

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-197
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Microcontrollers & Applications
[OLD]

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Solve any three questions from each section
 2. Q.1 & Q.6 are compulsory.
 3. Assume suitable data if necessary
- Section A
- | | | |
|-----|--|----------|
| Q.1 | Solve the following | 10 |
| | <ol style="list-style-type: none"> a) What is the function of data pointer in 8051 microcontroller b) What is opcode & operand of an instruction. c) How the bit addressing is distinguished from byte addressing . d) What is the function of instruction decoder in 8086. e) Explain the function of AC flag. | |
| Q.2 | <ol style="list-style-type: none"> a) Explain the memory organization of 8051 microcontroller. b) Draw & explain programming model of 8086 microprocessor. | 08
07 |
| Q.3 | <ol style="list-style-type: none"> a) With suitable memory address, explain the operation of PUSH & POP instructions. b) What is the last instruction in interrupt service routine? How does it work? | 08
07 |
| Q.4 | <ol style="list-style-type: none"> a) Explain in detail TCON special function Register of 8051. b) Explain the stack & the stack pointer of 8051. | 08
07 |
| Q.5 | Write a short note on <ol style="list-style-type: none"> a) Subroutines b) Logical instructions of 8051 c) Overview of 8051 microcontroller family . | 15 |

Section – B

- Q.6 Solve the following 10
- a) What is the use of internal RAM in 8051?
 - b) What is the priority of interrupts?
 - c) What is vectored & non- vectored interrupt.
 - d) Explain the function of $\overline{INT0}$ & $\overline{INT1}$ of microcontroller 8051.
 - e) What are assembly directives? Explain any two.
- Q.7 08
- a) Write a program to toggle. LED's at port 1.
 - b) Explain with neat block – diagram Timer/ counter operation in mode2 07
- Q.8 08
- a) Explain in detail types of serial data communication.
 - b) Draw the interfacing of stepper motor with microcontroller 8051. Write a program to rotate the stepper motor continuously by step angle 1.8° . 07
- Q.9 08
- a) Explain detail how the timing operation is performed in 8051 microcontroller.
 - b) Explain in detail interrupt structure & 8051. 07
- Q.10 Write a short notes on 15
- a) Keyboard interfacing
 - b) Port 0 of 8051 microcontroller
 - c) Use of timer as counter.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-162
FACULTY OF SCIENCE AND TECHNOLOGY
T.E (EEP/EE/EEE)
Testing and Maintenance of Electrical Equipment
(Old)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Q.No.1 and 6 are compulsory.
2. Solve any two questions from each section from remaining.
3. Assume suitable data if required.

Section A

- | | | |
|-----|--|----------|
| Q.1 | a) Define the terms
1) Testing
2) Maintenance
3) Tolerance | 06 |
| | b) Match the pairs
i) Reduced voltage running up test
ii) Polarity test
iii) Dielectric strength test
iv) Impregnation | 04 |
| | a) Transformer
b) Pouring in cavity
c) Induction motor
d) Insulating oil | |
| Q.2 | a) What is ISS and write its significance.
b) What are the different types of testing? Write the significance of testing. | 07
08 |
| Q.3 | a) Classify maintenance. Explain giving example in each case.
b) What is TPM? Explain with example. | 08
07 |
| Q.4 | a) Explain heat run test on a transformer with supporting neat sketches.
b) Explain any one type test conducted on rotating machine with neat sketches. | 07
08 |
| Q.5 | a) What is the importance of polarity test on 1- ϕ transformer? Explain the procedure for terminal marking.
b) With neat circuit diagram explain regenerative method of testing on rotating machine. | 07
08 |

Section B

- Q.6 Attempt any five 10
- 1) Which material is used to manufacture brushes for motor and why?
 - 2) State the function of capacitor in 1- ϕ induction motor.
 - 3) What is the effect of core saturation?
 - 4) What are the effects of bent shaft of the rotor of an induction motor?
 - 5) What is the significance of ultra-sonic testing?
 - 6) Which equipment is used to locate the blow holes present on machine body?
 - 7) What are the possible reasons if the motor is not supplying the power with full load capacity?
- Q.7 a) Explain the process of vacuum impregnation with neat diagram. 08
b) What are the testing methods for testing the jammed bearings? Explain. 07
- Q.8 a) With the neat sketch explain the method of measuring insulation resistance by using megger. 08
b) What do you mean by duty cycle? What are the parameters deciding the duty cycle? 07
- Q.9 a) Draw the block diagram indicating working of industrial sonography and explain working of each block. 08
b) Explain the working of vibration measuring machine (E.M. swinging) 07
- Q.10 Write short note on any three 15
- i) Dynamic balancing of induction motor
 - ii) High voltage with stand test
 - iii) Detection of internal cracks
 - iv) Acidity test

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-127
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Power Electronics
(OLD)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Q.No.1 and Q.No.6 are compulsory.
 2. Solve any two questions from remaining from each section
 3. Assume suitable data, if required.
 4. Draw appropriate wave form if required.
- Section A
- Q.1 Solve any five 10
- a) Draw the output characteristics of 'n' channel enhancement MOSFET.
 - b) Give the comparison between GTO and SCR.
 - c) Compare circulating and non-circulating current mode of dual converter.
 - d) Define the term gate recovery time.
 - e) State the performance parameters of controlled rectifier.
 - f) What are the difference between fully controlled and half controlled rectifiers?
 - g) What is meant by step up and step-down chopper.
 - h) What are advantages of dual converter?
- Q.2 07
- a) Draw and explain the dynamic turn-on and turn off characteristics of SCR.
- 08
- b) A 3 – \emptyset half wave converter is operated from a 3 – \emptyset star connected 220V, 50 Hz supply and load resistance of 10 ohms. If the average output voltage is 25% of maximum possible average voltage. Calculate delay angle, RMS and Average output currents, average and RMS SCR current, input power factor.
- Q.3 07
- a) Explain with neat circuit diagram and wave forms operation of single phase half wave controlled rectifier with effect of free-wheeling diode.
- 08
- b) A 3 – \emptyset phase half wave controlled rectifier supplying a constant load current of 30A. operated from three phase 400 (line) supply. Find the average load voltage at firing angle 45° . What value of current and peak reverse voltage rating will the thyristor require?
- Q.4 07
- a) What is dual converter? Explain the basic principle of operation of ideal dual converter.
- 08
- b) Explain principle of operation of time control and current limit control strategies for chopper circuit.
- Q.5 Write short notes. 07
- a) Working of 3 – \emptyset fully controlled bridge rectifier.
- 08
- b) Explain the pwm and fm techniques used for chopper control.

Section B

- Q.6 Solve any five 10
- a) Define modulation index of pwm inverter.
 - b) Application and limitations of cyclo converter.
 - c) What are the advantages of switch mode converter over chopper?
 - d) What are the effects of chopping frequency on filter sizes?
 - e) What do you mean by switch mode converter?
 - f) Give the classification of inverters.
 - g) Why thyristor are not preferred for inverters
 - h) What is the difference between fly back and forward converter?
- Q.7 07
- a) Prove that the average output voltage of step up chopper is given by $V_0 = \frac{V_{dc}}{1-\alpha}$
 Where $V_{dc} = \text{supply (dc)voltage}$
 $\alpha = \text{duty ratio}$
- b) A chopper circuit supplied from 80V dc battery, supplies a R-L load with L=40mH and R=6Ω. The load has freewheeling diode across it. It is required to vary to load current between 10 A and 12 A. calculate the time ratio chopper. 08
- Q.8 07
- a) What are the draw backs of square wave inverter? What are the techniques used to overcome draw backs of square wave inverter?
- b) Explain with neat circuit diagram and wave from the operation of single phase half bridge VSI with R-L load. 08
- Q.9 07
- a) State different methods of pulse width modulation techniques used in inverter explain any one in detail.
- b) Explain the control techniques for output voltage of chopper. 08
- Q.10 07
- a) With neat circuit diagram and waveform explain the operation of single phase cyclo converter.
- b) Write short note on working principle of single half wave AC-AC voltage controller. 08
 Supply a resistive load and derive the average load voltage.

Total No. of Printed Pages:03

SUBJECT CODE NO:- H-107
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Electrical Machine Design
(OLD)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q. No. 1 and Q. No. 6 are compulsory.
 2. Attempt any two questions from remaining questions of each section A and B.
 3. Assume suitable data wherever necessary.

Section A

- Q.1 Attempt any five. 10
- a) What do you mean by Electrical Machine Design?
 - b) Enlist different design circuits of electrical Machines.
 - c) What do you mean by gap Contraction Factor?
 - d) Define specific Magnetic loading.
 - e) Enlist the various design limitations.
 - f) What do you mean by rating of rotating machine?
- Q.2 07
- a) Explain governing factors and limitations in designing electrical machines.
 - b) The stator of a machine has a smooth surface but its rotor has open type of slots with slot width $W_s = W_t = 12mm$, where W_t is tooth width. Length of air gap $l_g = 2mm$, find effective length of air gap if carter's coefficient $= \frac{1}{1+519 W_s}$. There are no radial ducts. 08
- Q.3 07
- a) Explain in detail various types of slot used in stator of 3-phase induction motor.
 - b) Determine the main dimensions, no of ventilating ducts, no of stator slots of 3.7kw, 400v, 3- phase, 4 pole, 50Hz squirrel cage induction motor to be started by star delta starter. Assume average flux density in the gap $= 0.45wb/m^2$, ampere conductors per meter = 23000, efficiency = 0.85 and power factor = 0.84 winding factor = 0.955, stacking factor = 0.9. 08
- Q.4 07
- a) Explain the factors affecting length of air gap in 3 phase induction motor.
 - b) During the stator design of 3 phase 30kw, 400v, 6 pole, 50Hz, squirrel cage induction motor following information has been obtained. Gross length of stator = 0.17m
 Internal diameter of stator = 0.33m
 Number of stator slots = 45
 Number of conductors per slot = 12
 Based on above data design a suitable cage rotor for above motor. 08

- Q.5 Attempt any three 15
- Design of heating coil
 - Carter's coefficient and its significance.
 - Design of endring of 3-phase induction motor.
 - Choice of specific loading in 3-phase induction motor.
 - Unbalanced magnetic pull and its estimation in induction motor.

Section B

- Q.6 Solve any five. 10
- Define heating code of transformer.
 - Explain the causes of temperature rise in transformer.
 - What is the function of yoke in transformer?
 - What do you mean by stacking factor?
 - What type of mechanical force developed in transformer winding?
 - What are the different modes of heat dissipation in electrical machines?

- Q.7 07
- Derive output equation of 3-phase transformer. 07
 - A 3 phases, 50Hz, oil cooled core type transformer has following dimensions. 08
 Distance between core centers = 0.2m
 Height of window = 0.24m
 Diameter of circumscribing circle = 0.14m
 Maximum flux density = 1.25 wb/m^2
 Current density $\delta = 2.5 \text{ A/mm}^2$
 Estimate the KVA rating. Assume window space factor = 0.2 and $A_i = 0.56d^2$ for 2 stepped core.

- Q.8 08
- Give in detail the design steps for LV and HV winding design of transformer. 07
 - Estimate the main core dimensions for 50Hz, 3- phase, 200 KVA, 6600/500 V star delta core type transformer, use the following data. 08
 4- stepped core for which area factor = 0.62
 Window space factor = 0.27
 $\frac{H_w}{W_w} = 2$, current density = 2.8 A/mm^2
 volts per turn = 8.5, Maximum flux density = 1.25 Wb/m^2

- Q.9 07
- Derive the expression for calculation of no. of cooling tubes provided on surface of transformer tank. 07
 - A 250 KVA, 6600/400V, 3 phase core type transformer has a total loss of 4800 watts at full load. The transformer tank is 1.25m height and $1 \text{ m} \times 0.5 \text{ m}$ in plan. Design a suitable scheme for tubes if average temp. Rise is to be limited to 35°C . The diameter of tube is 50mm and are spaced 75mm from each other. The average height of tube is 1.05m. Specific heat dissipation due to radiation and convection is respectively 6 and $6.5 \text{ W/m}^2\text{C}$. Assume that convection is improved by 35 percent due to provision of tubes. 08

Q.10 Attempt any three

- a) Cooling methods employed in transformer.
- b) Explain selection of winding used for transformer design.
- c) Explain design of choke.
- d) Explain the choice of maximum flux density and current density in design of transformer.

15

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-269
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Energy Conservation & Audit
(Old)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i) Q.No.1 and Q.No.6 from are compulsory.
 - ii) Attempt any two from remaining question from each section.
 - iii) Assume suitable data if required.
- Section A
- Q.1 Solve any five. 10
- a) What are different greenhouse gases? List out it.
 - b) Define energy audit.
 - c) What is second law of thermodynamics.
 - d) Draw schematic diagram for bottoming cycle co-generation.
 - e) What is Emission trading?
 - f) What is meant by Global-warming potential.
 - g) Define “Ton” of refrigeration.
 - h) What is meant by Evaporation ratio in case of steam boiler.
- Q.2
- a) What are the duties and responsibilities of Energy-manager as per the Energy- conservation Act-2001? 07
 - b) Explain various step involved in carrying out Energy-audit with one example. 08
- Q.3
- a) What are major heat losses in boiler? Give energy efficiency opportunities in Boilers. 07
 - b) Explain the steps to calculate boiler efficiency by indirect method. 08
- Q.4
- a) What is co-generation and with the help of diagram. Explain. 07
 - i. Back pressure turbine
 - ii. Extraction condensing turbine co-generation system
 - b) Explain waste heat recovery system in detail. 08
- Q.5 Write short notes on any three. 15
- a) CDM and its objectives
 - b) Energy manager
 - c) Energy audit in HVAC system
 - d) Energy sustainable development

Section B

- Q.6 Attempt any five. 10
- Define power factor and write the specification for power factor improvement capacitor.
 - What is DSM? How does it help in Energy management?
 - For lighting system, define room index.
 - Define harmonics.
 - What is PI?
 - What are the different methods of financial Evaluation?
 - How will you calculate discount factor?
 - What is IRR?

- Q.7 07
- Explain in detail the importance by power factor in energy conservation program. 07
 - Explain simple pay-back period method. 08

- Q.8 07
- Which points we want to consider to made motor more energy efficient. 07
 - A proposed energy improvement project requires an initial investment of Rs 5,00,000/- and 08 generates cash flows as. 08

Year	Savings
1	1,20,000
2	1,15,500
3	1,30,000
4	1,16,500
5	1,17,250
6	2,00,000

Calculate the NPV of proposal at the discount of 11%.

- Q.9 15
- Explain detail the procedure to carry out Energy audit in thermal plant mention the instruments used. 15

- Q.10 Write short notes on any three. 15
- APFC
 - ISO 5000/- Energy management system
 - E.A. 2003 of Energy sector reforms
 - Electricity tariff-applicable to industrial consumers

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-297
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Special Purpose Electrical Machines
(Old)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Q.1 and Q.6 are compulsory.
 2. Solve any two questions from each section A and section B.
- Section - A
- Q.1 Solve any five: 10
- a) Draw the equivalent circuit of self excited induction generator.
 - b) Write the minimum angle of step available in stepper motor.
 - c) What is meant by “Axial Air gap”?
 - d) Why fractional horse power motors used in day to day life?
 - e) Write two application of switched reluctance motor.
 - f) What are the advantages of BLDC motor?
- Q.2 a) What do you mean by DFIG? Explain its operation in generation mode. 07
- b) Explain different methods of voltage control in induction generator. 08
- Q.3 a) Explain the construction and working of hybrid stepper motor. 07
- b) Describe the construction and working of Linear Induction motor. 08
- Q.4 a) Explain the construction and working of BLDC motor. 07
- b) Explain operation and construction of PMSM motor and what are the application of it. 08
- Q.5 Write short note on following. 15
- a) Features of functional horse power synchronous motor.
 - b) Self excitation requirement of induction generator.
 - c) Synchronous reluctance motor.

Section – B

- Q.6 Solve any five: 10
- a) What is buck boost transformer?
 - b) What are the special applications of dielectric heating?
 - c) What type of electric supply suitable for arc welding?
 - d) State faraday's first law of electrolysis.
 - e) Define current efficiency in electrolytic process.
 - f) What are the applications of electrolysis?
- Q.7 a) What is isolation transformer, explain different application of it in detail. 07
- b) Discuss with neat sketch, the working of Ajax vertical core type induction furnace. 08
- Q.8 a) Explain various methods of electric resistance welding. Give its merits and demerits. 07
- b) Explain TIG welding process in detail. 08
- Q.9 a) Describe with suitable diagram the principle of electrolysis. 07
- b) What is the principle of electro deposition? State and explain the factors on which the quality of electro deposition depends. 08
- Q.10 Write short note on following: 15
- a) Welding transformer
 - b) Advantages of electric heating
 - c) Manufacture of chemicals.

Total No. of Printed Pages: 02

SUBJECT CODE NO:- H-318
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EE/EEP/EEE)
Electromagnetic Fields
(Old)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

N. B

- 1) Q. No. 1 and Q. No. 6 are compulsory.
- 2) Attempt any two questions from Q. No. 2 to Q. No. 5
- 3) Attempt any two questions from Q. No. 7 to Q. No. 10
- 4) Assume suitable data wherever necessary.

Section A

- Q. 1 Attempt any five questions:- 10
- a) Give the spherical co-ordinates of point p (1,2,3).
 - b) What do you mean by divergence?
 - c) Two vector, $\vec{A} = 2\hat{a}_x + 3\hat{a}_y - 4\hat{a}_z$ and $\vec{B} = 8\hat{a}_x + 12\hat{a}_y - 3\hat{a}_z$
Find their vector product.
 - d) Define electric dipole and dipole moment. State its unit.
 - e) State Gauss Law. What do you mean by Gaussian surface?
 - f) What do you mean by del operator?
 - g) Define potential gradient.
 - h) State the significance of dot product.
- Q. 2 a) To derive the expression for electric field intensity due to infinite line charge. 07
b) Given vector $r_A = -\hat{a}_x - 3\hat{a}_y - 4\hat{a}_z$ and $r_B = 2\hat{a}_x + 2\hat{a}_y + 2\hat{a}_z$ and C(1,3,4). 08
Find i) R_{AB} ii) $|r_A|$ iii) \hat{a}_A iv) unit vector directed from C towards A.
- Q. 3 a) State and explain divergence theorem. 07
b) Given $\vec{D} = \frac{5r^2}{4} \hat{a}_r$ C/m² in spherical co-ordinate system. Evaluate both sides of divergence theorem for the volume enclosed by r=4m $\theta = \frac{\pi}{4}$ radians. 08
- Q. 4 a) Show that $\vec{E} = -grad. V$. 07
b) A point charge of 10nc is placed at the origin, while another point charge of 8 nc is placed at (2,3,4). Find the potential at point (-1, 2,-3). 08
- Q. 5 a) Derive the point form of continuity equation of current. 07
b) A current density $\vec{J} = \frac{100 \cos\theta}{r^2+1} \hat{a}_r$ A/m² in spherical co-ordinate system. 08
i) How much current flows through the spherical cap r=3 m, $0 < \theta < \frac{\pi}{6}$, $0 < \Phi < 2\pi$.
ii) Same current flows through the cap r=10 m, $0 < \theta < \alpha$, $0 < \Phi < 2\pi$. Find α .

Section B

- Q. 6 Attempt any five :- 10
- State Biot Savart Law.
 - State the properties of perfect metallic conductor.
 - Compare self and mutual inductance.
 - Define Scalar Magnetic Potential.
 - Define Magnetization and its unit.
 - What is significance of displacement current?
 - Define Magnetic field intensity and its unit.
 - State Amperes Circuital Law.
- Q. 7 a) Derive an expression for magnetic field intensity due to infinite long current carrying filament at any point P in free space. 07
- b) Find the incremental contribution ΔH to magnetic field intensity at the origin caused by current element in free space $I \cdot \Delta L$ equal to $3\pi \hat{a}_z$ nA/m located at (3,-4,0). 08
- Q. 8 a) Explain Force between Differential current elements. 07
- b) A point charge of $Q = -1.2C$ has velocity $\vec{v} = 5\hat{a}_x + 2\hat{a}_y - 3\hat{a}_z$ m/s. Find the magnitude of the force exerted on the charge if
- $\vec{E} = -18\hat{a}_x + 5\hat{a}_y - 10\hat{a}_z$ V/m
 - $\vec{B} = -4\hat{a}_x + 4\hat{a}_y + 3\hat{a}_z$ T
- Q. 9 a) Derive the expression for boundary conditions between the perfect dielectric materials. 07
- b) Evaluate closed line integral of H about the rectangular path. $P_1(2,3,4)$ to $P_2(4,3,4)$ to $P_3(4,3,1)$ to $P_4(2,3,1)$ to P_1 Given $\vec{H} = 3z\hat{a}_x - 2x^3\hat{a}_z$ A/m 08
- Q. 10 Attempt any three. 15
- Explain uniqueness theorem.
 - State and explain Stokes theorem.
 - Explain Magnetic dipole moment and Magnetization.
 - Show that $\vec{\nabla} \times \vec{H} = \vec{J}_C + \vec{J}_D$

Total No. of Printed Pages: 3

SUBJECT CODE NO:- H-353
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Control System Engineering
(OLD)

[Time: Three Hours]

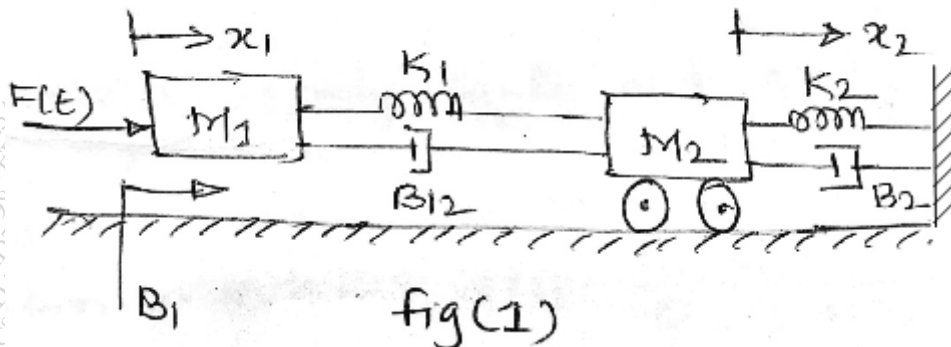
[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Q.no. 1 and Q.no.6 are compulsory.
 2. Solve any two from remaining questions from sections A and section B
 3. Use suitable data if necessary.

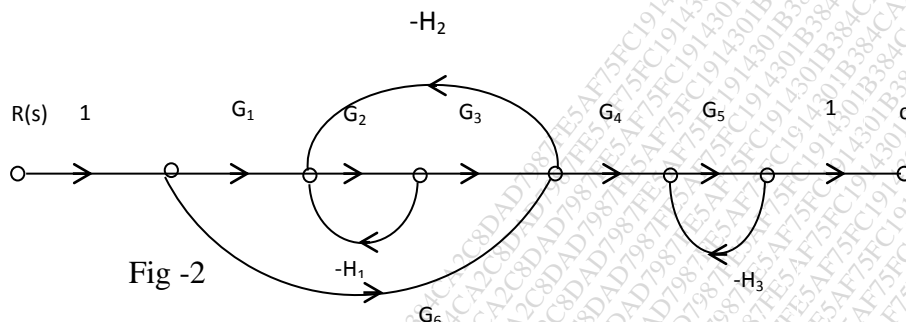
Section - A

- Q. 1 a) Solve any five 10
- a) Define open loop and closed loop control system
 - b) Define the term transfer function
 - c) What is signal flow graph?
 - d) What are parameters of time domain specification
 - e) Define steady state errors.
 - f) Define the term absolute and Relative stability.
- Q. 2 a) Write the differential equations governing the mechanical system shown in fig(1). Draw force voltage electrical analogous circuit and verify by writing mesh and node equation 08



- b) Explain closed loop and open loop control system with suitable example. 07

Q. 3 a) Find overall transfer function of system whose signal flow graph is shown in fig(2) 08



b) Explain block reduction technique rule in detail. 07

Q. 4 a) Derive the expression for i) peak time (t_p) and ii) Peak overshoot (M_p) for a given under damped second order system 08

b) Derive the expression for under damped second order system for a step input. 07

Q. 5 a) Explain steady state and static error constant. 07

b) For servo mechanism with open loop transfer function $G(s) = \frac{20(s+2)}{s(s+1)(s+3)}$, explain what type of input signal give rise to a constant steady state error and calculate their values. 08

Section -B

Q. 6 Answer any five 10

- a) Define Root locus?
- b) What is Asymptotes? Write the formula to calculate asymptotes.
- c) How to calculate angle of departure and angle of arrival.
- d) Define the term gain margin and phase margin.
- e) What do you mean by bode plot
- f) Define the term state space and state variable.

Q.7 Sketch root locus of the system whose open loop transfer function is $G(s) = \frac{K}{s(s+2)(s+4)}$ find the value of 'K' so that the damping ratio of the closed loop system is 0.5. 15

Q.8 Plot Bode diagram for the following transfer function and obtain the gain and phase cross over frequencies 15

$$G(s) = \frac{10}{s(1 + 0.45s)(1 + 0.15s)}$$

- Q.9 a) Obtain transfer function of a system described by. 08

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$x(o) = \begin{bmatrix} 1 \\ 1 \end{bmatrix} y = [1 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- b) Determine the state transition matrix for the system 07

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

Where $u > 0$

- Q.10 a) Test for controllability and observability of the system described by 07

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 1 & 1 \\ -3 & -2 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u, y = [1 \quad 0]$$

- b) Given a system 08

$$\dot{X}(t) = Ax(t) + B \cdot u(t), y(t) = ex(t)$$

where

$$A = \begin{bmatrix} 0 & 1 \\ -1 & -3 \end{bmatrix} B = \begin{bmatrix} 1 \\ 2 \end{bmatrix} C = [1 \quad 1]$$

Determine the state and output controllability

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-387
FACULTY OF SCIENCE & TECHNOLOGY
T.E. (EEP/EE/EEE)
Microprocessor & Interfacing
(OLD)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q. No.1 & Q. No.6 are compulsory.
 - 2) Solve any two questions from the remaining question for each section.
 - 3) Assume suitable data & addresses if necessary.

Section – A

- | | | |
|-----|---|----|
| Q.1 | Attempt any five questions. | 10 |
| | (a) What is ALU? | |
| | (b) Define machine cycle. | |
| | (c) Define opcode & operand. | |
| | (d) What is function of DAA instructions? | |
| | (e) Enlist different Addressing modes. | |
| | (f) Define T-State. | |
| Q.2 | (a) Explain the architecture of microprocessor 8085. | 08 |
| | (b) Write a program to perform addition of two 8-bit numbers and run it | 07 |
| Q.3 | (a) Explain flag register of 8085. | 08 |
| | (b) Write a 8085 ALP to generate a accurate time delay of 100ms. | 07 |
| Q.4 | (a) Enlist data transfer instructions of 8085 & explain any four in detail. | 08 |
| | (b) Write a program to add ten data bytes. Data is stored in memory locations starting from C300H. Result is - 16 bit. Store the result from D200H. | 07 |
| Q.5 | Write short note on (any three) | 15 |
| | (a) Features of Intel 8085 | |
| | (b) Interrupts of 8085 | |
| | (c) Stack & Subroutine | |
| | (d) PIN diagram of 8085 microprocessor | |

Section – B

- | | | |
|-----|--|----|
| Q.6 | Solve any five questions. | 10 |
| | (a) Explain the function of 8279. | |
| | (b) Draw control word format of 8255. | |
| | (c) Define I/O mapped I/O mode. | |
| | (d) What is the use of 8251 USART? | |
| | (e) What are the signals used by the DMA controller? | |
| | (f) Draw block diagram of 8253 PIT. | |

- Q.7 (a) Explain block diagram of 8253 PIT. 08
 (b) Draw the interfacing Diagram to interface two LED's to 8085 through 8255, such that when LED₁ is ON at that time LED₂ is OFF and viceversa. 07
- Q.8 (a) Explain in detail I/O mode of 8085. 08
 (b) Explain in detail architecture of 8255 PPI. 07
- Q.9 (a) Draw the interfacing diagram of stepper motor with 8085 using 8255. Write ALP to rotate it in clockwise direction. Assume delay subroutine is available at "Delay". 08
 (b) Explain block diagram of 8279 in detail. 07
- Q.10 Solve any three 15
 (1) DC motor speed control
 (2) MP based protective relays
 (3) Mode 2 of 8253
 (4) Measurement of power factor using 8085

Total No. of Printed Pages: 3

SUBJECT CODE NO:- H-422
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Power systems Analysis
(OLD)

[Time: Three Hours]

[Max. Marks: 80]

Please check whether you have got the right question paper.

- N.B
1. Questions No.1 and questions no.6 are compulsory
 2. Attempt from each section any two questions from the remaining questions.
 3. Assume suitable data wherever necessary.

Section - A

- Q. 1 Solve any five questions of the following 10
- a) What are components of power system
 - b) What is admittance matrix
 - c) Define terms i) oriented graph ii) Link
 - d) If the reactance in ohms is 15Ω . find P.U value of base of 15MVA, 10KV.
 - e) What do you mean by PQ bus
 - f) What are advantages of per unit computations
 - g) What is need of base values
 - h) Define per unit value.
- Q. 2 a) Explain the impedance diagram. 07
- b) Figure 1 shows the single line diagram of a system the transformer ratings, generator rating line impedance and load impedance are shown in figure. Choosing 100MVA. Base and 220 KV as base voltage for line draw impedance diagram 08

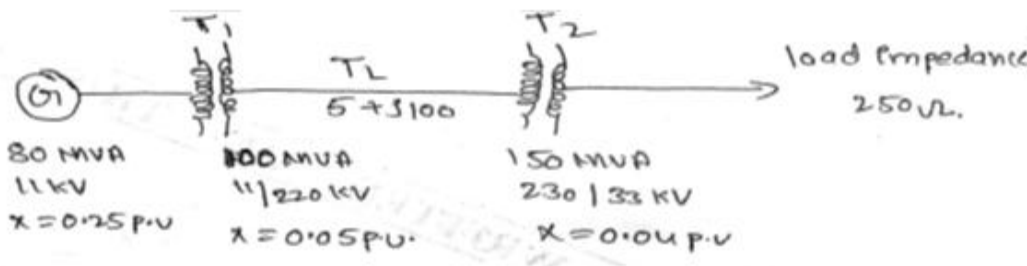


Fig-1

- Q. 3 a) Prove that $y_{Bus} = A^T yA$ 07
- b) For the power system shown in fig.2 find A, \bar{A} and B 08

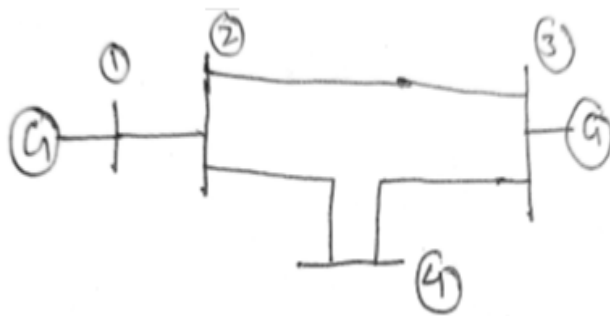
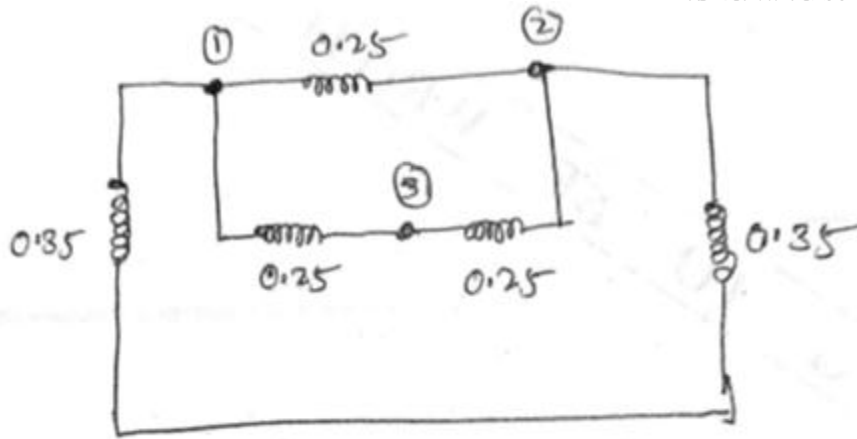


Fig-2

- Q. 4 a) Explain step by step procedure for N-R method of load flow studies. 07
 b) Derive an expression for symmetrical components of currents $I_s = A^{-1}I_p$. 08
- Q.5 a) Explain the selection of circuit breakers. 07
 b) Derive an expression for symmetrical components of $V_s = A^{-1}V_p$. 08

Section -B

- Q.6 Solve any five questions of the following 10
 a) What is sequence operator?
 b) Define maximum momentary current.
 c) List the various shunt and series faults.
 d) What is difference between L-L and L-L-G fault?
 e) Classification of faults.
 f) What is need for short circuit studies?
 g) How symmetrical faults are analyzed.
 h) What are sequence impedance and the sequence network?
- Q.7 a) Explain the sequence impedance and network of synchronous machine. 07
 b) A generating station "A" has a short circuit capacity of 1000MVA. Another station "B" has a short circuit capacity of 650 MVA they are operating at 11kv. Find the short circuit MVA by taking 100MVA as base and 11kv as base values if station "A" and "B" are interconnected by a cable of 0.50 ohms reactance per phase Assume 3- ϕ fault at bus "A". 08
- Q.8 a) Explain Z Bus Building for Type 2 and Type -4 modification. 07
 b) Build Z Busby using ZBus algorithm for the network shown in figure below 08



- Q.9 a) Derive the expression for fault current for L-G fault and draw the sequence network. 07
- b) A 3- ϕ 11KV, 20 MVA generator with positive, negative and zero sequence reactance as 0.4 P.U, 0.4 P.U and 0.1 P.U respectively and is grounded through a reactance of 0.6 Ω calculate the fault current for a single line to grand fault. 08
- Q.10 a) Explain briefly the static security analysis at control centers. 07
- b) Explain the open conductor fault. 08

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-558
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Elective-II: Communication Engineering
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

1. Questions No.1 & 6 are compulsory.
2. Attempt any 2 from Q.No.2 to 5 & Q.7 to 10
3. Assume suitable data if required.

Section A

- | | | |
|-----|---|----|
| Q.1 | Attempt any five from following. | 10 |
| | <ol style="list-style-type: none"> a) What are the advantages of using modulation technique? b) Why high – frequency carrier needed in a communication system? c) How will you convert an analog signal into a digital signal? d) What are the basic modes of communication? e) Give the importance of multiplexing. f) Enlist the draw backs of optical fiber. | |
| Q.2 | a) Give the comparison between Analog modulation Digital modulation. | 07 |
| | b) Draw the block diagram of a communication system & explain the function of each block. | 08 |
| Q.3 | a) Draw the block diagram of FSK system & explain its working. | 07 |
| | b) Define the sampling process & explain its necessity in communication system. | 08 |
| Q.4 | a) What are the advantages of optical fiber communication? Explain in detail. | 07 |
| | b) Draw a block diagram of fiber optic communication system and describe the functions of each component. | 08 |
| Q.5 | Write short note on (any three) | 15 |
| | <ol style="list-style-type: none"> a) PSK b) Types of optical fibers c) TDM d) Concept of noise. | |

Section – B

- Q.6 Attempt any five 10
- a) Define Kepler’s third law.
 - b) What is satellite communication?
 - c) What is grid in communication system?
 - d) What is protocol? What are the protocols used in Remote energy meter?
 - e) What is optical network?
 - f) What is Real time data transmission?
- Q.7 07
- a) What are the parameters of orbit? Explain in detail.
 - b) Explain kepler’s laws of planetary notion in detail. 08
- Q.8 08
- a) What is a modulation? Describe modulation schemes for PLC. 08
 - b) Explain in detail communication in power distribution grid. 07
- Q.9 08
- a) Explain Zigbee in detail. 08
 - b) Discuss substation communication network in detail. 07
- Q.10 Write short note on 15
- a) Fiber optical networks
 - b) Satellite communications
 - c) Communication systems in power stations.

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-557
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Elective-II: Digital Electronics
(Revised)

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- i) Question nos. 1 & 6 are compulsory.
- ii) From the remaining, solve any two questions from each sections.
- iii) Figures to the right indicate full marks.
- iv) Assume suitable data wherever necessary.

Section A

- | | | |
|-----|---|----------|
| Q.1 | Solve any five from the following | 10 |
| | <ol style="list-style-type: none"> i) Define & explain 'Noise margin'. ii) Comment on 'Don't care conditions'. iii) Compare Demultiplexer & decoder. iv) What is Tri-State Logic? Explain. v) Compare SOP & POS. vi) What is multiplexer? List out the types. | |
| Q.2 | <ol style="list-style-type: none"> a) Design binary to gray code converter. b) Explain TTL logic in detail. | 08
07 |
| Q.3 | <ol style="list-style-type: none"> a) Simplify logic function using K-map $f(A,B,C) = \Pi_m(0,1,3,5) + d(4,6)$ b) Design a full-Subtractor using NAND gates only. | 08
07 |
| Q.4 | <ol style="list-style-type: none"> a) Design 32:1 multiplexer using 8:1 multiplexers. b) Explain parallel adder 7483 in detail. | 08
07 |
| Q.5 | Write short note on (any three) | 15 |
| | <ol style="list-style-type: none"> (a) Demultiplexer (b) ADC0808 (c) Demorgan's theorem (d) Boolean Algebra rules | |

Section – B

- | | | |
|-----|--|----|
| Q.6 | Solve any five question of the following | 10 |
| | <ol style="list-style-type: none"> a) Define Flip-Flop. What are the types of Flip-Flop? b) Define counter. What are the types of Counter? c) Explain Race- around condition d) Define shift register. What are the modes of shift register? e) Explain flash memory. f) Compare static RAM & dynamic RAM. | |

- Q.7 a) Explain Master slave J-K. Flip Flop. 08
 b) Explain SISO & PIPO with diagram. 07
- Q.8 a) Explain Moore & Mealy machines with an example. 07
 b) Design a 4 bit up counter using J-K flip flops. 08
- Q.9 a) How will you classify the memories? Also give the comparison between SRAM & DRAM 08
 b) Explain the Read operation of a memory with waveforms. 07
- Q.10 Write short note on (any three) 15
 (a) PAL
 (b) State Diagram & State Table
 (c) MOD-N Counter
 (d) Synchronous counter
 (e) Memory Organization

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-556
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Elective-II: Special Purpose Electrical Machines
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Q.1 and Q.6 are compulsory.
 - ii. Attempt any two questions from the remaining questions in each section.

Section A

- Q.1 Solve any five from the following. 10
- a) Why the generator is often called as an asynchronous generator?
 - b) Write the two applications of switched reluctance motor.
 - c) What are the main advantages of BLDC motor?
 - d) What is stepper motor?
 - e) Write the minimum angle of step, available in stepper motor.
 - f) Why fractional horse power motors are used in day to day life.
- Q.2 07
- a) Explain the self-excitation requirement in case of induction generator.
 - b) Explain construction, operating principle and working of BLDC motor. 08
- Q.3 07
- a) A single sided LIM has 98 poles and pole pitch is 500mm. the LIM is used to replace a conveyor movement. Determine linear synchronous velocity and the speed of moving platform in Km/h, if the frequency of supply is 50Hz. Take slip is 0.3.
 - b) Explain the permanent magnet synchronous motor (PMSM) in detail. 08
- Q.4 07
- a) Explain the construction and working of hybrid stepper motor.
 - b) Explain the construction, operating principle and working of synchronous reluctance motor. 08
- Q.5 Write short note on following 15
- a) Switched Reluctance motor.
 - b) Features of fractional horsepower synchronous motor.
 - c) Multi stack configuration of stepper motor.

Section B

- Q.6 Solve any five from following 10
- a) What is isolation transformer?
 - b) Define electric heating.
 - c) Define convection of heat.
 - d) What are the qualities of good weld?
 - e) State faraday's law of electrolysis
 - f) Give the classifications of electrical welding process.

- Q.7 a) Explain the welding transformer in detail. 07
 b) Explain with diagram, working of core type induction furnace. 08
- Q.8 a) What is dielectric heating? Explain the factors on which dielectric loss depends. 07
 b) Describe with neat sketches various methods of electric resistance welding. Give its merits and demerits. 08
- Q.9 a) Explain the factors affecting on electro – deposition. 07
 b) Describe in detail, the application of electrolytic process used for metal extraction. 08
- Q.10 Write short note on following. 15
 a) Isolation transformer
 b) TIG welding process.
 c) Manufacture of chemicals.

Total No. of Printed Pages: 03

SUBJECT CODE NO:- H-545
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Control System Engineering
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

N.B

- 1) Q.No.1 and Q.No.6 are compulsory.
- 2) Solve any two from remaining questions from each section.
- 3) Use suitable data if necessary.

Section A

Q.1 Solve any FIVE questions. 10

- a) Define open loop and closed loop control system.
- b) Define transfer function.
- c) What is the difference between types and order of system?
- d) Define settling line and Peak overshoot.
- e) What is velocity error coefficient?
- f) Define damping and damping ratio.

Q.2 a) For the mechanical system shown in fig.1. Derive the transfer function. Also draw the force voltage and force current analogous circuit. 08

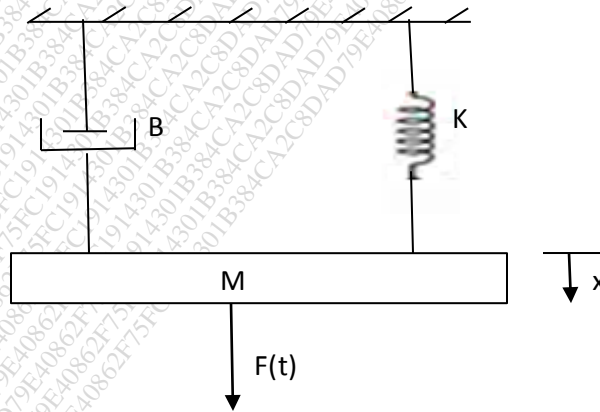
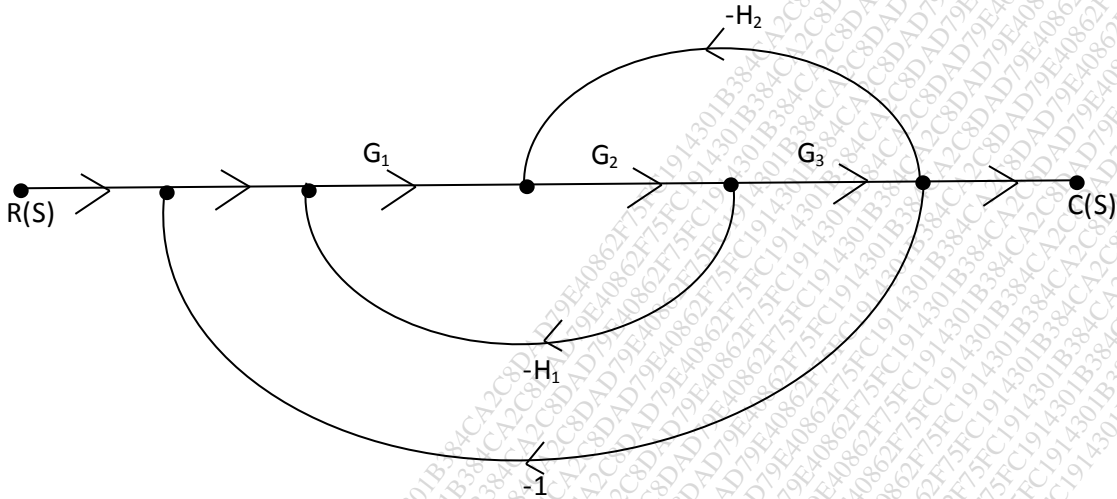
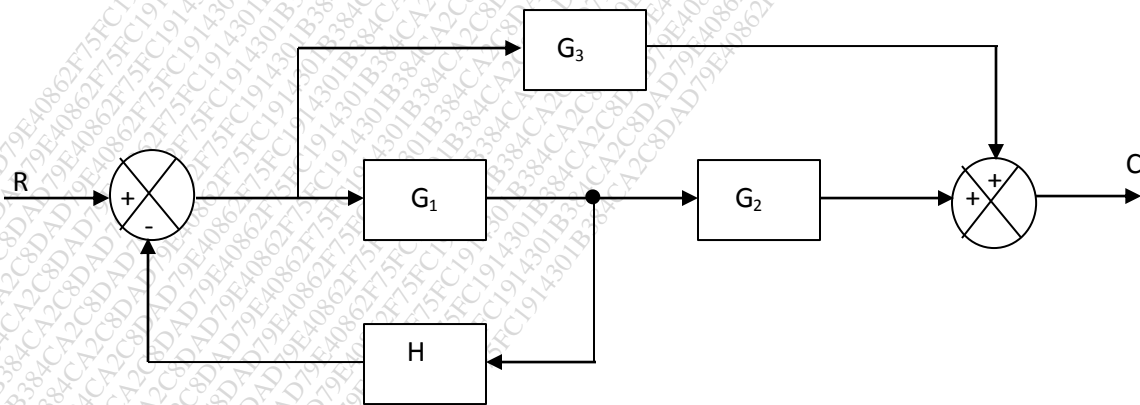


Fig. (1)

- b) Consider the system shown in fig.(2) obtain the transfer function using Mason's gain Formula. 07



- Q.3 a) Derive the expression and draw the response of the first order system for unit ramp input. 07
- b) Reduce the block diagram shown in fig (3) and find C/R. 08



- Q.4 a) Derive the expression for i) Peak time (t_p) ii) Peak overshoot (m_p). 08
- b) The open loop transfer function of a unity feedback system is $G(s) = \frac{4}{s'(s+1)}$, determine the nature of response of closed loop system for a unit step input also. Determine the rise time, peak time, peak overshoot & settling time. 07

- Q.5 a) Explain steady state and static error constant. 07
- b) The feedback system has open loop transfer function $G(S)H(S) = \frac{K.e^{-S}}{S'(S^2 + 5S + 9)}$, 08
 determine by use of Routh's criterion, the maximum value of 'K' for the closed loop system to be stable.

Section B

- Q.6 Answer any five:- 10
- What is root locus?
 - What do you mean by angle of departure?
 - What is centroid? How the centroid is calculated?
 - What is bode plot?
 - Define the term state. State vector.
 - What are asymptotes? Give the formula to calculate the angle of asymptotes.

- Q.7 Sketch Root locus for the unity feedback system whose open loop transfer function is 15
 $G(S) = \frac{K}{S(S+4)(S^2+4S+20)}$

- Q.8 Sketch bode plot for the following transfer function and determine the system 'K' for the gain 15 cross-over frequency to be 5 rad/sec. 15
 $G(S) = \frac{K S^2}{(1+0.2S')(1+0.02S')}$

- Q.9 a) Obtain Transfer function of a system, described by, 08

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$$

$$x(0) = \begin{bmatrix} 1 \\ 1 \end{bmatrix} \quad y = [1 \quad 0] \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$$

- b) Determine the state transition matrix for the system. 07

$$\begin{bmatrix} \dot{X}_1 \\ \dot{X}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} X_1 \\ X_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u \quad \text{where } u > 0$$

- Q.10 a) Explain controllability and observability. 07

- b) Explain the effect of addition of poles and zeros on root locus. 08

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-538
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Electromagnetic Fields
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- i. Que. No. 01 & Que no. 06 are compulsory.
 - ii. Attempt any two questions from remaining questions of each section.
 - iii. Assume suitable data wherever necessary.

Section A

- Q.1 Attempt any five. 10
- a) Define current density.
 - b) Given points $P(-3, -3, 5)$ & $Q(2, 6, -4)$ in Cartesian coordinate system. Find distance form P & Q.
 - c) State Gauss law.
 - d) Define Del operator.
 - e) Define convection current.
 - f) Define electric flux & flux density.
 - g) Find volume of closed surface bounded by $0 \leq x \leq 2, 0 \leq y \leq 1$ & $0 \leq z \leq 5$.
- Q.2
- a) Give the Cartesian coordinates of vector field $\vec{H} = 20\hat{a}_r - 10\hat{a}_\phi + 3\hat{a}_z$ at point $(5, 2, -1)$ 07
 - b) Derive the expression for electric field intensity due to line charge located along z-axis of infinite extend. 08
- Q.3
- a) Find the divergence of \vec{A} at $P(5, \pi/2, 1)$ where $\vec{A} = r z \sin \phi \hat{a}_r + 3r z^2 \cos \phi \hat{a}_\phi$. 07
 - b) State & explain Gauss law. Define Gaussian surface. 08
- Q.4
- a) Derive the relation between electric current, current density & volume charge density. 07
 - b) Given the potential $V = 10(x^2 + xy)$ & a point $P(2, -1, 3)$ on a conductor to free space boundary find V, E & \vec{D} at point P. 08
- Q.5
- a) Define Dielectric & Conductor & explain properties of dielectric materials. 07
 - b) Derive the expression for potential due to point charge. 08

Section B

- Q.6 Attempt any five. 10
- Define magnetic flux density.
 - Define self-inductance.
 - Define magnetic dipole moment.
 - State Poisson's equation for magnetic field.
 - State Biot-Savart law.
 - Define vector magnetic potential.
 - Define displacement current.
- Q.7 a) State & explain Biot – Savarts law. 07
- b) Given the general vector $\vec{A} = (\sin 2\theta) \hat{a}_\theta$ in cylindrical Co – ordinates. Find curl of \vec{A} at point $P (2, \pi/4, 0)$. 08
- Q.8 a) Derive the boundary conditions at the interface between two different magnetic materials. 07
- b) The magnetic field $\vec{B} = 3.5 \times 10^{-2} \hat{a}_z$ exerts a force on a 0.3m long conductor on x-axis. If current of 5A flows in $-\hat{a}_x$ direction. Determine what force must be applied to hold conductor in position. 08
- Q.9 a) Drive the expression for Maxwell's equation in integral form in magnetic field. 07
- b) Derive the expression for retarded potential. 08
- Q.10 Write a short note on. 15
- Lorentz force
 - Magnetization of magnetic material
 - Magnetic dipole

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-531
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Microprocessors And Interfacing
(Revised)

[Time: Three Hours]

[Max.Marks:80]

Please check whether you have got the right question paper.

- N.B
- 1) Q.No.1 & Q.No.6 are compulsory.
 - 2) Attempt any two questions from the remaining questions in each section.
 - 3) Assume suitable data & address if necessary.

Section A

- Q.1 Solve any five questions:- 10
- a) Define T-State & machine cycle.
 - b) Give functional categories of 8085 instruction.
 - c) Give the difference between JZ & JNZ.
 - d) What is opcode & operand?
 - e) What is the function of instruction register?
 - f) Write the need of ALE signal in 8085.
 - g) What is the function of accumulator?
 - h) What is an ALU?
- Q.2 a) Define fetch, decode and execute? And explain the terminologies used in microprocessor. 07
- b) With a neat diagram explain the memory interfacing. 08
- Q.3 a) Explain the addressing modes of 8085 microprocessor. 07
- b) With suitable examples explain 8085 instruction set in detail. 08
- Q.4 a) Explain 8085 stack in detail. 07
- b) Draw and explain brief the flag register of 8085. 08
- Q.5 a) Draw the internal architecture of 8085 and explain the function of each block in brief. 10
- b) Write a short note of concept of looping. 05

Section B

- Q.6 Solve any five questions: 10
- Write the control signals used in 8255 PPI.
 - Mention the purpose of SID & SOD.
 - What is USRAT?
 - What are the modes of operations used in 8253?
 - Write features of 8255.
 - Define ADC & DAC.
 - What are the output signals used in 8259?
 - What are the functions performed by 8251?
- Q.7
- Write a program to generate a time delay of 5msec using 8253. Assume clock frequency 07 1MHz.
 - Draw the interfacing diagram of stepper motor and write ALP to rotate through 90° anticlockwise direction. 08
- Q.8
- Draw the functional pin diagram of 8259 and explain each pin function. 07
 - Explain the block diagram of 8251 USART in detail with a neat diagram. 08
- Q.9
- Explain the architecture of 8257 with neat diagram. 07
 - Explain the block diagram of 8279 keyboard/display interface and its operation. 08
- Q.10 Write a short note on: 15
- ADC 0809 & DAC 0808 interface.
 - 8253 modes of operation
 - Interrupts of 8085

Total No. of Printed Pages:3

SUBJECT CODE NO:- H-524
FACULTY OF SCIENCE AND TECHNOLOGY
T.E.(EEP/EE/EEE)
Power System Analysis
(Revised)

[Time: Three Hours]

[Max.Marks:80]

N.B Please check whether you have got the right question paper.

- i) Question No. 1 and Question No. 6 are compulsory.
 ii) Attempt from each section any two Questions.
 iii) Assume suitable data wherever necessary.

Section A

- Q.1 Solve any five question from the following 10
- a) What is the need of per unit System?
 - b) What are different types of load buses?
 - c) What is need of slack bus?
 - d) A generator rated at 30 MVA, 11KV has a reactance of 20%. Calculate its P. U. reactance for a base of 50 MVA and 10 KV.
 - e) What is impedance and reactance diagram?
 - f) Why is load flow study necessary?
 - g) What are advantages of P. U. System?
 - h) Define terms i) Oriented graph
 ii) Tree
 iii) Co-tree
 iv) Link

- Q.2 a) Derive the Expression for per unit impedance referred to base value. 07
 b) Draw the per unit reactance diagram for 3-Ø system shown in figure-1. Use base of 20 MVA and 66 KV. 08

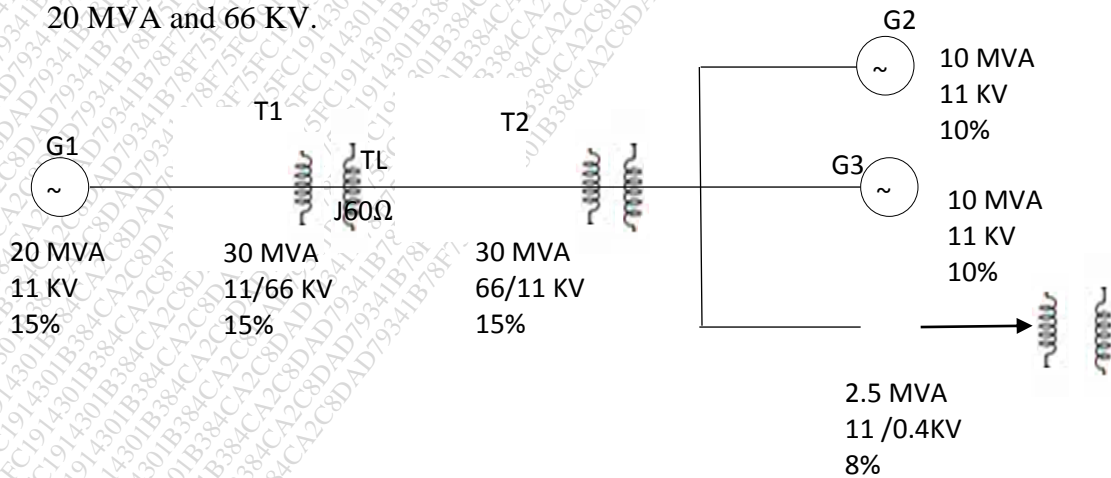


Fig – 1

- Q.3 a) Derive the expression for primitive network. 07
 b) For the Power System as shown in fig.2. Obtain the A, \bar{A} and B. Take ground as Reference. 08

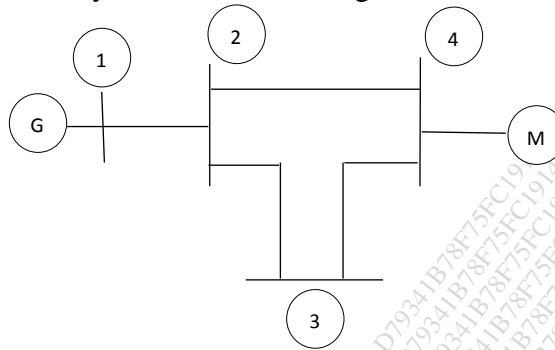


Fig.2

- Q.4 a) Write the algorithm for load flow solution using G.S. Method. 07
 b) Fig.3 shows 3 bus power system. 08
 Bus-1: Slack bus $V=1.05 \text{ Lo}^0 \text{ P.U.}$
 Bus-2: PV bus $V=1.0 \text{ P.U.}$ $P_g=3.0 \text{ P.U.}$
 Bus-3: PQ bus $P_1= u \text{ P.U.}$ $Q_1=2 \text{ P.U.}$

Carry out one iteration of solution by G-S method. Neglect limits on reactive power generation.

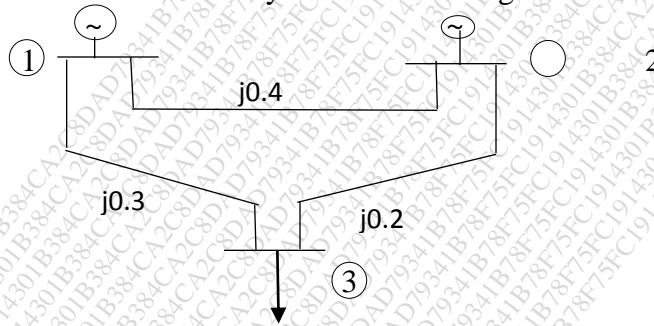


Fig.3

- Q.5 a) Write a Short note on Selection of circuit breaker. 07
 b) Derive the Expression for transients on transmission line. 08

Section – B

- Q.6 Solve any five Questions of following. 10
 a) How the faults are classified?
 b) What is meant by doubling effect?
 c) Define Subtransient reactance.
 d) What is sequence operator?
 e) What is need for short circuit studies or fault analysis?
 f) List the various of shunt and series faults.
 g) What is synchronous reactance?
 h) How are symmetrical faults are analyzed?

- Q.7 a) Explain sequence impedance of Transmission line. 07
 b) Determine the symmetrical components of current of 3 wire system, current in the line 'a', 'b' and 'c' under abnormal condition of loading were as follows
 $I_a=100\angle 30^\circ A$, $I_b=50\angle 300^\circ A$, and $I_c=30\angle 180^\circ A$. 08

- Q.8 a) Explain Zbus building for Type-1 and Type-4 modifications. 07
 b) Explain Zbus by using ZBus algorithm for the network shown in figure-4. 08

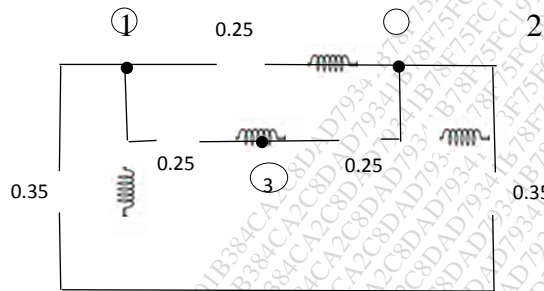


Fig.4

- Q.9 a) Derive an Expression to determine fault current for L-G fault. Draw the sequence network. 07
 b) A 30 MVA, 11 KV, 3- ϕ Synchronous generator has a direct subtransient reactance of 0.25 P. U. The negative and Zero sequence reactance are 0.35 P. U. and 0.1 P. U. respectively. The neutral of generator is solidly grounded. Determine subtransient current in generator and line to line voltage for subtransient condition. When a single line to ground fault occurs at generator terminals with generator operating unloaded at rated voltage. 08
- Q.10 a) Explain contingency selection and static Security analysis. 07
 b) Explain open conductor fault. 08

Total No. of Printed Pages:2

SUBJECT CODE NO:- H-569
FACULTY OF SCIENCE & TECHNOLOGY
T.E. (EEP/EE/EEE)
Electrical Machine Design
(Revised)

[Time: Three Hours]

[Max. Marks:80]

- N.B Please check whether you have got the right question paper.
- i) Q.1 and Q.6 are compulsory.
 - ii) Attempt any two questions from remaining questions of each section.
 - iii) Assume suitable data wherever necessary.

SECTION – A

- Q.1 Attempt any Five 10
- a) Enlist the limitations in design.
 - b) Define specific electric loading.
 - c) What do you mean by magnetic fringing
 - d) Define gap contraction factor for slot.
 - e) What is significance of output coefficient?
 - f) What are the advantages of semi enclosed slots provided in a stator of induction motor?
- Q.2 07
- a) What do you mean by real and apparent flux density? Derive the relation between them. 07
 - b) Calculate the mmf required for the airgap of machine having core length 0.32m, including 4 duets of 10 mm each, airgap length = 5mm, flux per pole = 52 mwb. Given carter's coefficient is 0.18 for opening / gap =1 and is 0.28 opening per gap = 2. 08
- Q.3 07
- a) Derive the expression for output equation of induction motor. 07
 - b) Estimate the main dimensions of a 3.7 KW, 3 phase, 4 pole, 50 Hz, squirrel cage induction motor. Average flux density = 0.45 Wb/m^2 , Ampere conductor= 23000 ac/m, full load efficiency =0.85, power factor =0.84, winding factor = 0.955, Stacking factor=0.9 08
- Q.4 07
- a) Explain in detail design of end rings of squirrel cage rotor of 3 phase induction motor. 07
 - b) A 11 KW, three phase, 6 pole, 50 Hz, 220 volts star connected induction motor has 54 stator slots, each containing '9' conductors. Calculate the value of bar and end ring currents. The number of rotor is. 64. The machine has an efficiency of 86% and power factor of 0.85. The rotor mmf may be assumed to be 85% of stator mmf. 08
- Q.5 Write short note (Attempt any three) 15
- a) Choice of air gap length in 3 – phase induction motor.
 - b) Governing factors for deciding size of rotating machines.
 - c) Standardization and specifications in design of electrical machines.
 - d) Choice of specific loadings in Induction motor.

SECTION – B

- Q.6 Attempt any five 10
- What is Window Space Factor?
 - Enlist the different types of Winding provided in transformer.
 - What is the use of choke coil?
 - Define cooling time constant
 - What type of mechanical forces developed in transformer winding?
 - Why stepped core are generally used for transformer.
 - How heat is dissipated in a transformer.
- Q.7 a) Derive the output equation of single phase transformer. 07
- b) Calculate the KVA rating of A 3 phase, 50 Hz, oil cooled core type transformer has the following dimensions 08
- Distance between core centers = 0.2m
 - Height of Window = 0.24
 - Diameter of Circumscribing circle=0.14m
 - flux density in the core = 1.25 Wb/m².
 - Current density = 2.5A/mm².
- Assume window space factor 0.2 and a core area factor 0.56 and the core is 2 stepped.
- Q.8 a) For a transformer show that emf per turn E_t is given as $E_t = K\sqrt{Q}$. 07
- b) Determine the dimensions of core and yoke for 200 KVA, 50Hz, single phase core type transformer. A cruciform core is used with distance between adjacent limbs equal to 1.6 times the width of core laminations. Assume voltage per turn 14V. Maximum Flux density 1.1 Wb/m², Window space Factor 0.32, Current density 3A/mm² and stacking Factor=0.9, The net iron are is 0.56d² in a cruciform core where 'd' the diameter of circumscribing circle. Also width of largest stamping is 0.85d. 08
- Q.9 a) Explain in detail cooling methods employed in transformer 07
- b) A cooling tank of 3 phase oil cooled transformer is 1.2m in height and 1m × 0.6m in plan. The temperature of the wall to be limited to 35°C while dissipating total loss of 4 KW. Find the number of cooling tubes and their placement on tank surface. Assume tube length = 100 cm and diameter = 5 cm. 08
- Q.10 Attempt any three 15
- Explain the Evaluation of resistance in transformer.
 - Explain the choice of max. Flux density and current density in design of transformer.
 - Explain the development of various forces in transformer under short circuit condition.
 - Estimation of No load current in 3-phase transformer.

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-576
FACULTY OF SCIENCE & TECHNOLOGY
T.E. (EEP/EE/EEE)
Testing and Maintenance of Electrical Equipment
(Revised)

[Time: Three Hours]

[Max. Marks:80]

Please check whether you have got the right question paper.

- N.B
1. Que 01 & Que. 06 are compulsory.
 2. Solve any two questions from remaining questions of each Sections.

SECTION – A

Q.1 a) Define any three of following:- 06

- i) Maintenance
- ii) Tolerance
- iii) Fault
- iv) Type Test
- v) NDT

b) Match the pairs 04

Set A	Set B
i) NDT	Pouring in cavity
ii) Type Test	Design validation
iii) Short Circuit	X-ray
iv) Impregnation	Nearest path

Q.2 a) Differentiate between three test in view of their importance. 08
 A) Type test B) Routine test C) Special test

b) Explain what do you mean by 'Tolerance'? Giving suitable example in view of testing. 07

Q.3 a) What are the tests done on transformer at site before commissioning? List & Explain any one. 07

b) 'Measurement of earth resistance', explain the procedure with neat diagram. 08

Q.4 a) Explain the reasons & effects of overheating of transformer. 07

b) Explain need of Conservator topup & radiator chocking in detail. 08

Q.5 Write a short note on 15

- a) Type tests of 3Φ power transformer.
- b) Magnetic Imbalance of 3Φ I.M
- c) Preventive maintenance

SECTION-B

- Q.6 Solve any five:- 10
 Explain the reasons behind the faults listed below:-
 a) Motor gets overheated
 b) Rotor had bend
 c) Bearing is jammed
 d) Not supplying power with full capacity.
 e) Magnetic flux leakage from stator core
 f) Motor is not rotating at required speed
 g) Overleakage current.
- Q.7 a) Describe the causes of reasons of faults during manufacturing of 3- Φ Induction motor. 07
 b) Explain in detail the testing of DOL starter of I.M. 08
- Q.8 a) Explain in detail the faults during operation of Induction motor on rotor & stator both. 07
 b) With neat sketch describe the operation & construction of X-ray system used in Industry. 08
- Q.9 a) Why it is required to test the acidity in transformer oil? How it will react on transformer winding insulation? 07
 b) Explain in detail the E.M. Swinging graph machine. 08
- Q.10 Write a short note on:- 15
 a) Turns ratio testing
 b) H.V. Withstand test
 c) Megger testing

Total No. of Printed Pages:02

SUBJECT CODE NO:- H-583
FACULTY OF SCIENCE AND TECHNOLOGY
T.E. (EEP/EE/EEE)
Power Electronics - I
(Revised)

[Time: Three Hours]

[Max.Marks:80]

- N.B Please check whether you have got the right question paper.
- i) Q.No.1 and Q.No.6 are compulsory.
 ii) Solve any two questions from remaining from each section.
 iii) Draw appropriate wave forms if required.
 iv) Assume suitable data if necessary.
- Q.1 Solve any five. 10
- Draw V-I characteristics of TRIAC.
 - Give the comparison between GTO and SCR.
 - Define i) Latching current, ii) Holding current of thyristor.
 - Give any two power ratings of any two power devices.
 - What is meant by step up and step down chopper.
 - List the advantage of MOSFET.
 - State the performance parameters of controlled rectifiers.
 - What are different methods to turn on the thyristor.
- Q.2 07
- Draw and Explain the dynamic turn-on and off characteristics of SCR.
 - Explain with neat circuit the triggering requirement of IGBT. 08
- Q.3 07
- What is freewheeling diode? What are its functions?
 - A 3- ϕ half wave converter is operated from a 3- ϕ star connected 220V, 50Hz supply and load resistance of 10ohm. If the average output voltage is 25% of maximum possible average voltage. Calculate Delay angle, RMS and average output currents, Average and RMS SCR currents, input power factor. 08
- Q.4 07
- Explain in details working of dual-converter.
 - A step-down chopper supplied from dc source of 200V. The load parameter are $R = 6\Omega$, $L = 10\text{mH}$ and $E = 60\text{V}$. The chopper is operating with chopping frequency of 1200Hz and duty cycle of 0.6. Assume continuous conduction. Determine – 08
 - Average load current
 - Current ripple.
- Q.5 07
- Explain the pwn and fm techniques used for chopper control.
 - Explain with neat waveform discontinuous current conduction operation of step down chopper. 08

Section B

- Q.6 Solve any five. 10
- Define modulation index of PWM inverter.
 - What is cyclo converter?
 - What are the advantages of switch mode converter over chopper?
 - What is duty cycle?
 - What are the effects of chopping frequency on filter sizes?
 - What is SMPs?
 - What is inverter? What are the different types of inverters?
 - What is power conditioner?
- Q.7
- With neat circuit and waveform. Explain the working principle of six step VSI operates in 180° mode. 10
 - The single phase full bridge inverter has a resistance load of 10Ω and the dc input voltage is $V_s=220V$. determine 05
 - RMS output voltage at the fundamental frequency.
 - The output power P_o .
- Q.8
- Explain with neat diagram and waveforms operation of $1-\phi$ to $3-\phi$ cycloconverter with R-L Load. 07
 - For single phase half bridge inverter, DC input voltage is $200V$ with 5Ω resistive load, calculate. 08
 - RMS output voltage
 - Output power
 - PIV
 - Total Harmonic Distortion
- Q.9
- Explain working principle of single phase AC voltage controller. 07
 - Prove that the Peak ripple current for buck converter is given by 08

$$\Delta I = \frac{v_s k(i - k)}{fL}$$
- Q.10
- A single phase half wave AC-AC voltage controller supplying a resistive load. Prove that the average load voltage is given by 07

$$V_{oav} = \frac{v_m}{\alpha\pi} (\cos\alpha - 1)$$
 - A single phase full bridge inverter is operating from a $2\mu V$ battery and is supplying a resistive load of 05Ω . Determine 08
 - Fundamental output volt
 - Fundamental output power
 - Switch ratings