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II B. Tech II Semester Regular Examinations, May/June - 2015
CONTROL SYSTEMS
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

PART-A

1. a) Define the transfer function in control system.
 b) What is signal flow graph?
 c) What are the time domain specifications?
 d) What is the effect of addition of pole to a transfer function on Root Locus?
 e) What is the effect on polar plot if a non-zero pole is added to the transfer function?
 f) What are the specifications in frequency domain design are specified.
 g) What is meant by state in control system? (3M+3M+3M+4M+3M+3M+3M)

PART-B

2. a) State and explain the Mason's gain formula.
 b) Derive the transfer function and develop the block diagram of Armature controlled DC servo motor
3. a) Discuss the effect of PD and PI on performance of a control system.
 b) A unity feed back system is characterized by an open loop transfer function $G(s) = \frac{K}{s(s+5)}$.
 Determine the gain K so that the system will have a damping factor of 0.7. For this value of K determine the natural frequency of the system. It is subjected to a unity step input. Obtain the closed loop response of the system in time domain.
4. A unity feedback system has an open loop function $G(s) = \frac{k}{s(s^2 + 3s + 10)}$ make a rough sketch of root locus plot by determining the following (i) Centroid, number and angle of asymptotes (ii) angle of departure of root loci from the poles, (iii) Breakaway points if any, (iv) points of intersection with $j\omega$ axis and (v) maximum value of k for stability



5. a) Derive the expressions for frequency domain specifications of a second order system.
 b) Given the open loop transfer function of a unity feedback system $G(s) = \frac{1}{s(3+s)(1+2s)}$.
 Draw the Bode plot and measure from the plot the frequency at which the magnitude is 0 dB.
6. Consider a unity feedback system with open loop transfer function $G(s) = \frac{K}{s(1+s)(2+s)}$,
 design a suitable compensator so that the compensated system has
 $K_v = 10 \text{ sec}^{-1}$
 Phase margin = 40°
 Gain margin $\leq 12 \text{ db}$
7. The state equations of the LTIV system are given by $\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -2 & 0 \\ 1 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u$;
 $y = \begin{bmatrix} 1 & 0 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix}$
 a) Determine the STM
 b) Find the solution for $y(t)$ and
 c) If a unit step is given to the input, what will be the behavior of the output



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PART-A

1. a) What are the advantages and disadvantages of closed loop control system?
 b) How do you reverse the direction of rotation in AC servomotor
 c) Draw the time response of second order system and represent the time domain specifications on it
 d) What are the advantages of Root Locus?
 e) State the Nyquist stability theorem.
 f) Write the differences between lead and lag compensator.
 g) What are the properties of state transition matrix (4M+2M+4M+2M+2M+4M+4M)

PART-B

2. a) Derive the transfer function of DC servo motor.
 b) What do you mean by the sensitivity of the control system and discuss the effect of feedback on sensitivity
3. a) Define the steady state error and error constants of different types of inputs
 b) Damping factor and natural frequency of the system are 0.12 and 84.2 rad/sec respectively. Determine the rise time (t_r), peak time (t_p), maximum peak overshoot (mp) and settling time (t_s).

4. Sketch the root locus plot of unity feedback system with an open loop transfer function

$$G(s) = \frac{K}{s(s+1)(s+5)}. \text{ Find the range of } K \text{ for the system to have damped oscillatory response.}$$

Determine the value of K so that the dominant pair of complex poles of the system has a damping ratio of 0.6. Corresponding to this value of K. Determine the closed loop transfer function in the factored form.



5. Determine the value of the gain constant K for the system with open loop transfer function

$$G(s) = \frac{K}{s(1+0.2s)(1+0.01s)}. \text{ So that it has a phase margin of about } 35^{\circ}. \text{ For this value of K,}$$

find the new gain margin.

6. Design a phase lag network for a plant with the open loop transfer function $G(s) = \frac{5}{s(1+0.1s)^2}$ to have a phase margin of 45° . Verify the performance of the compensated system with the specification

7. a) Discuss the concept of controllability and observability with an example.

b) Given the state equation $\dot{X} = AX$, where $A = \begin{bmatrix} -3 & 1 & 0 \\ 0 & -3 & 1 \\ 0 & 0 & -2 \end{bmatrix}$. Determine the state

transition matrix.



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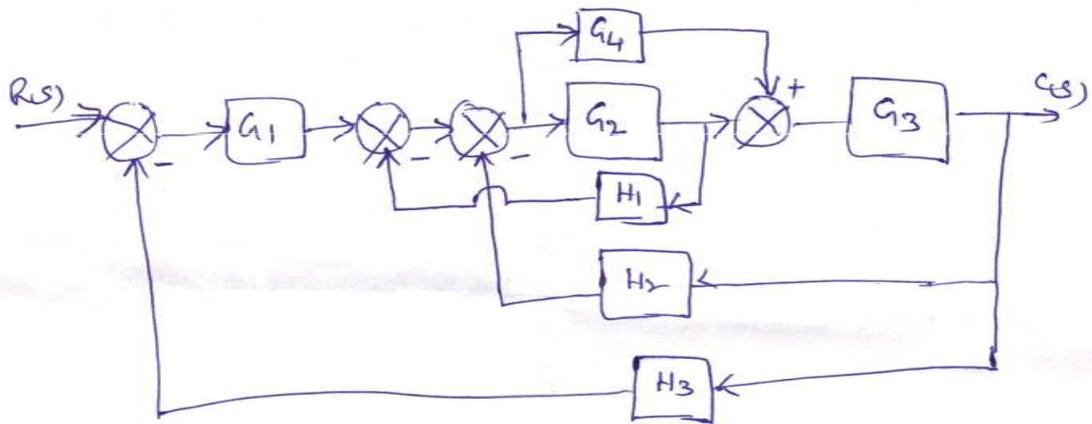
PART-A

- Define the closed loop control system. Give its properties.
 - What is a synchro? Write its transfer function.
 - What are the standard test signals used in time domain analysis?
 - What are the disadvantages of Routh Criterion?
 - Define phase margin and gain margin.
 - What is the need of lag-lead compensator?
 - What is controllability?

(4M+3M+3M+4M+4M+2M+2M)

PART-B

- Simplify the block diagram shown in below figure and obtain the closed loop transfer function



- Obtain the time response of a first order system for a unit step input and plot its response.
 - A unity feedback system is characterized by the open loop transfer function

$$G(s) = \frac{1}{s(1+0.3s)(1+0.4s)}$$

Determine the steady state error for unity step, unity ramp and unity acceleration inputs. Also determine the damping factor and natural frequency of dominant roots.



4. a) Explain the procedure to draw root locus of a given transfer function.
 b) A feedback system has the open loop transfer function of $G(s) = \frac{Ke^{-s}}{s(s^2 + 2s + 3)}$. Find the limiting values of K for maintaining stability.
5. a) Explain the frequency domain specifications of a second order system.
 b) Given the open loop transfer function $G(s) = \frac{5}{(1 + 2s + s^2)(1 + 3s)}$. Sketch the Nyquist plot and investigate the open loop and closed loop systems stability.
6. For the given open loop transfer function, $G(s) = \frac{K}{s(s + 4)(s + 6)}$.
 Design suitable lead compensation so that phase margin is $\geq 30^\circ$ and velocity error constant, $K_v \geq 15$
7. The state equation of a system is given by

$$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} -3 & 1 \\ -2 & -1 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t), \quad t > 0$$

- a) Is the system controllable?
 b) Compute the state transition matrix
 c) Compute $x_1(t)$ under zero initial condition and a unit step input



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PART-A

1. a) What are the advantages and disadvantages of open loop control system
- b) What is the difference between AC servo motor and DC servo motor?
- c) Define the transient response, and draw the time domain response of first order system.
- d) What is the necessary and sufficient condition for stability?
- e) What are the frequency domain specifications?
- f) Draw the electrical equivalent circuits of lead, lag and lag-lead compensators.
- g) What is observability? (3M+3M+3M+3M+3M+4M+3M)

PART-B

2. a) Explain the construction and principle of operation synchro transmitter.
- b) Derive the transfer function and develop the block diagram of Armature controlled DC servo motor
3. a) Derive the time domain specifications of second order system with unit step input
- b) Given the open loop transfer function of a servo system with unity feed back is

$$G(s) = \frac{6}{s(1+0.2s)}. \text{ Obtain the steady state error of the system when subjected to an input}$$

$$\text{signal given by } r(t) = a_0 + a_1 t + \frac{a^2 t^2}{2}$$



4. a) Explain the Routh's criteria with an example. What are its limitations.
b) Determine the stability of the closed loop system whose open loop transfer is

$$\frac{5(2s+1)}{s(s+1)(1+3s)(1+0.5s)}, \text{ using Routh-Hurwitz criterion.}$$

5. Given the open loop transfer function with unity feedback as $G(s) = \frac{Ke^{-10s}}{s(2+s)(1+5s)}$. Draw the bode plot and determine the gain K for the gain cross over frequency to be 4 rad/sec.

6. A unit feedback system has an open loop transfer function $G(s) = \frac{K}{s(s+2)(0.3s+1)}$. Design a phase lag compensator to meet the following specifications:

Velocity error constant = 10

Phase margin $\geq 40^\circ$

7. Determine the state transition matrix for the system $\dot{X} = AX$, where $A = \begin{bmatrix} -2 & 0 & 1 \\ 0 & -1 & 1 \\ 2 & 0 & -1 \end{bmatrix}$



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PART-A

1. a) Derive an expression for induced e.m.f. in a transformer in terms of frequency, the maximum value of flux and the number of turns on the windings.
- b) Derive an expression for saving of copper when an auto –transformer is used.
- c) What is the difference between a 3-phase transformer bank and a 3 phase transformer unit
- d) Compare cage and wound 3-phase induction motor
- e) What is the procedure to conduct the no-load test in 3 – ϕ induction motor?
- f) How to calculate the number of turns for a transformer (4+4+4+3+4+3)

PART-B

2. a) A. single –phase transformer is connected to a 230 V, 50 Hz supply. The net cross –sectional area of the core is 60 cm². The number of turns in the primary is 500 and in the secondary 100. Determine:
 - i) Transformation ratio.
 - ii) E. m. f. induced in secondary winding.
 - iii) Maximum value of flux density in the core.
- b) Explain the need for stepping up and stepping down voltages in a power system. How does a transformer accomplish?



3. The following readings were obtained from O.C. and S.C. tests on 8 kVA 400/ 120V, 50 –Hz transformer.
- O.C. Test: (l.v. side) : 120 V; 4 A; 75 W.
S.C. Test: (h.v.side) : 9.5 V; 20 A; 110W
- Obtain
- The equivalent circuit (approximate) constants,
 - Voltage regulation and efficiency for 0.8 lagging power factor load, and
 - The efficiency at half full – load and 0.8 power factor load.
4. A 3-Phase transformer has a delta –connected primary and is supplied at 11000 V. The terminal voltage (line voltage) of the star – connected secondary at 0.8 power factor lagging is 400 V. The effective resistance and reactance drops are 1.5% and 6% respectively, Determine the approximate transformation ratio.
5. a) How would you determine circle diagram of a 3- phase induction motor experimentally?
b) A 3 –phase, 4- pole, 50 – Hz induction motor is running at 1440 r.p.m. Determine the slip speed and slip.
6. a) Discuss briefly the following:
(i) Crawling (ii) Cogging.
b) The equivalent resistance and reactance values of a double cage induction motor for stator, outer cage and inner cages are 0.5, 2.0 and 0.3 Ω resistance and 7, zero and 6.0 Ω reactance respectively.
7. a) The current densities in the primary and secondary windings of a transformer are 2.2 and 2.1 A/ mm² respectively. The ratio of transformation is 10: 1 and the length of mean turn of the primary is 10 per cent greater than that of the secondary. Calculate the resistance of the secondary winding given the primary winding resistance is 8 Ω .
b) What is window space factor? Find the width of window for optimum output of a transformer.



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PART-A

1. a) Draw and explain the no – load phasor diagram for a single -phase transformer.
- b) List the condition that must be fulfilled before two transformers can be operated successfully in parallel?
- c) What is meant by slip in an induction motor? Develop an expression for the frequency of rotor currents in it.
- d) Define slip. Why can't an induction motor run at synchronous speed?
- e) What is the procedure to conduct the blocked motor test on 3- ϕ induction motor?
- f) How to choose the number of slots for an induction motor (4+4+4+3+4+3)

PART-B

2. a) A 230 V/115 V single –phase transformer takes a no –load current of 2 A at a power factor of 0.2 lagging with low voltage winding kept open. If the low voltage winding is now loaded to take a current of 15 A at 0.8 power factor lagging find the current taken by high voltage winding.
- b) Derive an expression for induced e.m.f. in a transformer in terms of frequency, the maximum value of flux and the number of turns on the windings.
3. The primary of a transformer is rated at 10 A. On open circuit the readings are $V_1 = 1000$ V; $V_2 = 500$ V, $I = 0.42$ A and $P_{OC} = 100$ W. On short circuit the readings are $I_1 = 10$ A, $V_1 = 126$ V and $P_{SC} = 400$ W. Draw an equivalent circuit for the transformer and determine the parameters. Predict the output voltage across a load impedance $Z_L = (19 + j 12) \Omega$.



4. a) A 3-Phase, 1000 kVA, 6600/1100 V transformer is delta – connected on the primary and star –connected on the secondary. The primary resistance / phase is 1.8Ω and secondary resistance/phase is 0.025Ω . Determine the efficiency on full –load at: Unity power factor; and 0.8 power factor lagging if the iron loss is 15 kW.
- b) What are the two general types of three –phase transformers? Does either have any advantage over the other?
5. a) Explain with the aid of diagrams the principal of operation of double cage induction motor. Sketch the torque –slip curves of such a motor.
- b) A 3- phase alternator having 12 – poles is driven at a speed of 500 r.p.m. It supplies power to an 8- pole, 3- phase induction motor. If the slip of the motor at full –load is 4%, calculate the full – load speed of the motor.
6. The ratio of maximum torque to full – load torque in a 3- phase squirrel –cage induction motor is 2.2: 1. Determine the ratio of actual starting torque to full – load torque for the following cases : (i) Direct starting, (ii) Star –delta starting, and (iii) Auto –transformer starting tapping of 70%. The rotor resistance and standstill reactance per phase are 0.5Ω and 5Ω respectively.
7. a) A 415 V, 3 phase, 50 Hz, 6 pole delta connected induction motor has a specific magnetic loading of 0.5 Wb/m^2 and a specific electric loading of 24000 A/m. The stator core diameter and length are 0.275 m and 0.15 m respectively. Find the output of the machine if the full load efficiency and power factor are 0.88 and 0.89 respectively. Determine the number of stator slots, conductors per slot and the length of air gap.
- b) Optimise the transformer design from the point of view of (i) minimum cost (ii) minimum loss.



Code No: RT22025

R13

SET - 3

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PART-A

1. a) Draw the vector diagram of a power transformer under full – load condition.
b) Assuming that two transformers having unequal ratios of transformation are connected in parallel, indicate how the total load divides between them.
c) What are the advantages of a 3-phase unit transformer over three single phase transformer bank of the same kVA
d) What are the various losses in an induction motor?
e) Why starting methods are needed for 3- ϕ induction motor
f) How to select the conductor dimensions in 3- ϕ induction motor (4+4+4+3+4+3)

PART-B

2. a) A 230 V, 2.5 kVA single – phase transformer has an iron loss of 100 W at 40- Hz and 70 W at 30 –Hz. Find the hysteresis and eddy current losses at 50 Hz.
b) Under what condition will there be no circulating current when two transformers are operated in parallel at no –load?
3. A 200/2000 V transformer is fed from a 220 V supply. The total winding resistance and leakage reactance as referred to low voltage side are 0.15 Ω and 0.6 Ω respectively. The resistance representing core loss is 450 Ω and magnetizing reactance is 250 Ω . A load of impedance (600 + j400 Ω) is connected across the secondary terminals. Calculate :
i) Input current, ii) Secondary terminal voltage, and iii) Primary power factor.



4. a) Two single phase electric furnaces A and B are supplied at 220 V from a -3- phase 1100 V supply by means of a Scott –connected transformer combination. If the total output is 600 kW at 0.6 power factor lagging determine the currents in the winding and transformation ratio of each transformer.
- b) What is the total load capacity of V-V bank as compared with a Δ - Δ bank?
5. a) Write a short note on induction generator.
- b) A 3-phase, 6-pole, 50-Hz induction motor has a slip of 1% at no –load and 3% at full –load. Find: i) Synchronous speed, (ii) No –load speed, (iii) Full –load speed, (iv) Frequency of rotor current at standstill, and (v) Frequency of rotor current at full – load.
6. A 400 V, 50 –Hz, induction, motor, when started directly from the mains takes 4 times the full – load current and the torque produced is twice the full – load torque. Determine :
The motor current, the line current and the starting torque when started by means of an auto transformer of ratio 2.5 : 1.
The voltage to be applied and the motor current if the full –load torque is to be obtained at starting.
7. a) Which factor should be considered when estimating the length of the airgap of induction motor? Why the airgaps should be as small as possible?
- b) Determine the approximate diameter and length of the stator core, the number of stator slots and the number of conductors for a 11 kW, 400 V, 3 phase , 4 pole , 1425 r.p.m. delta connected induction motor. Adopt a specific magnetic loading of 0.45 Wb/m^3 and a specific electric loading of 23,000 A/m. Assume full load efficiency and power factor as 0.85 and 0.88 respectively. The ratio of core length to pole pitch is 1. The stator employs a double layer winding.



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PART-A

1. a) What is meant by equivalent resistance of a transformer? How may it be calculated in primary terms and secondary terms?
b) What is an auto –transformer? What advantages are possessed by auto –transformers?
c) State with the help of connection and vector diagrams how a 2 – phase supply can be obtained from a 3 –phase supply.
d) Draw equivalent circuit of a 3- phase induction motor.
e) Compare a single cage motor with a double cage induction motor of the same rating
f) How to select the length of mean turn of windings of transformer (4+4+4+3+4+3)

PART-B

2. a) A 4400 V, 50 –Hz transformer has a hysteresis loss of 1200 W, eddy current loss of 1800 W and full –load copper loss of 4000 W. If the transformer is supplied at 6600 V, 75 – Hz. What will be the losses?
b) What is an auto –transformer? What advantages are possessed by auto –transformers?
3. A 50- Hz, single –phase transformer has a turn ratio of 5. The resistance are 0.8 Ω , 0.02 Ω and reactances are 4 Ω and 0.12 Ω for high – voltage and low –voltage winding respectively. Find: The voltage to be applied to the h.v. side to obtain full – load current of 180 A in the l.v. winding on short – circuit.
 - i) The power factor on short – circuit.
 - ii) Draw the equivalent circuit and vector diagram.



4. a) A Scott – connected transformer set supplies two electric furnaces A and B at 110 V each from a 3- phase 4400 V system. If the furnace connected to teaser transformer secondary takes 270 kW and other one connected to main transformer secondary takes 450 kW at unity p.f. find the line current taken from the 3-phase mains.
- b) What are the advantages of V-V connection?
5. a) Describe the constructional details of a 3-phase squirrel –cage and phase wound induction motors. Also discuss the applications of various types of starters used for starting these motors.
- b) A. 50 Hz, 440 V, 3-phase, 4-pole induction motor develops half the rated torque at 1490 r.p.m. With the applied voltage magnitude remaining at the rated value, what should be its frequency if the motor has to develop the same torque at 1600 r.p.m ? Neglect stator and rotor winding resistances, leakage reactances and iron losses.
6. A 3- Phase, 400 V induction motor gave the following test readings :
- | | |
|----------------------|----------------------|
| No –load test | : 400 V, 1250 W, 9A |
| Short – circuit test | : 150 V, 4 kW, 38 A. |
- Draw the circle diagram.
- If the normal rating is 14.91 kW, find from the circle diagram, the full –load values of current, p.f. and slip.
7. a) Develop the output equation for a single phase as well as a three phase transformer?
- b) What are the main dimensions of induction motor? What are the desired values of L/t , peripheral speed and width of ventilation ducts?



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PART-A

1. a) What are Green house gases? How are they responsible for global warming?
 b) What are Food Pyramids?
 c) Mention the merits of Solar Energy
 d) What is Eutrophication?
 e) Define the term 'bio-diversity'
 f) What is Noise? What are the CPCB standards of day time noise levels at silence zones
 g) What is Fluorosis?
 h) Define the term 'Environment' (3M+3M+3M+3M+2M+3M+2M+3M)

PART-B

2. a) What is Sustainable development? What are the strategies for Sustainable development?
 b) Define Ecosystem. Give the classification of Ecosystem (10M+6M)
3. a) What are the causes and consequences of deforestation
 b) Distinguish between Renewable and Non-renewable resources (10M+6M)
4. a) What is meant by generic, species and ecosystem diversity
 b) Explain In-situ and Ex-situ measure of conservation of biodiversity (6M+10M)
5. a) Explain the role of an individual in prevention of pollution
 b) Write short note on Solid waste management (10M+6M)
6. a) "Man cannot command nature except by obeying it". Explain
 b) Write the salient features of The Air (Prevention and Control of Pollution) Act (8M+8M)
7. Write short notes on
 - a) Environmental Impact Statement
 - b) Environmental Audit
 - c) Checklist method (6M+6M+4M)



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PART-A

1. a) Define the term Environment
 b) What is acid rain?
 c) Distinguish between renewable and non-renewable resources
 d) What are Hot-spots of biodiversity in India?
 e) Mention few natural sources of air pollution
 f) Define the term Water pollution as per The Water Act, 1974
 g) What is EIA?
 h) Mention the aesthetic value of biodiversity (2M+3M+3M+3M+2M+3M+3M+2M)

PART-B

2. a) What is the importance of Environmental education?
 b) Explain the structure and functions of an Ecosystem (6M+10M)
3. a) Write the impacts of mining on forests
 b) What are the non-conventional sources of energy? Write their merits (6M+10M)
4. Define the term bio-diversity. Describe the In-situ and Ex-situ measures of bio-diversity conservation (16M)
5. a) Explain the impacts of Air Pollution on human and plant
 b) Write short notes on Nuclear hazards (10M+6M)
6. a) Write the salient features of The Forest Conservation Act
 b) The principle of living is "To live and Let live ". Explain (10M+6M)
7. Write short note on
 - a) Environmental audit
 - b) Draft EIS
 - c) Primary and Secondary Impacts (6M+4M+6M)



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**PART-A**

1. a) What is sustainable development?  
 b) Distinguish between producers and consumers  
 c) Define bio-magnification  
 d) Mention the agents responsible for soil erosion  
 e) What are the threats to bio-diversity?  
 f) What is garbage? What is the best method of disposal of garbage from hotels?  
 g) What is rain-water harvesting?  
 h) Write the difference between Draft EIS and final EIS
- (3M+3M+3M+2M+2M+3M+3M+3M)

**PART-B**

2. a) What are the Global Environmental challenges? Explain  
 b) Distinguish between Food chain and Food web (10M+6M)
3. a) Write the benefits and problems associated with dams  
 b) What is sustainable development? What are the strategies for sustainable development? (6M+10M)
4. a) What are the values of bio-diversity?  
 b) Explain the measures of bio-diversity conservation? (8M+8M)
5. a) What is Solid waste management? Explain briefly.  
 b) What are water-borne diseases? Explain water as a vehicle of disease transmission(8M+8M)
6. a) "Nature has for man's needs but not for man's greed's ". Explain  
 b) Write the salient features of Wild life Protection Act (10M+6M)
7. Write short note on  
 a) EIA methodologies  
 b) Ecotourism  
 c) Public Hearing (8M+4M+4M)



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- ~~~~~

**PART-A**

1. a) Mention the global impacts air pollution  
 b) Define the term Ecosystem  
 c) Mention two flood control measures  
 d) What is meant by desertification?  
 e) Define genetic biodiversity  
 f) Mention the pollutant responsible for Bhopal gas Tragedy  
 g) Distinguish between composting and very-composting  
 h) What is Draft EIS? (3M+3M+2M+3M+3M+3M+3M+2M)

**PART-B**

2. a) What is man's impact on Environment?  
 b) Explain Forest Ecosystem (8M+8M)
3. a) What are the effects of modern agriculture?  
 b) Explain the role of an individual in conservation of natural resources (8M+8M)
4. a) What is biodiversity? What are the threats to bio-diversity?  
 b) Describe India as a mega diversity nation (8M+8M)
5. a) What is noise? What are the auditory effects and non-auditory effects  
 b) Explain the reduction, recycling, reuse and recovery principles of solid waste management (8M+8M)
6. a) Write the impacts of mining and dams on forests and Tribal people  
 b) Write the salient features of The Water Act (8M+8M)
7. Write short note on
  - a) Adhoc method
  - b) Cost benefit analysis
  - c) Safety audit (5M+6M+5M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**POWER SYSTEMS - I**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

**PART-A**

1. a) What are the functions of an economizer?  
 b) What is the need of electrostatic precipitator in a thermal power station?  
 c) What are the nuclear materials used in nuclear power station?  
 d) What are the advantages and disadvantages of fast breeder reactor?  
 e) What are the differences between radial and ring main distribution system.  
 f) What are the merits of gas insulated substation over air insulated substation?  
 g) What is meant by capacitance grading of a cable.  
 h) Define the terms load factor and diversity factor.  
 i) What are the desirable characteristics of a tariff method?

(2M+3M+2M+3M+2M+3M+2M+2M+3M)

**PART-B**

2. a) Explain the factors to be considered for the selection of the site for a thermal power station.  
 b) Explain the functions of Cooling tower and condenser with respect to a Thermal power station. (8M+8M)
3. a) With the help of neat diagram, describe the working of pressurized water reactor.  
 b) Explain the radiation hazards and shielding in nuclear power plants. (9M+7M)
4. Explain, in detail the radial and ring main distribution systems. Discuss the characteristics of each system. Also explain the design features of each system. (16M)
5. a) What are the various types of bus bar arrangements in the substations? Explain sectionalized single bus bar arrangement with suitable diagrams.  
 b) Explain the constructional aspects of gas insulated substation. (9M+7M)
6. a) Derive the expression for electrostatic stress in a single core cable. Where does maximum stress occur and where is it minimum and why?  
 b) A single core, 33kV cable has a conductor diameter of 3.4 cm and a sheath of inside diameter 6.2 cm. The cable has an inner layer of 1.5 cm thick of rubber of dielectric constant 5.1 and rest impregnated refer of dielectric constant 3.2. Find the maximum stresses in the rubber and in the paper. (8M+8M)
7. a) A Domestic lighting installation having fifteen 60 watt lamps is operated as follows:  
 i) 5 lamps from 6 p.m till 8 p.m      ii) 10 lamps from 8 p.m till 10 p.m  
 iii) 6 lamps from 10 p.m till 12 p.m   iv) Determine the demand factor and the daily load factor.  
 b) Explain two-part tariff and compare it with power factor tariff. (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**POWER SYSTEMS - I**  
(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
2. Answer **ALL** the question in **Part-A**  
3. Answer any **THREE** Questions from **Part-B**

**PART-A**

1. a) What are the functions of an condenser?  
b) List the important functions of the boiler.  
c) List out the main parts of nuclear reactor.  
d) What are the advantages and disadvantages of boiling water reactor?  
e) What are the characteristics of ring main distribution system?  
f) Give the comparison of outdoor and indoor substations.  
g) Explain why and how the grading of cables in done.  
h) Define the terms demand factor and plant use factor.  
i) What is meant by block-rate tariff? (2M+3M+2M+3M+2M+3M+2M+2M+3M)

**PART-B**

2. Draw the complete schematic diagram of a coal fired thermal power plant. Label each component. Discuss briefly the function of each component. (16M)
3. a) With the help of a neat diagram explain the working principle of a fast breeder reactor used in a nuclear power plant.  
b) Enumerate and explain essential components of a nuclear reactor. (9M+7M)
4. a) Explain the radial distribution system with neat diagram and list out its merits and demerits compared to ring main distributor.  
b) A D.C ring main system ABCDA fed from point A with 250 V supply and the loop resistances of various sections are AB = 0.09 ohms; BC = 0.4 ohms; CD = 0.3 ohms and DA = 0.08 ohms. The main supplies 110 A at B, 160A at C and 220 A at D. Calculate the voltages at each load point. If the points A and C are inter connected through a link of 0.08 ohm. Determine the voltages at the load points. (8M+8M)
5. a) What is the difference between indoor and outdoor substations? What are the factors which are to be considered for a selection of a site of a substation.  
b) Explain the installation and maintenance of gas insulated substation (9M+7M)



6. a) Deduce an expression for insulation resistance of a single core cable in terms of specific resistance of dielectric, its core and sheath diameter.
- b) A 3-core, 3-phase metal sheathed cable has capacitance between all conductors bunched and sheath is  $0.9 \mu\text{F}$  and capacitance between two conductors bunched with sheath and third conductor is  $0.7 \mu\text{F}$ . Determine the capacitance when the sheath is insulated for the following conditions: (i) Between any two conductors (ii) Between any two bunched conductors and the third conductor (iii) Calculate the capacitance to neutral and charging current taken by the cable when connected to 33 kV, 3-phase, 50 Hz systems. (8M+8M)
7. a) Explain the following with respect to the economic aspects power generation: (i) Load duration curve, (ii) Diversity factor, (iii) Maximum demand and (iv) Plant Capacity factor.
- b) A Power station is to fed four regions of load whose peak loads are 12, 7, 10 and 8 MW. The diversity factor at the station is 1.4 and the average annual load factor is 65%. Determine the following: i) Maximum demand on the station ii) Annual energy supplied by the station and iii) Suggest the installed capacity. (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015****POWER SYSTEMS - I**

(Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

**PART-A**

1. a) What are the functions of an Chimney?  
 b) What is the need of cooling towers in a thermal power station?  
 c) What are the factors considered for location of nuclear power plant?  
 d) Give the advantages and disadvantages of pressurized water reactor?  
 e) What are the characteristics of radial distribution system?  
 f) State the advantages of outdoor substations over indoor substations.  
 g) Discuss why loss angle of power cable is very low.  
 h) Define connected load and maximum demand.  
 i) What is meant by two-part tariff? (2M+3M+2M+3M+2M+3M+2M+2M+3M)

**PART-B**

2. a) Describe the functions of economizer and super heater in a thermal power plant.  
 b) What are the essential requirements of steam power station design? (8M+8M)
3. a) Describe with the help of a neat sketch, construction and working of a boiling water reactor.  
 b) Explain the factors considered for location of a nuclear power plant. (9M+7M)
4. a) Explain about stepped distributor and ring main distributor in a distribution system.  
 b) A 500 m long single phase AC distributor has a total impedance of  $(0.02+j0.04)$  ohms and is fed from one end at 230V. It is loaded as follows: 50A at UPF, 200 m from feeding point, 100A at 0.8 p.f lag, 300 m from feeding point, 50A at 0.7 p.f lag at the far end. Calculate the total voltage drop and voltage at the far end. (7M+9M)
5. a) Draw the single line diagram of a GIS and explain.  
 b) Explain with a neat lay out diagram of main and transfer bus bar system. (8M+8M)
6. a) Draw the cross section of a 3-core belted high voltage cable and describe its various parts.  
 b) A 3-phase, single core 132 kV cable has a conductor diameter of 3.2 cm and a sheath of inside diameter 9 cm. If two intersheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers. Find i) Positions of intersheaths ii) voltage on the intersheaths iii) Maximum and minimum stress. (8M+8M)
7. a) Discuss the objectives and requirements of tariff methods.  
 b) A 2000 MW power station delivers 2000 MW for 3 hours, 600 MW for 7 hours and is shut down for the rest of each day. It is also shut down for maintenance for 70 days annually. Calculate its annual load factor. (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**POWER SYSTEMS - I**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

**PART-A**

1. a) What are the functions of an super heater?  
 b) Write the differences between impulse and reaction turbine.  
 c) Give the advantages and disadvantages of pressurized water reactor?  
 d) What is the working principle of nuclear power station?  
 e) Give the comparison between DC and AC distribution systems.  
 f) What are the differences between single bus bar scheme and double bus bar scheme?  
 g) What is meant by intersheath grading?  
 h) Define the terms plant capacity factor and demand factor.  
 i) What is meant by three-part tariff? (2M+3M+2M+3M+2M+3M+2M+2M+3M)

**PART-B**

2. a) Describe briefly various components in modern thermal power station with neat flow diagram.  
 b) Explain briefly about ash handling mechanism in a thermal plant. (8M+8M)
3. a) Describe the fast breeder reactor with neat sketch? Discuss its merits.  
 b) Discuss about the nuclear waste disposal mechanism in a nuclear power plant. (9M+7M)
4. a) Give the classification of distribution systems and compare AC and DC distribution systems.  
 b) A single-phase distributor has a total resistance of 0.3 ohms and a reactance of 0.4 ohms. At the midpoint 'A', a current of 75A at 0.75 p.f lead and at the far end 'B', a current of 100A at unity p.f is tapped. If the voltage at the midpoint is 230V, find the voltage at the supply end and also its phase angle with respect to voltage at the far end when the power factors are with reference to respective voltages at the load point. (8M+8M)
5. a) What are the merits and demerits of GIS over air insulated substations.  
 b) What are the various types of bus bar arrangements in the substation? Discuss double bar system. (8M+8M)



6. a) A single core cable has a conductor diameter of 2.5 cm and a sheath of inside diameter 6 cm. Calculate the maximum stress. It is desired to reduce the maximum stress by using two intersheaths. Determine their best position, the maximum stress and the voltage on each. Consider the System voltage as 3-phase 66 kV.
- b) What is the most general criterion for the classification of cables? Draw the sketch of a single core low tension cable and label the various parts. (8M+8M)
7. a) What are the various types of tariffs? Explain the power factor tariff.
- b) An industry working 12 hours a day for 360 days in a year. The following two systems of tariff are available: H.V supply at 5 paise per unit plus Rs. 4.5 per month per kVA of maximum demand, LV supply at Rs.4 per month per kVA of maximum demand plus 7 paise per unit. The industry has an average load of 300 kW at 0.8 p.f and a maximum demand of 125 kW at p.f of 0.85. The H.V equipment costs Rs. 50 per kVA and losses can be taken as 5%. The interest and depreciation charges are 5%. Calculate the differences in cost between the two systems. Comment on the results. (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**PULSE AND DIGITAL CIRCUITS**  
 (Com. to EEE, ECC)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**
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**PART - A**

1. a) Differentiate High pass and Low pass RC circuits  
 b) Describe the operation of an attenuator?  
 c) How shall you observe diode and BJT switching action?  
 d) Give the importance of clamping circuits.  
 e) Relate Flip flop with binary.  
 f) Write a brief note on Hysteresis effect.  
 g) Obtain relation of time period for Monostable multivibrator.  
 h) What is the difference between positive logic and negative logic?  
 i) Draw the constant current sweep circuit. (3M+2M+3M+2M+3M+2M+3M+2M+2M)

**PART - B**

2. a) Compare the response of RC circuit taken across R and C for an exponential input.  
 b) Write the steps involved in the design a BJT switch. (8M+8M)
3. a) Conclude clamping circuit operation by considering source resistance and diode resistance.  
 b) Design a two level clipper for bias voltages  $V_1=5V$  and  $V_2=-5V$ . Use practical diodes (8M+8M)
4. a) Write different steps involved in symmetrical and unsymmetrical triggering process  
 b) Draw collector and base wave forms for collector coupled monostable multi and explain (8M+8M)
5. a) Compare DTL and TTL and conclude.  
 b) Compare CMOS and NMOS and conclude. (8M+8M)
6. a) Obtain sweep speed error for bootstrap sweep circuit.  
 b) List out various methods to generate time base waveforms and explain any two. (8M+8M)
7. a) Compare the process of synchronization of Astable and monostable multivibrators.  
 b) With the help of a neat circuit diagram and waveforms, explain frequency division with respect to a sweep circuit. (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**PULSE AND DIGITAL CIRCUITS**  
 (Com. to EEE, ECC)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

**PART - A**

1. a) Relate High pass RC circuit with clipper.  
 b) Relate clipper with an attenuator.  
 c) What is the difference between transient and steady state responses?  
 d) What is the difference between self bias binary and fixed bias binary?  
 e) Draw the Hysteresis for PNP - BJT multivibrator.  
 f) Obtain the relation of time period for an Astable multi.  
 g) Mention differences between PMOS and NMOS logic.  
 h) Define the different errors related to time base generators.  
 i) What is a sampling gate? (3M+2M+3M+2M+3M+2M+3M+2M+2M)

**PART - B**

2. a) How RC circuit behaves as a differentiator and an Integrator? Discuss. (8M+8M)  
 b) How BJT behaves as switch? Give details
3. a) Draw the circuit of BJT clipper and explain the operation. (8M+8M)  
 b) Draw the circuit of emitter coupled clipper and explain the operation
4. a) What are the effects of commutating capacitors in a binary? Give reasons (8M+8M)  
 b) Draw the circuit of emitter coupled binary and its wave forms with all details.
5. a) Draw the OR gate and AND gate with diodes and analyze. (8M+8M)  
 b) List out the merits of ECL and its applications
6. a) Draw the circuit of UJT-time base generator and explain its operation wave forms. (8M+8M)  
 b) Relate current sweep and voltage sweep with examples.
7. a) Explain in detail about synchronization of sweep circuit with symmetrical signals (8M+8M)  
 b) Draw the circuit of bidirectional sampling gate using two BJTs and explain the operation of it.



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**PULSE AND DIGITAL CIRCUITS**  
 (Com. to EEE, ECC)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**
- ~~~~~

**PART - A**

1. a) Relate Low pass RC circuit with clipper.  
 b) List out different attenuators.  
 c) Define transition time and settling time.  
 d) Draw the inverter circuit with BJT.  
 e) Draw the circuit for monostable multi if Q1 is ON and Q2 is OFF.  
 f) Mention differences between DTL and TTL.  
 g) Mention the differences between CMOS and NMOS logic.  
 h) What is the difference between miller and bootstrap sweep circuits?-3m  
 i) Define pulse synchronization. (2M+2M+2M+2M+3M+3M+3M+3M+2M)

**PART - B**

2. a) Relate the operation of series clipper and shunt clipper with corresponding RC circuits and give reasons for it.  
 b) Obtain the relation between junction temperature and reverse saturation current and give details. (8M+8M)
3. a) How to draw the transfer characteristics of a two level clipper having more than two diodes? Give an example and compare your answer.  
 b) Prove clamping circuit theorem by including cut-in voltage of diode. (8M+8M)
4. a) Design Schmitt trigger circuit for  $V_H=2.2V$  and assume all the other data reasonably.  
 b) Compare waveforms of collector coupled Astable multi for NPN and PNP BJTs. (10M+6M)
5. Explain the following with neat diagrams,  
 i) MOS inverter, ii) Two-input MOS NAND gate and iii) Two-input MOS NOR gate. (16M)
6. a) Draw the circuit diagram of BJT-boot strap time base generator and derive sweep speed error  
 b) Obtain the relation between  $e_s$ ,  $e_d$  and  $e_t$ . (10M+6M)
7. a) Explain the sine wave frequency division of a sweep circuit.  
 b) With the help of neat diagram explain the working of a four-diode gate (8M+8M)



**II B. Tech II Semester Regular Examinations, May/June - 2015**  
**PULSE AND DIGITAL CIRCUITS**  
 (Com. to EEE, ECC)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)  
 2. Answer **ALL** the question in **Part-A**  
 3. Answer any **THREE** Questions from **Part-B**

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PART - A

1. a) Define tilt.
 b) How do you draw the transfer characteristics to get square wave as output for a clipper?
 c) Define resolution time and resolving time.
 d) Define rise time and obtain the relation.
 e) Why clamping circuit is called as DC restorer circuit?
 f) Differentiate voltage and current sweep circuits.
 g) Draw the bootstrap BJT time base generator circuit.
 h) Mention the differences between ECL and AOI logic.
 i) Draw the four diode gate. (2M+3M+2M+2M+2M+3M+2M+3M+3M)

PART - B

2. a) Obtain the output voltage levels of RC low pass circuit for square wave input.
 b) List out the switching characteristics of diode and BJT (8M+8M)
3. a) What are practical clamping circuits? Differentiate with an ideal circuit.
 b) Compare series and shunt clippers with all possible cases. (8M+8M)
4. a) Draw the circuit of emitter coupled mono stable multi and explains the operation.
 b) Draw the circuit of emitter coupled Astable multi and explains the operation (8M+8M)
5. Explain the following with neat diagrams.
 a) Dynamic MOS inverter, b) Dynamic NAND gate, and c) Dynamic NOR gate. (16M)
6. a) With the help of a circuit diagram and waveforms, explain frequency division by an astable multivibrator.
 b) Draw the circuit of bi-directional BJT gate and explain the operation. (8M+8M)
7. a) With the help of a neat diagram, explain the working of bi-directional gates using transistors.
 b) How pedestal shall be cancelled by sampling gate? Discuss. (8M+8M)



II B. Tech II Semester Regular Examinations, May/June – 2015
SWITCHING THEORY AND LOGIC DESIGN

(Com. to EEE, ECE, ECC, EIE.)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART-A

1. a) Represent +65 and -65 in sign magnitude, sign 1's complement and sign 2's Complement representation.
- b) Define prime implicant and essential prime implicants of a Boolean expression
- c) List the applications of Multiplexers.
- d) Implement the following Boolean function using PROM
 $F_1(A_1, A_0) = \sum m(1, 2)$ $F_2(A_1, A_0) = \sum m(0, 1, 3)$
- e) Write the differences between combinational and sequential circuits.
- f) Sketch Mealy circuit and explain.

(4M+4M+3M+3M+4M+4M)

PART - B

2. Implement the following functions using NAND gates.
 - a) $F_1 = A(B + C D) + (B C)^1$
 - b) $F_2 = w x^1 + x^1 y (z + w^1)$ (8M+8M)
3. Minimize the following function using K-map and also verify through tabulation method.
 $F(A, B, C, D) = \sum m(1, 4, 5, 7, 8, 9, 12, 14) + d(0, 3, 6, 10)$. (16M)
4. a) Define decoder. Construct 3x8 decoder using logic gates and truth table.
 b) Define an encoder. Design octal to binary encoder. (8M+8M)



5. a) Derive the PLA programming table for the combinational circuit that squares a 3 bit number.
b) Implement the following Boolean functions using PAL.
 $W(A, B, C, D) = \sum m(0, 2, 6, 7, 8, 9, 12, 13)$
 $X(A, B, C, D) = \sum m(0, 2, 6, 7, 8, 9, 12, 13, 14)$
 $Y(A, B, C, D) = \sum m(2, 3, 8, 9, 10, 12, 13)$
 $Z(A, B, C, D) = \sum m(1, 3, 4, 6, 9, 12, 14)$ (8M+8M)
6. Convert the following
a) JK flip-flop to T flip-flop
b) RS flip-flop to D flip-flop (8M+8M)
7. A clocked sequential circuit is provided with a single input x and single output z, whenever the input produces a string pulsed 111 or 000 and at the end of the sequence it produces an output z=1 and overlapping is also allowed.
a) Obtain state diagram and state table.
b) Find equivalence classes using partition method and design the circuit using D flip-flop. (8M+8M)



II B. Tech II Semester Regular Examinations, May/June – 2015
SWITCHING THEORY AND LOGIC DESIGN
 (Com. to EEE, ECE, ECC, EIE.)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART-A

1. a) Perform $(24)_{10} - (56)_{10}$ in BCD using 9's complement
- b) State De Morgans's theorems.
- c) Design 2x4 decoder using NAND gates.
- d) Give the comparison between PROM, PLA and PAL.
- e) What are applications of Flip-Flop?
- f) Write capabilities and limitations of Finite- State machine.

(4M+3M+4M+4M+3M+4M)

PART - B

2. Find the complement of the following Boolean functions and reduce them to minimum number of literals.
 - a) $(b c^1 + a^1 d) (ab^1 + cd^1)$
 - b) $(b^1 d + a^1 b c^1 + a c d + a^1 b c)$
3. Simplify the following Boolean expressions using K-map and implement it by using NOR gates.
 - a) $F(A,B,C,D) = AB^1 C^1 + AC + A^1 CD^1$
 - b) $F(W,X,Y,Z) = w^1 x^1 y^1 z^1 + w x y^1 z^1 + w^1 x^1 yz + wxyz$
4. a) Design and implement a two bit comparator using logic gates.
 b) Implement full adder using decoder and OR gates.
5. a) Design a BCD to excess-3 code converter and implement using suitable PLA.
 b) Implement the following functions using a PROM
 - i) $F(w,x,y,z) = \sum(1,9,12,15)$
 - ii) $G(w,x,y,z) = \sum(0,1,2,3,4,5,7,8,10,11,12,13,14,15)$



6. a) Draw the logic diagram of a JK flip- flop and using excitation table explain its operation.
 b) What do you mean by triggering? Explain the various triggering modes with examples.
 (8M+8M)
7. Find the equivalence partition and a corresponding reduced machine in a standard form for a given machine.

PS	NS	Z
	X=0	X=1
A	B,0	E,0
B	E,0	D,0
C	D,1	A,0
D	C,1	E,0
E	B,0	D,0
F	C,1	C,1
G	C,1	D,1
H	C,0	A,1

(16M)



II B. Tech II Semester Regular Examinations, May/June – 2015
SWITCHING THEORY AND LOGIC DESIGN
 (Com. to EEE, ECE, ECC, EIE.)

Time: 3 hours

Max. Marks: 70

- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
 2. Answer **ALL** the question in **Part-A**
 3. Answer any **THREE** Questions from **Part-B**

PART- A

1. a) Convert $(97.75)_{10}$ to base 2.
- b) Prove that OR-AND network is equivalent to NOR-NOR network.
- c) Realize full adder using two half adders and logic gates.
- d) Design a 4x2 PROM with AND-OR gates.
- e) Define the following terms of flip flop.
 - i) Hold time ii) Setup time iii) Propagation delay time
- f) Distinguish between Moore and Mealy Machines.

(3M+4M+4M+3M+4M+4M)

PART- B

2. a) Convert the given expression in standard SOP form
 $f(A,B,C)=AC+BA+BC$
- b) Convert the given expression in standard POS form
 $y=A.(A+B+C)$ (8M+8M)
3. a) Reduce the following function using k-map technique
 $F(A,B,C,D)=\prod(0,2,3,8,9,12,13,15)$
- b) Minimize the expression using k-map
 $y=(A+B+C^1)(A+B+C)(A^1+B^1+C^1)(A^1+B+C)(A+B+C)$ (8M+8M)
4. a) Design BCD to gray code converter and realize using logic gates.
- b) Design a 1:8 demultiplexer using two 1:4 demultiplexer. (8M+8M)
5. a) Implement the following Boolean functions using PLA.
 $A(x,y,z)=\sum m(1,2,4,6)$
 $B(x,y,z)=\sum m(0,1,6,7)$
 $C(x,y,z)=\sum m(2,6)$
- b) Design a combinational circuit using PROM that accepts 3-bit binary number and generates its equivalent excess-3 code. (8M+8M)



6. a) Draw the logic diagram of a SR latch using NOR gates. Explain its Operation using excitation table.
 b) Convert D flip-flop into T and JK flip-flops. (8M+8M)

7. a) Convert the following Mealy machine into a corresponding Moore Machine.

8. PS	9. NS	a. Z
	10. X=0	11. X=1
12. A	13. C,0	14. B,0
15. B	16. A,1	17. D,0
18. C	19. B,1	20. A,1
21. D	22. D,1	23. C,0

- b) Convert the following Moore machine into a corresponding Melay Machine

24. PS	i. NEXT STATE		25. OUTP UT 26. Z
	27. X=0	28. X=1	
29. A	30. D	31. B	32. 0
33. B	34. B	35. C	36. 1
37. C	38. C	39. D	40. 0
41. D	42. D	43. B	44. 0

(8M+8M)



Code No: RT22022

R13

SET - 4

II B. Tech II Semester Regular Examinations, May/June – 2015
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, EIE.)

Time: 3 hours

Max. Marks: 70

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- Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer **ALL** the question in **Part-A**
3. Answer any **THREE** Questions from **Part-B**
-

PART-A

1. a) Convert $(2468)_{10}$ to $()_{16}$
b) What are the advantages of tabulation method over K-map?
c) Implement the following functions using Demultiplexer.
 $F_1(A,B,C) = \sum m(0,3,7)$ $F_2(A,B,C) = \sum m(1,2,5)$
d) Write a brief note on PLDs
e) Give the comparison between synchronous sequential and asynchronous sequential circuits
f) Draw and explain Moore circuit.

(3M+4M+4M+3M+4M+4M)

PART - B

2. a) Given the 8bit data word 01011011, generate the 12 bit composite word for the hamming code that corrects and detects single errors.
b) Perform the following addition using excess-3 code.
i) $386+756$ ii) $1010 + 444$ (10M+6M)
3. Simplify the following using tabulation method
 $y(w,x,y,z) = \sum m(1,2,3,5,9,12,14,15) + d(4,8,11)$ (16M)
4. a) Design a excess-3 adder using 4-bit parallel binary adder and logic gates.
b) What are the applications of full adders? (12M+4M)



5. a) Illustrate how a PLA can be used for combinational logic design with reference to the functions

$$F_1(A,B,C)=\sum m(0,1,3,4) \quad F_2(A,B,C)=\sum m(1,2,3,4,5)$$

Realize the same assuming that a 3x4x2 PLA is available.

- b) Reliaze the following four Boolean functions using PAL.

$$F_1(w,x,y,z)=\sum m(0,1,2,3,7,9,11) \quad F_2(w,x,y,z)=\sum m(0,1,2,3,10,12,14)$$

$$F_3(w,x,y,z)=\sum m(0,1,2,3,10,13,15) \quad F_4(w,x,y,z)=\sum m(4,5,6,7,9,15)$$

(8M+8M)

6. a) Construct a JK flip flop using a D flip flop, a 2x1 multiplexer and an inverter.
 b) Draw the schematic circuit of RS master slave flip flop. Give its truth table and justify the entries in the truth table. (8M+8M)
7. a) Draw the diagram of Mealy type FSM for serial adder.
 b) Draw the circuit for Moore type FSM. (8M+8M)

