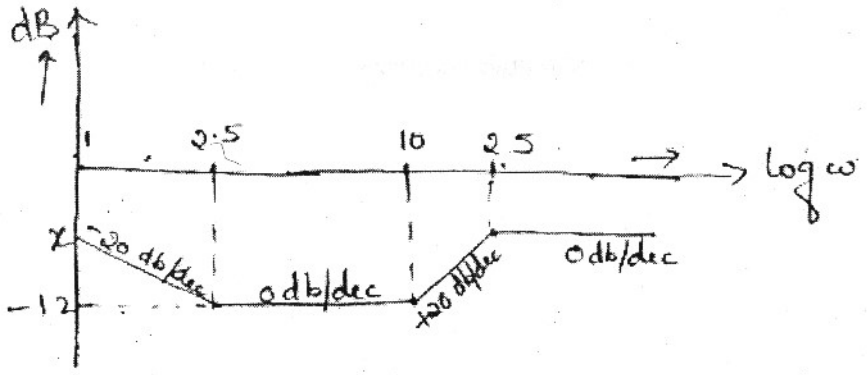


**fig. 3**

5. A system characterised by the transfer function $y(s)/u(s) = \frac{2}{s^3+6s^2+11s+6}$. Test the controllability and observability of the system. **(8)**

6. Explain all design specifications in frequency Domain. **(8)**

7. Explain optimal control system with suitable example. **(8)**

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **Four** questions **(4×15=60)**

1. a) Find the transfer function X(s)/E(s) for the electromechanical system shown in fig 4. The coil has a back emf $e_b = k_1 \frac{dx}{dF}$ and the coil current i produces a force $f_1 = k_2 i$ on the Mass M. **(12)**

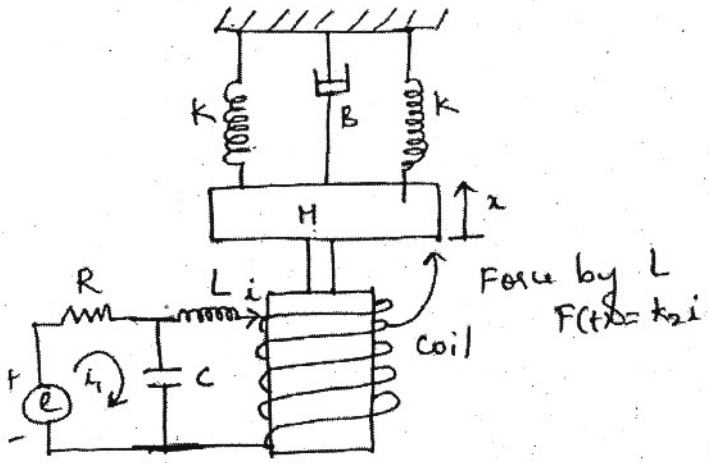


**fig. 4** Force by L $F(t) = k_2 i$

b) Specify benefits of Feedback in a control system. **(3)**

2. a) The block diagram of a simple servosystem shown in fig 5. Find

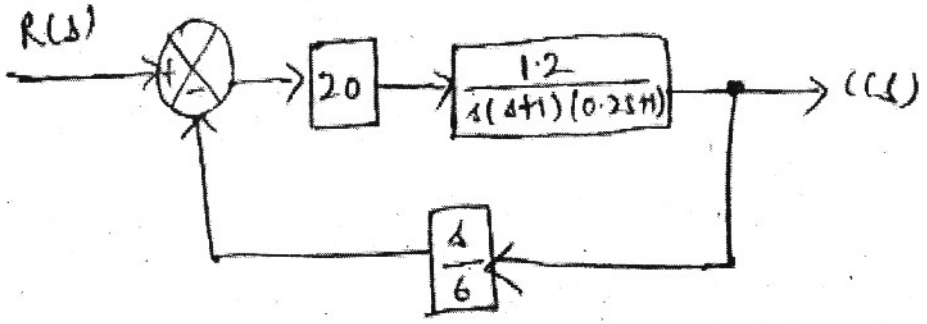


**fig. 5**

1) The characteristics equation of the system
2) Undamped frequency of oscillations.
3) Damped frequency of oscillations.
4) Damping ratio.
5) Damping factor.
6) Maximum overshoot
7) First undershoot
8) Time interval after which maximum and minimum occurs.
9) Settling time
10) Number of cycles completed before the output is settled within 2% of the final value (consider unit step input) **(11)**

b) Write short notes on Non - Linear control system. **(4)**

3. Using the Routh - Hurwitz criterion and Unity feedback system with $G(s)=\frac{k}{s(s+1)(s+2)(s+5)}$

a) Find the range of k for stability.

b) Find the value of k for marginal stability.

c) Find the actual location of the closed loop system when the system is marginally stable. **(15)**

4. Plot the root - locus pattern for a unity feed back system whose forward path transfer function is given by $G(s)=\frac{k(s+1)}{s(s+2)(s^2+2s+5)}$ **(15)**

5. Compare lag, lead and lead - lag compensating network in detail. **(15)**

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5E1364

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# 5E1364

## B.Tech. V- Semester (Main) Examination, Nov. - 2019
## PCC/PEC Electrical Engg.
## 5EE4-04 Microprocessor
## (Common For EE,EX)

**Time : 3 Hours** **Maximum Marks : 120**

**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** 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.*

## PART - A

(Answer should be given up to **25** words only)

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

**1.** Differentiate between timers and counters. Draw the diagram of TCON in 8051. **(2)**

**2.** Which register is used for serial programming in 8051? Illustrate it. **(2)**

**3.** List the 8051 interrupts with its priority. **(2)**

**4.** How is A/D converter interfaced with 8051? Explain. **(2)**

**5.** What are the benefits of subroutine? **(2)**

**6.** What does the term embedded system mean? **(2)**

**7.** Explain the function of each bit in TMOD register. **(2)**

**8.** Draw the pin diagram of 8051. **(2)**

**9.** State how band rate is calculated for serial data transfer in mode 1. **(2)**

**10.** What is the drawback of memory mapped I/O? **(2)**

## PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. Compare 8-bit, 16-bit and 32-bit microcontrollers. **(8)**
2. Show the interfacing circuit and functional pins of LCD. **(8)**
3. Explain the block diagram of 8051. Also discuss its features. **(8)**
4. Write short note on overview of 8051 family. **(8)**
5. Give PSW of 8051 and describe the use of each bit in PSW. **(8)**
6. Write short note on synchronous and Asynchronous communication. **(8)**
7. How are D/A and A/D interfaces used? Explain. **(8)**

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **Four** questions **(4×15=60)**

1. a) How microprocessors and microcontrollers are different from computer based controllers? Explain. **(7)**

   b) What is sensor interfacing and external memory interfacing? Explain in detail. **(8)**

2. a) A switch is connected to pin P 2.7 and a stepper motor to port 1. Write a program to monitor the status as of switching and if SW = 0, stepper motor should rotate clockwise continuously. if SW = 1, stepper motor should rotate anticlockwise, continuously. **(8)**

   b) For an 8051 system of 11.0592 MHz. find the time delay for the following subroutine.

```
Delay : MOV R3, #250
Back : Nop
       Nop
       DJNZ R3, BACK
       RET
```

**(7)**

3. a) Draw and explain the architecture of 8051. **(10)**

b) Write an ALP to read switch as shown in figure 1. If switch is closed turn on the LED else turn OFF the LED. **(5)**

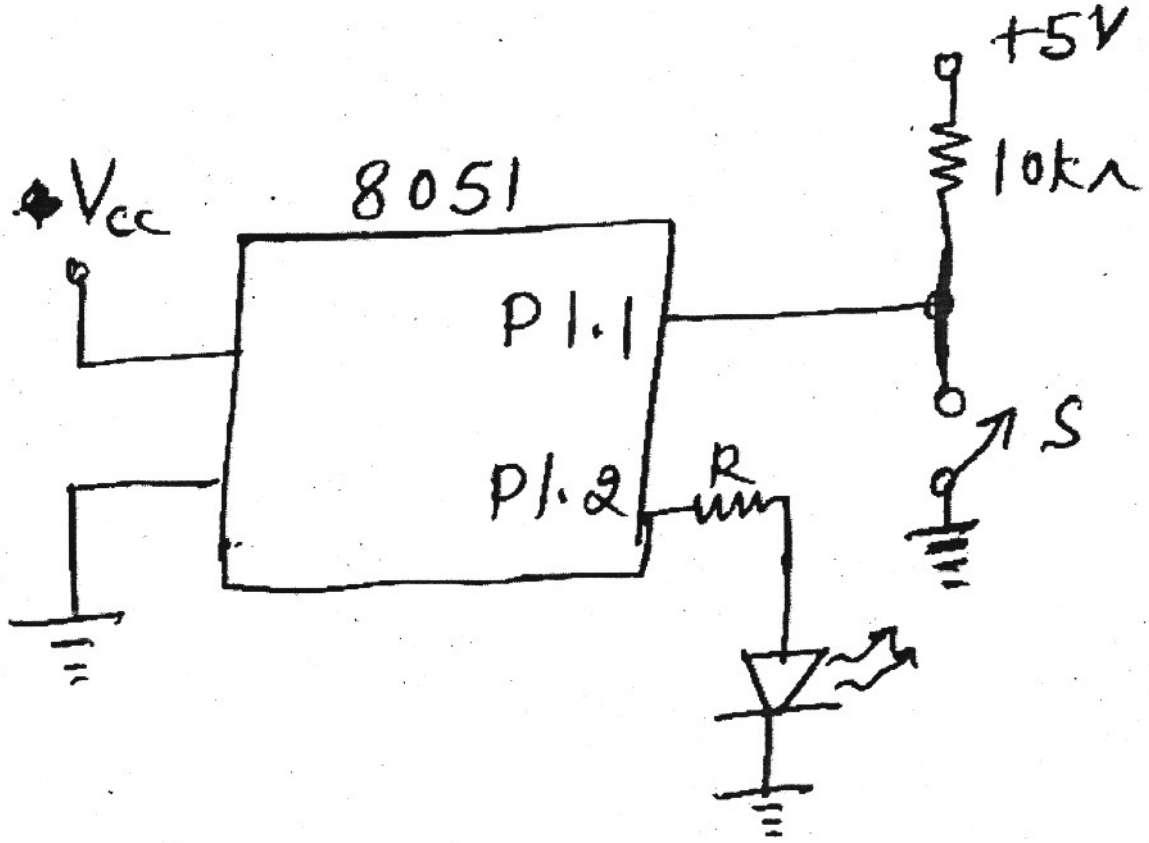


Figure 1.

4. a) Interface ADC 0804 to 8051 and write an ALP to connect the analog input to digital value. **(10)**

b) What are SFR's? Explain. **(5)**

5. a) Draw the schematic for interfacing a stepper motor with 8051 microcontroller and write 8051 ALP for changing speed and direction of motor. **(12)**

b) Explain any two data addressing modes of 8051 with example. **(3)**

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5E1365

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# 5E1365

## B.Tech. V- Semester (Main) Examination, Nov.- 2019
## PCC/PEC Electrical Engg.
## 5EE4-05 Electrical Machine Design

**Time : 3 Hours** **Maximum Marks : 120**
**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** 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.*

## PART - A

(Answer should be given up to **25** words only)

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

1. How is iron loss reduced in transformers? **(2)**
2. List of the advantages of using open slots. **(2)**
3. What are the factors that affecting the size of rotating machines? **(2)**
4. What is cogging? How is it avoided in Induction motor? **(2)**
5. Mention various duty cycles of motor. **(2)**
6. Give the purpose of providing damper windings in synchronous machines. **(2)**
7. What are the different types of heat transfer methods found in electrical machines? **(2)**
8. Write short notes on FEM. **(2)**
9. Define specific electric loading. **(2)**
10. Explain synthesis and hybrid methods. **(2)**

## PART - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. State and derive the KVA output equation of single phase transformer. **(8)**
2. Derive the expression for output equation of Inductor motor. **(8)**

3. Explain the construction of synchronous machine with neat diagrams. **(8)**

4. State and explain the specific magnetic loading and the choice of magnetic loading. **(8)**

5. A 3 phase, 4 pole, 50 Hz induction motor has 24 stator slots and 28 rotor slots Prove that it has a tendency to run as a synchronous motor at 214.3 rpm. **(8)**

6. Define the short circuit ratio in connection with 3 phase synchronous generator. Explain the factors affecting by short circuit ratio. **(8)**

7. Explain SRM? What are the different power controllers used for the control of SRM. **(8)**

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **Four** questions **(4×15=60)**

1. A 100 KVA, 3300 V, 50 Hz, 300 rpm, 3 phase alternator has 180 slots with 5 conductors per slot, single layer winding with full pitched coil is used. The winding is star connected with one circuit per phase. Determine the specific electric loading and magnetic loading if the stator bore is 2.0 m and the core length is 0.4 m. Using the same loading, determine corresponding data for a 1250 KVA, 3300 V, 50 Hz 250 rpm, 3 phase star connected alternator having 2 circuit per phase The machine has $60^{\circ}$ phase spread. **(15)**

2. Estimate the main dimensions including winding conductor area of a 3 phase delta-star core type transformer rated at 300 KVA 6600/440 volt. 50 Hz. A suitable core with 3 steps having circumscribing circle of 0.25 m diameter and leg spacing of 0.4 m is available. Emp per turn = 0.5 volt, current density = 2.5 A/mm$^2$, $k_w$ = 0.28, stocking factor = 0.9. **(15)**

3. a) Derive the expressions for design of rotor and end rings of squirrel cage. **(10)**

   b) Explain the methods of improving the starting torque in I.M. **(5)**

4. a) Write a short note on cooling of transformers. **(5)**

   b) Prove that EMP/Turn of a single phase Transformer = $k\sqrt{Q}$ where Q = per phase KVA output of transformer. **(10)**

5. a) What do you understand by CAD analysis. **(5)**

   b) Explain different approaches used in computer aided design with the help of suitable flowcharts? **(10)**

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5E1366

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# 5E1366

## B.Tech. V- Semester (Main) Examination, Nov. - 2019
## HSMC Electrical Engg.
## PCC/PEC 5EE5-11 Restructured Power System

**Time : 2 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 28**

***Instructions to Candidates:***

*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.*

## PART - A

(Answer should be given up to **25** words only)

**All** questions are **compulsory** **(5×2=10)**

1. Enumerate the need of restructuring of power system.
2. Define Market Clearing Price (MCP) and name the different market clearing mechanisms.
3. Write the names of different indices that are recognized by experts to measure the market concentration of industry.
4. Define Locational Marginal Prices (LMPs) and their significance.
5. Role of Independent System Operator (ISO).

## PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions **(4×10=40)**

1. Discuss different capacity alleviation methods with the help of suitable examples and diagrams.

2. What are the suitable measures you will take as a system operator to remove transmission congestion. Explain the basic principle of congestion management by defining basic building blocks and remedial technologies. Why congestion management is important in deregulated power system?

3. The demand curve for a product is to be estimated to given by the expression :

$Q = 200 - \pi$

Calculate the price and the price elasticity for following values of demand 0,50,100 and 200. Repeat these calculations when the expression is changed to $Q = 200/\pi$.

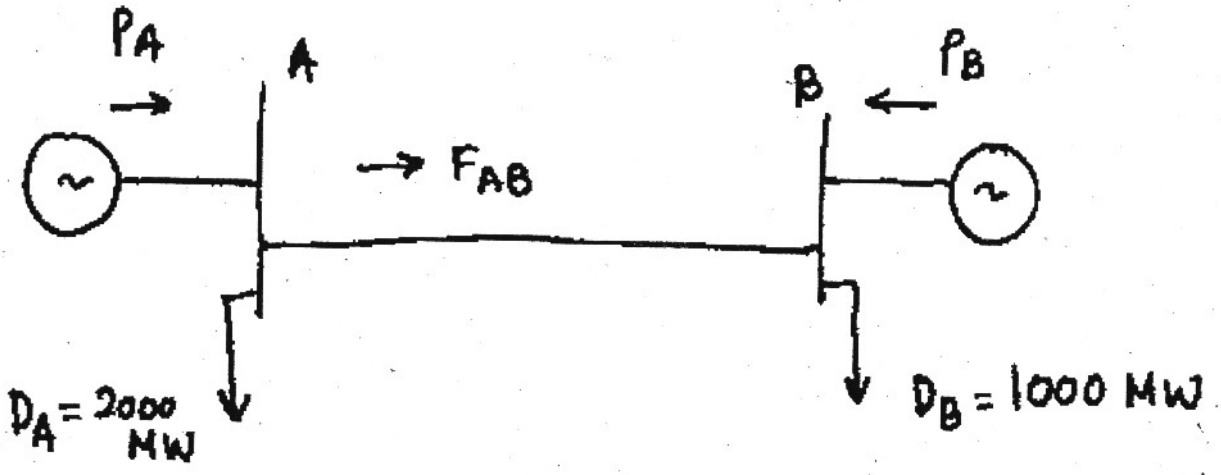
4. Derive the expressions for models of imperfect competition conditions of market. Explain Bertrand and Cournot models in detail.

5. Define and explain different services that are considered as Ancillary Services in a deregulated power system. Classify the services which fall under the direct control of ISO and which are obtained from outside the local control area.

6. Consider the two-bus power system shown in Figure. Assume that the demand is constant and insensitive to price and that energy is sold at its marginal cost of production and that there are no limits on the output of the generators. What is the maximum price that could be charged for transmission if the marginal costs of generation are as follows?

$MC_a = 25\$/MWh$

$MC_b = 17\$/MWh$



## PART - C

(Descriptive/Analytical/Problem Solving/Design Questions)

Attempt any **two** questions **(2×15=30)**

1. What is the basic principle of transmission line pricing. Give a clear classification of transmission pricing methods. Explain each of them with the help of suitable illustrated derivations and numerical analysis

2. Vertically integrated utilities often offer two-part tariffs to encourage their consumers to shift demand from on-peak load periods to off-peak periods. Consumption of electrical energy during on-peak and off-peak periods can be viewed as substitute products. The table below summarizes the results of experiments that the Company 1 and Company 2 has conducted with its two- part tariff. Use these results to estimate the elasticities and cross-elasticities of the demand for electrical energy during peak and off-peak periods.

   Table : Results of Experiments

| | On Peak Price in Rs/MWh | Off peak price in Rs/MWh | Average on peak Demand in MWh | Average of Peak Demand MWh |
|---|---|---|---|---|
| Base case | 8001 | 6000 | 1000 | 500 |
| Experiment-1 | 8001 | 5000 | 992 | 509 |
| Experiment-2 | 9010 | 6000 | 985 | 510 |

   Discuss the results and their significance.

3. Give a comparative analysis of different market models that include monopoly, single buyer, wholesale and retail. Give merits and demerits of these market models. Draw the block diagrams of all the models and explain the functioning blocks of each of these.

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5E1368

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# 5E1368

## B.Tech. V - Semester (Main) Examination, Nov. - 2019
## PCC/PEC Electrical Engg.
## 5EE5-13 Digital Control System

**Time : 2 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 28**

***Instructions to Candidates:***

*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.*

### PART - A

**(5×2=10)**

1. Define the resolution and dynamic range of D/A converter. **(2)**
2. Write two merits of the digital controller versus the analog controller. **(2)**
3. What is the z-transform of unit - step function. **(2)**
4. Define the controllability and observability. **(2)**
5. What is digital control system network? **(2)**

### PART - B

**(4×10=40)**

1. Find z - transform of the function whose Laplace transform is

$$F(s)=\frac{3}{s^2+9}+\frac{-2e^{0.2s}}{s(s+2)}$$ **(10)**

2. Explain the shifting property of z-transform in detail. **(10)**
3. Draw and explain the mapping between s - plane to z - plane for the following.
   i) Constant frequency loci,
   ii) Constant damping loci. **(10)**
4. Explain the transient response specifications with reference to unit step response of discrete time response **(10)**

5. Investigate the controllability and observability of the following system.

$$X(k+1)=\begin{bmatrix}-2 & 1\\ 1 & -2\end{bmatrix}X(k)+\begin{bmatrix}1\\ 0\end{bmatrix}u(k)\ ;\ Y(k)=\begin{bmatrix}1 & -1\end{bmatrix}X(k)$$ **(10)**

6. a) Explain the Designing of setpoint tracker. **(5)**

   b) Discuss the digital PID controllers. **(5)**

## PART - C

**(2×15=30)**

1. Determine the stability of a sampled - data control system having following characteristic polynomial $2z^4+8z^3+12z^2+5z+1=0$ Use Jury's stability test criterion. **(15)**

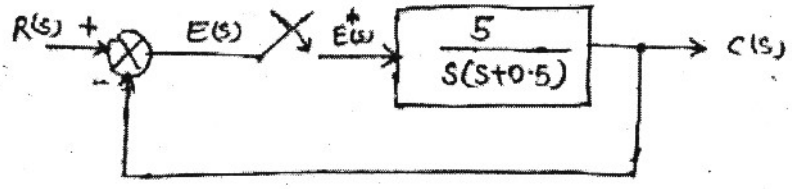
2. a) Write short note on Design of discrete output feedback control. **(8)**

   b) Explain lead compensator design using Bode plot. **(7)**

3. Determine the pulse transfer function and stability of the sampled - data control system as shown in figure for sampling time **(15)**

   a) T = 0.5 sec

   b) T = 1 sec



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5E1371

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**5E1371**

**B.Tech. V - Semester (Main) Examination, Nov. - 2019**
**ESC Electrical and Electronics Engg.**
**5EX3-01 Neural Network**

**Time : 2 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 28**

***Instructions to Candidates:***

*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.*

## Part - A

**(Answer should be given up to 25 words only)**

**All questions are compulsory**

**[5×2=10]**

1. What is the Significance of weights used in artificial neural Network. **[2]**
2. Define Error-Correction Learning. **[2]**
3. What are the two types of learning in neural Network? **[2]**
4. How is the error back propagated in a back propagation Network? **[2]**
5. Define Hessian Matrix. **[2]**

## Part - B

**(Analytical/Problem solving questions)**

**Attempt any four questions**

**[4×10=40]**

1. What are the various characteristics of an artificial Neural Network? Also Explain the development of artificial Neural Network in detail. **[10]**

2. Realise a Hebb net for the AND-NOT function with bipolar inputs and targets (upto 2 iterations) **[10]**

3. Using the perceptron Learning rule, find the updated weight for the given set of input vectors is as follows:-

$$x_1 = \begin{bmatrix} 1 \\ -2 \\ 0 \\ -1 \end{bmatrix}, x_2 = \begin{bmatrix} 0 \\ 1.5 \\ -0.5 \\ -1 \end{bmatrix}, x_3 = \begin{bmatrix} -1 \\ 1 \\ 0.5 \\ -1 \end{bmatrix}$$ and the initial weight $W^1$ is, $W^1 = \begin{bmatrix} 1 \\ -1 \\ 0 \\ 0.5 \end{bmatrix}$

The learning Constant C=0.1. The desired responses for $x_1, x_2, x_3$ are $d_1 = -1, d_2 = -1$ *and* $d_3 = 1$. **[10]**

4. Discuss in detail the training Algorithm used in Back propagation Net. **[10]**

5. Differentiate between Back propagation and Radial basis function Network in detail. **[10]**

6. Write short notes on:-
   i) Learning with a teacher and without a teacher.
   ii) Learning rate Annealing techniques. **[2×5=10]**

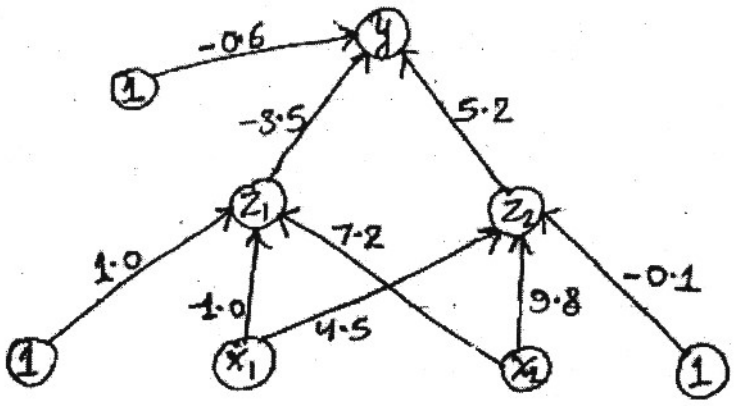
## Part - C

**(Descriptive/Analytical/Problem Solving/Design question)**

**Attempt any two questions**

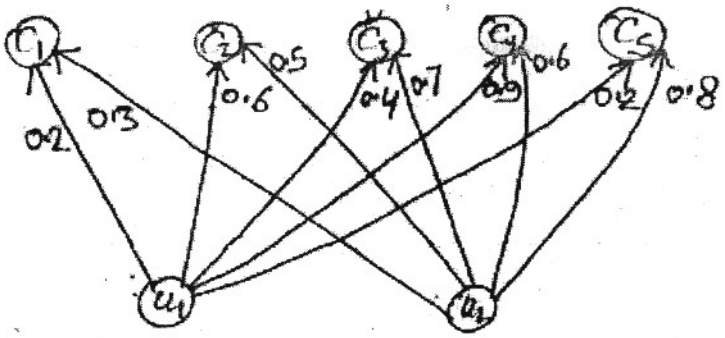
**[2×15=30]**

1. Generate a neural Net using back propagation Network algorithm for X-OR logic function. The architecture and the values of initial weights and biases are shown in figure. **[15]**




2. a) With the architecture, explain the training algorithm used in kohonen self organizing feature map. **[5]**

b) A kohonen self organizing map is shown in figure




i) Using the square of the Euclidean Distance find the cluster Unit $C_j$ that is closest to the input vector (0.3,0.4)

ii) Using Learning rate of 0.3, find the new weights for unit $C_j$.

iii) Find new weights for $C_{J-1}$ and $C_{J+1}$, if they are allowed to learn. **[10]**

**3.** Write short notes on :- **[3×5=15]**

a) Boltzmann Learning

b) Cover's Theorem on the separability of patterns.

c) Comparison between Artificial Neural N/W and Biological Neural Network.

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5E1372

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**5E1372**

**B.Tech. V- Semester (Main) Examination, Nov. 2019**
**PCC/PEC Electrical and Electronics Engg**
**5EX4-05 Analog Communication**

**Time : 3 Hours** **Maximum Marks : 120**
**Min. Passing Marks : 42**

***Instructions to Candidates:***

*Attempt **all ten** questions from **Part A**, **five** questions out of **Seven** from **Part B** and **Four** questions out of **Five** 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.*

## Part - A

(Answer should be given up to **25** words only)

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

1. Calculate the noise voltage across a parallel combination of two resistor $R_1 = 5K\Omega$ and $R_2 = 10K\Omega$.
2. Draw the spectrum of AM when base band signal is 5KHz and carrier signal is 5MHz.
3. Write relation between S/N, ratio and noise figure.
4. Where Narrow band FM is more suitable?
5. Draw waveform of PPM signal.
6. If input signal is 5W KHz and intermediate frequency is 10KHz then find local oscillator frequency.
7. Write one difference between linear and square detector.
8. If total power in AM is 10 watt and Modulation index is 0.6 then find power in USB

9. Write the name of two sources for external noise.

10. Write the problem for obtain natural sampling.

## Part - B

(Analytical/Problem solving questions)

Attempt any **five** questions **(5×8=40)**

1. Explain and Draw Scheme of AM - SSB.

2. Compare the total Bandwidth in AM, FM and PM.

3. Draw Block diagram of super heterodyne receiver and define the image signal in it.

4. Develop relation between noise figure and noise temperature.

5. Draw the ckt diagram of diode detector for demodulate AM signal.

6. Draw the Block diagram of PLL and explain its uses.

7. How PWM signal is connected to PPM ? Explain one scheme with required ckt.

## Part - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **Four** questions **(4×15=60)**

1. Explain FM and find the expression of FM signal and Modulation index. How FM classified as Narrow and wide FM?

2. Draw Any ckt for obtain AM signal. If the base band signal is given by $i_m(t) = 0.01\sin 10^3 t + 0.2\sin 10^4 t$ and carrier signal is given as $i_c(t) = 10\sin 10^6 t$

   Find modulation index and power in CSB and USB.

3. Define flat sampling and Draw a ckt of it. Draw waveform of PAM signal;How and where such signals are used?

4. Draw and explain any one FM modulator ckt.

5. Draw and explain the working of envelope detector.

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5E1374

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# 5E1374

## B.Tech. V- Semester (Main) Examination, Nov. - 2019
## PCC/PEC Electrical and Electronics Engg.
## 5EX5-12 Principle of Communication System

**Time : 2 Hours**

**Maximum Marks : 80**
**Min. Passing Marks : 28**

***Instructions to Candidates:***

*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.*

### PART - A

(Answer should be given up to **25** words only)

**All** questions are **compulsory** **(5×2=10)**

1. A carrier of 6 kV amplitude is modulated by an audio signal of 3 kV. Find the modulation index. **(2)**
2. What are the advantages of frequency translation? **(2)**
3. How does pre-emphasis and de-emphasis process provide overall SNR improvement in FM systems? **(2)**
4. Compare sampling theorem with nyquist criteria. **(2)**
5. Define and explain Noise bandwidth. **(2)**

### PART - B

(Analytical/Problem solving questions)

Attempt any **four** questions **(4×10=40)**

1. Derive an expression of noise figure for an amplifier. **(10)**
2. a) Explain the working of ring modulation for generation of a DSB - SC signal. **(6)**
   b) The baseband signal is a voice signal which extends over a frequency range from 300 Hz to 3400 Hz. Carrier signal with frequency of 1MHz is used to amplitude modulate the baseband signal. Compare the signal transmission bandwidth by drawing SSB(USB) and DSB - SC spectrum. **(4)**

3. a) Compare AM, FM and PM. **(6)**

b) Explain the following terms for FM wave :

i) Frequency deviation

ii) Carrier swing **(4)**

4. a) Calculate the figure of merit $\gamma$ for a DSB - SC system. **(6)**

b) Find the Nyquist rate and Nyquist intervel for the signal $x(t) = \frac{1}{2\pi}\cos(4000\pi t)\cos(1000\pi t)$ **(4)**

5. Compare PAM, PPM and PWM. **(10)**

6. a) Derive an expression for a single - tone frequency. **(6)**

b) Calculate the figure of merit $\gamma$ for a SSB receiver. **(4)**

## PART - C

(Descriptive/Analytical/Problem Solving/Design Question)

Attempt any **two** questions **(2×15=30)**

1. a) A mixer stage has a noise figure of 20dB. This mixer stage is preceded by an amplifier which has a noise figure of 9 dB and an available power gain of 15 dB. Find the overall noise figure of this system. **(8)**

b) Derive the expression of total transmitted power relating carrier and side band powers for conventional AM wave. **(7)**

2. a) Explain Armstrong method of FM generation. Compare the narrowband FM and wideband FM. **(8)**

b) State and prove sampling theorem. **(7)**

3. a) Explain the working of Balanced modulator with the help of circuit diagram. Derive the expression of DSB-SC wave generated by Balanced modulation. **(10)**

b) Discuss the generator of FM using phase modulator and PM using frequency modulator with the help of block diagrams. **(5)**

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5E5041

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**5E5041**

**B.Tech V - Semester (Back) Examination, Nov. - 2019**
**Electrical and Electronics Engg.**
**5EE1A Power Electronics**
**(Common for EX, EE)**

**Time : 3 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five** questions, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used / calculated must be stated clearly.*

## UNIT - I

1. a) How does a GTO differs from a conventional thyristor? Give its circuit symbol and static V-I characteristics. **[8]**

   b) Discuss the two transistor model of thyristor. **[8]**

**OR**

   a) Explain the operation and principle of TRIAC. Differentiate the TRIAC with antiparallel SCRs. **[8]**

   b) Explain switching characteristic of an IGBT. **[8]**

## UNIT- II

2. a) Describe the different modes of operation of a thyristor with the help of its static V-I characteristics. **[8]**

   b) Explain RC half wave firing circuit for SCR along with suitable waveforms and circuit diagram. **[8]**

**(OR)**

   a) Discuss the problems associated with the parallel operation of SCRs and how these are overcome? **[8]**

   b) Explain overvoltage protection of SCR and its remedies. **[8]**

## UNIT - III

3. a) Explain single phase circulating type dual converter with waveforms. [8]

b) For a single phase one pulse controlled converter system, sketch waveforms for load voltage and load current for

i) RL load and

ii) RL load and free wheeling diode across RL load. From a comparison of these waveforms, discuss the advantages of using a free wheeling diode. [8]

**(OR)**

a) Describe the working of single phase full converter in the rectifier mode with RLE Load. Illustrates your answer with waveform for source voltage, output voltage and current, source current, current through and voltage across one thyristor. [8]

b) Explain three phase half wave converter. Sketch waveform of output voltage having

i) R Load for $60^{\circ}$ firing angle

ii) RL Load for $60^{\circ}$ firing angle [8]

## UNIT - IV

4. a) Discuss the effect of source inductance on the performance of a single phase full converter. Also derive expression for its output voltage. [8]

b) Write short note on extinction angle control for power factor improvement. [8]

**(OR)**

a) Explain single phase semiconverter with RLE Load. Sketch supply voltage, load voltage and current, free wheeling diode current and current through each pair consisting of SCRs diodes. Find also the circuit turn-off time. [8]

b) Explain sinusoidal pulse width modulation control scheme used for power factor improvement. [8]

## UNIT - V

5. a) What is time ratio control (TRC) in dc choppers? Explain the use of TRC for controlling the output voltage in choppers. [8]

b) Describe the working of type-D chopper with appropriate waveforms to demonstrates its operation in first as well as fourth quadrants. [8]

**(OR)**

a) Explain Load commutated chopper with waveforms. **[8]**

b) A step up chopper has input voltage of 220V and output voltage of 660V. If the conducting time of thyristor-chopper is 100 $\mu$sec, compute the pulse width of output voltage.

In case output voltage pulse width is halved for constant frequency operation, find the average value of new output voltage. **[8]**

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5E5042

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**5E5042**

# B.Tech. V-Semester (Back) Examination, Nov - 2019
## Electrical Engg.
## 5EE2A Microprocessors and Computer Architecture

**Time : 3 Hours** **Maximum Marks : 80**

**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions,** selecting **one question** from **each unit**. All Questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly) Units of Quantities used/calculated must be stated clearly.*

### UNIT - I

**I.** a) How the demultiplexing of Address Bus and Data bus does takes place in 8085 microprocessor? Explain. **(8)**

b) Draw and explain the timing diagram of fetch cycle of 8085 microprocessor with suitable example. **(8)**

**(OR)**

**I.** a) Explain the following -
i) CPU
ii) Buffer
iii) Latches
iv) Control Bus **(8)**

b) What are the different status pins in 8085 mp? Explain their function. **(8)**

### UNIT -II

**II.** a) What are the various addressing modes in 8085 mp? **(8)**

b) Describe the sequence of events that are followed for the execution of PUSH and POP instructions in 8085 mp. **(8)**

**(OR)**

**II.** a) Explain the SIM and RIM instruction of 8085 mp? Mention their use, t-states, Machine cycles and instruction cycle. **(8)**

b) Write the 8085 assembly language program to store the contents of the flag register in memory location 2000H and load the flag register from top of stack. **(8)**

## UNIT - III

III. a) Explain the diagram of 8259 chip. Explain specific purpose of different blocks in 8259 block diagrams. **(8)**

b) Enumerate the sequence of instructions that you need to send to 8279 interfaced to 8085 mp to display 8888. **(8)**

**(OR)**

III. a) Explain why 8255 ports are divided into two groups? Discuss how these groups are controlled in different modes of operation. **(8)**

b) Write a short note on A/D Converter. **(8)**

## UNIT - IV

IV. a) What are the different registers available in 8086? Explain the special operations if any, performed by these registers. **(8)**

b) What is the min and max mode of 8086 microprocessor? Explain each of them briefly. **(8)**

**(OR)**

IV. a) Describe in brief by drawing necessary block diagram the architecture of 8086 microprocessor? **(8)**

b) Explain the segmented memory scheme in 8086 and its advantages. **(8)**

## UNIT - V

V. a) With the help of basic cell explain SRAM and DRAM. Discuss the advantages and disadvantages of the above memories. **(8)**

b) Define the following: **(8)**

i) Memory latency
ii) Memory Bandwidth
iii) Memory seek time
iv) Memory hierarchy

**(OR)**

V. a) Define the following: **(8)**

i) Primary and secondary memory.
ii) Static and dynamic memory.

b) Explain the following terms with reference to DRAM

i) Write cycle
ii) Access time
iii) Refresh
iv) Read cycle **(8)**

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**5E5043**

**B.Tech. V- Semester (Back) Examination, November - 2019**
**Electrical Engineering**
**5EE3A Control System**
**(Common EE, EX)**

**Time : 3 Hours**

**Maximum Marks : 80**
**Min. Passing Marks : 28**

***Instructions to Candidates:***

*Attempt any **Five** questions, selecting **one question** from **each unit**. All Questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly. Units of quantities used/calculated must be stated clearly.*

## UNIT - I

**1.** a) Explain and verify the following statements :

i) The control of traffic by glowing the LED's (red, yellow and green) is the example of open loop system where as control of traffic by the policeman is the example of closed loop control system.

ii) A blind person walking on the road is closed loop control system.

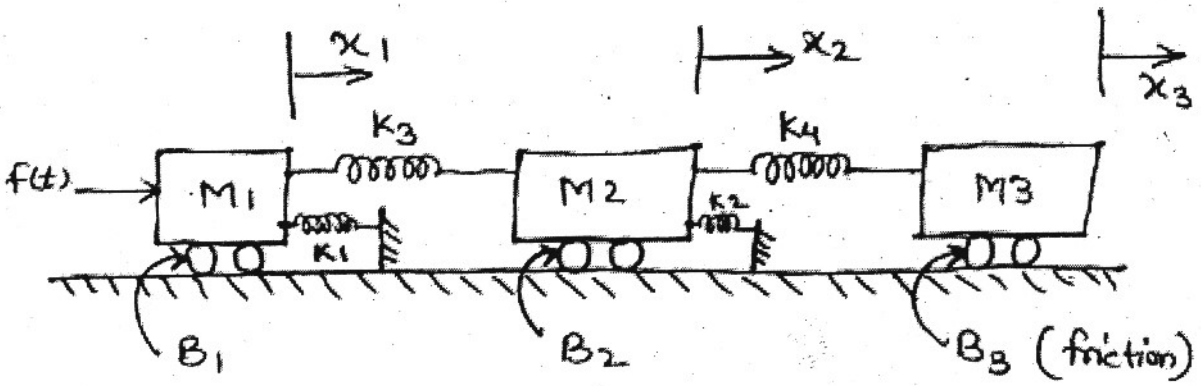
**(4×2=8)**

b) Obtain the solution of the differential equation given below

$2\frac{dx}{dt}+8x=10$; given x(D+)=2. **(8)**

**(OR)**

**1.** Obtain a mathematical model and electrical analogous circuit (F-V and F-I) for the given system. **(16)**



## UNIT - II

2. a) A second order control system is represented by a transfer function given below

$$\frac{\theta_0(s)}{T(s)} = \frac{1}{Js^2 + fs + k}$$

Where $\theta_0$ is the proportional output and T is the input torque. A step input of 10 Nm is applied to the system and test result are given below

i) $M_p = 6\%$

ii) $t_p = 1\text{sec}$,

iii) The steady value of the output is 0.5 radian. Determine the values of J, f and k. **(10)**

b) Determine the time response of first order control system. **(6)**

**(OR)**

2. Derive the expression for steady state error for various inputs (unit - step; unit - ramp, unit - parabolic) and systems (Type - 0, Type - 1, Type - 2). **(16)**

## UNIT - III

3. a) Using Routh - Hurwitz criterion determine the relation between k and T so that unity feedback control system whose open loop transfer function given below is stable.

$$G(s) = \frac{k}{s[s(s+10)+T]}$$ **(8)**

b) Determine the stability of a system whose overall transfer function is given below

$$\frac{C(s)}{R(s)} = \frac{2s+5}{s^5 + 1.5s^4 + 2s^3 + 4s^2 + 5s + 10}$$

if the system is found unstable, how many roots it has with positive real part? **(8)**

**(OR)**

3. Sketch the root locus for the open loop transfer function of a unity feedbackcontrol system given below and determine

i) The value of k for $\xi = 0.5$

ii) The value of k for marginal stability

iii) The value of k at s = -4 and obtain the closed loop transfer function for k = 1.66.

$$G(s)=\frac{k}{s(s+1)(s+3)}$$ **(16)**

## UNIT - IV

**4.** a) Sketch the polar plot for the following transfer function **(10)**

$$G(s)=\frac{1}{(1+s)^2}$$

b) Define the gain margin and phase margin. **(6)**

**(OR)**

**4.** Construct the Bode plot on a semi log graph - sheet for a unity feedback system whose open loop transfer function is given by

$$G(s)=\frac{50}{s(1+s)(1+0.5s)}$$

From the Bode plot check the stability of closed loop system. **(16)**

## UNIT - V

**5.** The open loop transfer function of a unity feedback control system is given by

$$G(s)=\frac{k}{s(1+0.2s)}$$

Design a suitable compensator such that the system will have $k_r$ = 10 and P.M. = 50°. **(16)**

**(OR)**

**5.** a) Derive the formula for steady state error ($e_{ss}$) of PI control. **(8)**

b) Write short note on (any **two**)

i) Proportional control

ii) Integral control

iii) Derivative control **(4×2=8)**

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5E5044

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# 5E5044

## B.Tech. V- Semester (Back) Examination, Nov. - 2019
## Electrical Engg.
## 5EE4A Database Management System
## (Common for EEEX)

**Time : 3 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five** questions, selecting one question from **each unit**. All questions carry **equal marks**. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used/calculated must be stated clearly.*

### UNIT - I

**1.** What is Database Management system? Write all advantages of DBMS. **(16)**

**(OR)**

**1.** What is E-R diagram? What is the role of E-R diagram in DBMS? Draw an E - R diagram of library management system. **(16)**

### UNIT - II

**2.** a) What is Normalization? Explain its need. Define various normal forms with example. **(8)**

b) Define primitive and composite data types. **(8)**

**(OR)**

**2.** a) Explain about Data Abstraction and data independence. **(8)**

b) Consider the following relation schema

Employee (Person - name, street, city)

Works (Person - name, company - name, salary)

Company (Company - name, city)

Manager (Person - name, Manager - name)

Write the following queries in relational algebra

i) Find the name of all employees who work in "First Bank"

ii) Find the names of all employees who live in the same city as the company for which they work.

iii) Find the name of all employees who do not work for "Small Bank"

iv) Find the names of all employees who live in the Same city and on the Same city as do their managers. **(4×2=8)**

## UNIT - III

**3.** a) Explain embedded SQL and its need. How is it different from dynamic SQL? **(8)**

b) Define a trigger. What are the uses of creating triggers? Explain with examples. **(8)**

**(OR)**

**3.** a) Explain the following clauses of SQL

i) GROUP by

ii) ORDER by

iii) EXCEPT

iv) HAVING **(4×2=8)**

b) What is a view? How can a view be used to implement database security? Explain with example. **(8)**

## UNIT - IV

**4.** a) What are various types of Indexes? Explain with examples. **(8)**

b) What is Hashing? Explain its implementation by explaining one Hashing Technique. **(8)**

**(OR)**

**4.** a) Define Inverted and Multi-list structure. **(8)**

b) Explain Mode structure of B tree. What are the differences between B and $B^+$ tree indexes? Explain. **(8)**

## UNIT - V

**5.** a) Define serializability. What are its various types? Explain. **(8)**

b) What is Deadlock? Explain various techniques of handling deadlock. **(8)**

**(OR)**

**5.** a) Define a transaction. What are the properties of a transaction? **(8)**

b) What all types of failures can occur in Database systems? Explain various log based recovery techniques in detail. **(8)**

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5E5045

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5E5045

# B.Tech. V - Semester (Back) Examination, Nov. - 2019
## Electrical Engineering
## 5EE5A Transmission And Distribution of Electrical Power
## (Common for EE, EX)

**Time : 3 Hours** **Maximum Marks : 80**

**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions**, selecting **one question** from **each unit.** All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used / calculated must be stated clearly.*

### UNIT - I

**I.** a) A single phase AC system supplies a load of 200 kW. If this system is converted into 3 phase 3 wire AC system by running a third similar conductor then calculate the 3 phase load than can now be supplied if the voltage between the conductor is same. Assume power factor and transmission efficiency to be same in both cases. **(8)**

b) Distinguish among feeder, distributor and service main. Why the distribution by AC consider superior than DC? **(8)**

**(OR)**

**I.** a) Distinguish radial and ring main distribution system. **(8)**

b) State and explain Kelvin's law for determination of conductor size with its limitations. **(8)**

### UNIT - II

**II.** a) Derive an expression for sag and tension of an overhead transmission line supported between the towers of the same height. **(8)**

b) Explain thc various types of line supports with their properties. **(8)**

**(OR)**

II. a) An overhead transmission line at a river crossing is supported from two towers at heights of 40 m and 90 m above water level, the horizontal distance between the towers being 400 m. If the maximum allowable tension is 2000 kg. find the clearance between the conductor and water at a point mid-way between the towers. Weight of conductor is 1 kg/m. **(8)**

b) Explain the various types of conductor material used in transmission and distribution system? **(8)**

## UNIT - III

III. a) Derive an expression for inductance of single phase transmission line. **(8)**

b) Write short notes on geometric mean distance and geometric mean radius. **(8)**

**(OR)**

III. a) Explain proximity effect and skin effect for conductor. **(8)**

b) Deduce the expression for the capacitance of a three phase unsymmetrical spaced overhead line. **(8)**

## UNIT - IV

IV. a) What is corona? Explain various factors which affect the corona loss in transmission lines. **(8)**

b) Determine the value of A, B, C, D parameters for medium transmission line (Nominal T configuration) in terms of Z (impedance) and Y (admittance). **(8)**

**(OR)**

IV. a) What is the interference of power lines with communication circuits? **(8)**

b) Derive expressions for A, B, C, D line parameters for a long transmission line. **(8)**

## UNIT - V

V. a) What is string efficiency? Explain various methods of improving string efficiency. **(8)**

b) Derive an expression for electric stress in a single core cable. **(8)**

**(OR)**

V. a) Write brief introduction of different types of insulators used in power system. **(8)**

b) Explain grading of cable using any suitable method. **(8)**

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5E5046

**B.Tech. V Semester (Back) Examination, Nov. - 2019**

**Electrical Engg.**

**5EE6.1A Optimization Techniques**

**Time : 3 Hours** **Maximum Marks : 80**

**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions**, selecting **one** question from **each unit**. All questions carry **equal** marks. Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used / calculated must be stated clearly.*

## UNIT - I

1. a) Define optimization techniques and describe the formulation method in OR **[8]**

b) A firm can produce three types of clothes say A,B and C. Three kind of wool are required for it, say red, green and blue wool : One unit length of type A cloth needs 2 meters of red wool and 3 meters of blue wool : One unit length of type B needs 3 meter of red wool, 2 meter of green wool and 2 meter of blue wool and : One unit of type C cloth needs 5 meters of green wool and 4 meters of blue wool. The firm has only stock of 8 meters of red wool, 10 meters of green wool and 15 meters of blue wool. It is assumed that the income obtained from One unit length of type A cloth is Rs. 3.00, of type B cloth is Rs. 5.00, and of type C cloth is Rs. 4.00

Formulate the problem so as to maximize the income from the finished cloth. **[8]**

**(OR)**

a) Define the mathematical programming method. Give the statement of optimization problem **[8]**

b) The data for three foods $x_1, x_2$ *and* $x_3$ are given below

| Vitamin | Gallon of Milk | pourd of Beaf | Dozen of eggs | Minimum daily Requirements |
|---|---|---|---|---|
| A | 1 | 1 | 10 | 1 mg |
| B | 100 | 10 | 10 | 50 mg |
| C | 10 | 100 | 10 | 10 mg |
| Cost | Rs. 1.00 | Rs. 1.10 | Rs. 0.50 | |

What is the linear programming formulation of this problem? **[8]**

## UNIT- II

**2.** a) $Minimize(z) = 2x_1^2 + x_2^2 + 3x_3^2 + 10x_1 + 8x_2 + 6x_3 - 100$

subject to $x_1 + x_2 + x_3 = 20$

and $x_1, x_2, x_3 \geq 0$

Use the method of Lagrangian multipliers. **[8]**

b) Determine the relative maximum and minimum (if any) of the function.

$f(x_1x_2x_3) = x_1 + 2x_3 + x_3x_2 - x_1^2 - x_2^2 - x_3^2$ **[8]**

**(OR)**

a) Find the extreme point of the function $f(x) = x_1 + 2x_2 + x_1x_2 - x_1^2 - x_2^2$ **[8]**

b) Solve the following problem by any suitable method

$Opitmize\ (z) = 4x_1^2 + 2x_2^2 + x_3^2 - 4x_1x_2$

*Subject to* : $x_1 + x_2 + x_3 = 15,\ 2x_1 - x_2 + 2x_3 = 20$ **[8]**

*and* $x_1\, x_2\, x_3 \geq 0$

## UNIT - III

**3.** a) Solve graphically :

$Min[z] = 2x_1 + 3x_2$

*Subject to* : $x_1 + x_2 \leq 4$

$6x_1 + 2x_2 \geq 8$

$x_1 + 5x_2 \geq 4$

$x_1 \leq 3$

$x_2 \leq 3$

*and* $x_1, x_2 \geq 0$ **[8]**

b) Solve the LPP by using the Big-M method

$Min(z) = x_1 + x_2$

*Subject to*: $2x_1 + x_2 \geq 4$

$x_1 + 7x_2 \geq 7$ **[8]**

*and* $x_1, x_2 \geq 0$

**(OR)**

Find the optimal solution to the following LPP by solving gts dual LPP with the help of simplex method:

$Max\ (z) = 2x_1 + x_2$

*Subject to*: $x_1 + 5x_2 \leq 10$

$x_1 + 3x_2 \leq 6$

$2x_1 + 2x_2 \leq 8$ **[16]**

*and* $x_1, x_2 \geq 0$

**UNIT - IV**

**4.** Find the maximum of $f(x) = x(5\pi - x)$ in the Interval $[0, 20]$ by Golden Section method. **(16)**

**(OR)**

a) Minimize $f(x_1, x_2) = x_1^2 - x_1x_2 + 3x_2^2 + x_1 - 17x_2$ by univariate method with the starting point $X_1(0,0)$ **[8]**

b) Compute the Newton step corresponding to $X_1(0,1)$ in a search of unconstrained Nonlinear programming

Min. $f(x_1x_2) = (x_1 + 1)^4 + (x_2 + 1)^4 + x_1 + x_2$ **[8]**

**UNIT - V**

**5.** Minimize $f(x) = x_1^2 + x_2^2 - 6x_2 - 8x_2 + 10$

Subject to $4x_1^2 + x_2^2 \leq 16$

$3x_1 + 5x_2 \leq 15$

and $x_1, x_2 \geq 0$

Using complex method with the starting point (:). **[16]**

**(OR)**

Find the solution of the following problem using the exterior penalty method with classical method of unconstrained minimization

Minimize $f(x_1 x_2) = (2x_1 - x_2)^2 + (x_2 + 1)^2$

Subject to $x_1 + x_2 \leq 10$

Consider the limiting case as $r_k \rightarrow$ analytically **[16]**

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5E5047

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**5E5047**

**B.Tech. V- Semester (Back) Examination,Nov - 2019**
**Electrical Engg.**
**5EE6.2A Principle of Communication Systems**
**(Common for EE,EX)**

**Time : 3 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions,** selecting **one question** from **each unit**. All Questions carry equal marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly) Units of quantities used/calculated must be stated clearly.*

**UNIT - I**

1. What is the noise figure? Derive an expression to calculate equivalent noise temperature in cascaded circuits. **(6+10=16)**

**OR**

1. Define the following terms :
   a) Noise temperature
   b) Noise band width
   c) Resistar noise **(6+6+4=16)**

**UNIT - II**

2. a) Calculate power relation in an AM signal by mathematical expression to show relation between carrier power and side band power. **(8)**
   b) Discuss the need of modulation by explaining some important reasons. **(8)**

**OR**

2. a) Draw the circuit diagram to generate full - AM wave and discuss its operation. **(8)**
   b) Draw the circuit diagram of envelope detector and discuss its operation state also that for what type of modulated wave this circuit can be used. **(8)**

## UNIT - III

3. a) Differentiate narrow band and wideband FM signal by writing suitable mathematical expressions. **(8)**

   b) Draw the block diagram of PLL demodulator and discuss its working. **(8)**

**OR**

3. a) Discuss need of pre - emphasis and de emphasis. Show how it is achieved in a communication system. **(8)**

   b) Differentiate AM, FM and PM type of modulation techniques by taking important parameters. **(8)**

## UNIT - IV

4. Draw the block diagram of super - hetrodyne receiver and discuss its working by stating specific use/application of different stages in a system. **(16)**

**OR**

4. a) Calculate signal to noise ratio for DSB with carrier type of communication. **(8)**

   b) Compare noise performance behaviour between SSB-SC, DSB-SC and DSB with carrier type of modulation techniques. **(8)**

## UNIT - V

5. a) Calculate the minimum sampling rate for the following signal x(t)

   $x(t) = 10\sin\left(2000\pi t + 500\pi t + 100\pi t\right)$. **(8)**

   b) Draw the waveforms for PAM, PWM and PPM wave for a given input signal. Differentiate these three type of pulse modulation techniques. **(4+4=8)**

**OR**

5. a) Draw the circuit diagram for PAM wave generation and discuss its working. **(8)**

   b) Draw the circuit diagram for demodulation of PWM wave and discuss its working. **(8)**

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5E5048

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**5E5048**

**B.Tech V - Semester (Back) Examination, Nov. - 2019**
**Electrical and Electronics Engg.**
**5EX6.3A Introduction to VLSI**
**(Common For EE,EX)**

**Time : 3 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions,** selecting **one** question from each unit. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly). Units of quantities used / calculated must be stated clearly.*

## UNIT - I

**Q.1** a) Derive the V-I characteristics of enhancement MOSFET [8]
   i) Ohmic Region
   ii) Saturation Region

b) What are different kind of mask used for P-well CMOS Fabrication process. [8]

**(OR)**

**Q.1** a) Draw the structure of depletion mode transistor. Also draw the fabrication steps to obtained this structure. [8]

b) Explain twin tube process in detail. [8]

## UNIT -II

**Q.2** a) Explain drain to source current Ids vs voltage Vds relationship. [8]

b) Derive formula for transconductance Gm with schematic diagram. [8]

**(OR)**

a) Determination of pull-up to pull-down ratio Zpv/Zpd for an NMOS inverter driven by anather NMOS inverter. [8]

b) Explain channel length Modulation. [8]

## UNIT - III

**Q.3** a) Draw and explain 2-input Ex-OR and EX-NOR using CMOS Technology. **[8]**

b) Explain power dissipation in CMOS circuit. **[8]**

**(OR)**

**Q.3** a) Implement OR gate using Transmission gate. **[8]**

b) Implement clocked S-R Flip-flop using CMOS inverter. **[8]**

## UNIT -IV

**Q.4** a) What is layout optimization. Explain it with on examples. **[8]**

b) Make stick diagram layout for $y = \overline{A(C+E)+BD}$ **[8]**

**(OR)**

**Q.4** a) Draw Euler path and layout diagram for two input NOR gate. **[8]**

b) Draw layout diagram for two input Ex-OR gate. **[8]**

## UNIT -V

**Q.5** a) What type of Language is VHDL ? Explain advantage and limitation of VHDL language. **[8]**

b) Write VHDL code For 4:1 multiplexer in behavioural type of modelling. **[8]**

**(OR)**

**Q.5** Write VHDL code for following: **[8]**

a) J-K Flip-flop

b) Full Adder using half Adder **[8]**

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5E5050

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**5E5050**

**B.Tech .V Semester (Back) Examination, Nov. - 2019**
**Electrical & Electronics Engg.**
**5EX2A Analog Communication**
**(Common for EX, AI)**

**Time : 3 Hours** **Maximum Marks : 80**
**Min. Passing Marks : 26**

***Instructions to Candidates:***

*Attempt any **five questions**, selecting **one** question from **each unit**. All questions carry **equal** marks. (Schematic diagrams must be shown wherever necessary. Any data you feel missing suitably be assumed and stated clearly.) Units of quantities used / calculated must be stated clearly.*

## UNIT - I

**1.** Calculate the total noise voltage across three resistor $R_1 = 10K\Omega,\ R_2 = 10K\Omega,\ R_3 = 1K\Omega$) When these are connected in

i) Series and

ii) Parallel. **[16]**

**(OR)**

**1.** Define

i) Noise figure and

ii) Noise temperature also find interrelation between it. **[16]**

## UNIT- II

**2.** Calculate the carrier power, USB power and CSB power in a AM signal given by

$V(t) = 10\left(1 + 0.5\cos 10^3 t\right)\sin\left(10^6 t + 45^o\right)$. **[16]**

**(OR)**

**2.** Draw AM signal when modulation index is

i) Zero

ii) 0.5 and

iii) M = 1.0

## UNIT - III

3. Define Modulation index and BW in FM signal also find their values in low level and high level FM signal . [16]

**(OR)**

3. How FM signal obtain by indirect method? Explain with block diagram. [16]

## UNIT - IV

4. Compare SSB -SC and DSB in terms of performance and cost. [16]

**(OR)**

4. Explain any one FM demodulator Ckt. [16]

## UNIT - V

5. Draw DAM signal and its circuit diagram. [16]

**(OR)**

5. Define

   i) Natural sampling and

   ii) PWM signal generation. [16]

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