Code No: RT22016 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May – 2016
STRUCTURAL ANALYSIS-I
(Civil 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**

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PART –A

1. a) Draw the BMD for propped cantilever with prop at free end carrying a point load at centre. (4M)
   b) Draw the S.F.D for a fixed beam carrying eccentric load. (4M)
   c) Write the equations of the Claypeyron's theorem with sinking of supports (3M)
   d) A 2M long cantilever beam carries a point load of 6000N at the free end. The beam is 15cm wide and 20 cm deep. If $E=2.1x10^6 N/cm^2$, find slope of the cantilever (4M)
   e) A simply supported beam of length L carries a point load W at the centre. Find the deflection using energy theorem. (4M)
   f) Draw I.L.D for the Bending Moment at a section X for a simply supported beam AB (3M)

PART –B

2. a) A timber beam 12cm wide,20cm deep and 4M long is loaded with a uniformly distributed load .It is fixed at the left end and simply supported at the right end.If the maximum allowable fibre stress is $10N/mm^2$ and right support settles by an amount equal to $wl^4/24$ EI,where w is load per meter run.determine the permissible value of load w. (12M)
   b) Differentiate between cantilever and propped cantilever. (4M)

3. Derive the equation for a fixed beam with ends at different levels. (16M)

4. A continuous beam ABCD is simply supported over three spans. Span AB is 9m carrying an udl of 5kN/m, span BC is 14M carrying an udl of 5kN/m and span CD is 6M carrying an udl of 8kN/m. Find the moment over supports B and C.Draw B.M.D. (16M)

5. A Continuous beam is fixed at A and is supported over rollers at B and C. AB=BC=12M.The beam carries a uniformly distributed load of 30kN/m over AB and a point load of 240kN at a distance of 4M from B on span BC.B has an settlement of 30mm.$E= 2 x10^5 N/mm^2$,$I= 2 x 10^9 mm^4$.Analyse the beam by slope deflection method. (16M)

6. a) Derive the strain energy equation due to axial loading. (6M)
   b) Analyze a continuous beam simply supported at A,B and C .The span AB is 6M and BC is 8M. The span AB is carrying an udl of 30kN/m and span BC carries a load of 40kN at a distance of 3M from B. Use Strain energy method. Draw the B.M.D. (10M)

7. Two point loads of 6000N and 3000N spaced 4M apart cross a girder of 10 m span from left to right, with smaller loading leading. Draw the SF and BM diagrams. Find the position and amount of absolute maximum bending moment. (16M)

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Code No: RT22016 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May – 2016
STRUCTURAL ANALYSIS-I
(Civil 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**

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PART –A

1. a) Differentiate between cantiver and propped cantilever. (2M)
b) Draw the B.MD for a fixed beam carrying an eccentric load. (4M)
c) Write the equations of the Clapeyron's theorem for different moments of inertia. (3M)
d) A point load of 12kN is placed at a distance of 5.5M from a 7m long cantilever beam. If E=$2.1x10^6$N/cm^2 and I=50000cm^4, determine the slope at the free end. (5M)
e) A cantilever beam of length L carries a point load W at the free end. Find the deflection at free end using energy theorem (4M)
f) Draw I.L.D for the reaction at A for a simply supported beam AB. (4M)

PART -B

2. a) A cantilever AB of length 2M is fixed at end A and B rests at the centre of simply supported beam of span 4M.Find the support moment at A and deflection at B when the cantilever is loaded with uniformly distributed load of 20,000N/m EI for cantilever is 1 x 10^7 Nm^2 and EI for simply supported beam is 2 x$10^7$$Nm^2$ (12M)
b) Write about moment area method (4M)

3. A fixed beam of length 12M carries two point loads at a distance of 4M and 8M from left end respectively. Find the fixed end moments under the loads when the beam is simply supported. Draw the B.M.D. (16M)

4. A continuous beam ABC of length 10M is simply supported ,AB and BC is of length 5M each. Span AB carries an udl of 4kN/m and BC carries an udl of 5kN/m.Support B sinks down by 5Mm below the supports of A and B.The moment of inertia of the beam is 10^8 mm^4 and E is 180kN/mm^2.Find the support moments and draw the B.M.D. (16M)

5. A Continuous beam is fixed at A and is supported over rollers at B and C. AB=BC=14M.The beam carries a uniformly distributed load of 40kN/m over AB and a point load of 260kN at a distance of 4M from B on span BC.B has an settlement of 25m.E= 2 x10^5 N/mm^2,I= 2 x 10^9 mm^4.Analyse the beam by slope deflection method. (16M)

6. a) Derive the strain energy equation due to bending moment. (6M)
b) Analyze a continuous beam simply supported at A,B and C .The span AB and BC is 6M each. The two spans are carrying an udl of 32kN/m over entire span. Use Strain energy method Draw the B.M.D. (10M)

7. A uniform load of 2000N/m,5M long crosses a girder of 20m span from left to right.Calculate the maximum S.F and B.M at a section 8M from left support. (16M)

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Code No: RT22016 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May – 2016
STRUCTURAL ANALYSIS-I
(Civil 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**

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PART –A

1. a) Draw the B.M.D for a propped cantilver carrying U.D.L throughout. (4M)
   b) Prove that for fixed beam area of BM diagram due to vertical loads is equal to the area of B,M diagram due to end loads. (4M)
   c) What do you mean by continuous beams? Show the different types of continuous beams with the help of sketches (4M)
   d) A 3M long cantilever beam carries a point load of 9000N at the free end. The beam is 20cm wide and 40 cm deep. If E=2.1x10^6N/cm^2, find deflection of the cantilever (4M)
   e) State Castigliano's first theorem. (3M)
   f) Draw I.L.D for the Shear force at a section X for a simply supported beam AB. (3M)

PART -B

2. a) A timber beam 14cm wide,24cm deep and 6M long is loaded with a uniformly distributed load .It is fixed at the left end and simply supported at the right end.If the maximum allowable fibre stress is 12N/mm^2 and right support settles by an amount equal to $wl^4/24$ EI,where w is load per meter run. Determine the permissible value of load w. (12M)
   b) Draw the BMD for a propped cantilever with an over hang at L/4 from free end carrying a point load at free end (4M)

3. A fixed beam of length 15M carries two point loads at a distance of 5M and 10M from left end respectively. Find the fixed end moments under the loads when the beam is simply supported. Draw the B.M.D. (16M)

4. Derive the Clayperon's theorem of three moments. (16M)

5. A Continuous beam is fixed at A and is supported over rollers at B and C. AB=BC=16M.The beam carries a uniformly distributed load of 40kN/m over AB and a point load of 240kN at a distance of 4M from B on span BC.B has an settlement of 30mm.E= 2 x10^5 N/mm^2,I= 2 x 10^9 mm^4.Analyse the beam by slope deflection method.

6. a) Derive the strain energy equation due to shear force (8M)
   b) Analyze a continuous beam simply supported at A,B and C .The span AB and BC is 8M each. The span AB is carrying a load of udl of 24kN/m and BC is carrying load of 40kN at the mid point of BC.Use Strain energy method .Draw the B.M.D. (8M)

7. Two point loads of 5000N and 2000N spaced 3M apart cross a girder of 9 m span from left to right, with smaller loading leading. Draw the SF and BM diagrams. Find the position and amount of absolute maximum bending moment. (16M)
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Code No: RT22016 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May – 2016
STRUCTURAL ANALYSIS-I
(Civil 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**

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PART –A

1.	a)	Differentiate between cantiver and propped cantilever.	(4M)
	b)	Draw the B.MD for a fixed beam carrying U.D.L throughout the span.	(4M)
	c)	State Clapeyron's three moment theorem	(4M)
	d)	A point load of 10kN is placed at a distance of 5M from a 7m long cantilever beam. If $E=2.1x10^6 N/cm^2$ and $I=50000cm^4$, determine the deflection at the free end.	(4M)
	e)	A simply supported beam of length L carries an eccentric load W . Find the deflection using energy theorem	(3M)
	f)	Draw I.L.D for the reaction at B for a simply supported beam AB.	(3M)

PART -B

2.	a)	Find the support moment for the propped cantilever carrying uniformly varying load w/unit length from A to B. Draw B.M.D	(12M)
	b)	What are the steps involved in the analysis of propped cantilever.	(4M)
3.		Derive the equation with the effect of rotation on one end of a fixed beam.	(16M)
4		A continuous beam ABCD is simply supported over three spans. Span AB is 8M carrying an udl of 4kN/m, span BC is 12M carrying an udl of 3kN/m and span CD is 5M carrying an udl of 6kN/m. Find the moment over supports B and C.Draw B.M.D.	(16M)
5.		A Continuous beam is fixed at A and is supported over rollers at B and C. AB=BC=10M.The beam carries a uniformly distributed load of 20kN/m over AB and a point load of 200kN at a distance of 4M from B on span BC.B has an settlement of 20mm.$E= 2 x10^5 N/mm^2$,$I= 2 x 10^9 mm^4$.Analyse the beam by slope deflection method.	(16M)
6.	a)	Derive the strain energy equation due to axial loading.	(4M)
	b)	Analyze a continuous beam simply supported at A,B and C .The span AB and BC is 8M each. The two spans are carrying a load of udl of 30kN/m over entire span. Use Strain energy method Draw the B.M.D.	(12M)
7.		Draw the influence line diagrams for forces in the members of a Warren Truss	(16M)
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Code No: RT22026 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May – 2016
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**

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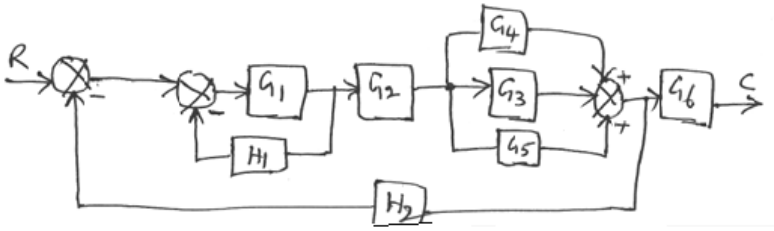
PART –A

1. a) State and explain the Mason's gain formula
   b) Define steady state error
   c) What is the necessary condition that the characteristic equation of a feedback system satisfies the BIBO stability?
   d) State the Nyquist Stability criterion
   e) Why bode plots are commonly used in the frequency domain design
   f) What are the properties of STM

PART -B

2. a) Explain the reduction of parameter variation by feedback.
   b) Using block diagram reduction technique finds the transfer function for the system shown in below Figure



3. a) What is meant by step, ramp, parabolic and impulse inputs
   b) The open-loop transfer function of a control system with unity feedback is

$$G(s) = \frac{150}{s(1+0.25s)}$$

i) Evaluate the error series for the system
ii) Determine the steady state error for an input
$r(t) = (1+t^2)\, u(t)$

4. a) Explain the construction rules for root locus technique
   b) Test the stability of the system with the following characteristic equation by Routh's test $s^6 + 2s^5 + 8s^4 + 20s^2 + 16s + 16 = 0$

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5. a) Explain frequency domain specifications.
   b) A unity feedback control system has an open loop transfer function given by G(s) H(s) = $\frac{100}{s(s+5)(s+2)}$ .Draw Nyquist diagram and determine 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 $\geq 40^{o}$ and velocity error constant, $K_v \geq 20$.

7. a) List out the advantages of state space techniques
   b) Determine the state model of the system for the following transfer function

$$\frac{Y_{(s)}}{U_{(s)}} = \frac{2s^2 + s + 5}{s^3 + 6s^2 + 11s + 4}$$

Code No: RT22026 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May – 2016
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**

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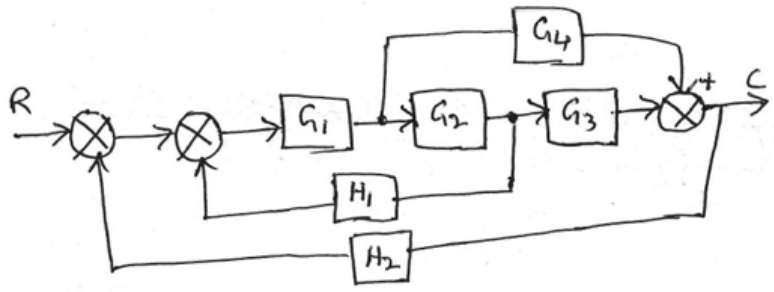
PART –A

1. a) How the control systems are classified
   b) Define steady state response
   c) When does the procedure for making the Routh array gets terminated
   d) What is meant by asymptotes
   e) What is the need of compensator
   f) What are the merits of state variable technique

PART –B

2. a) What are the requirements for good servomotor
   b) Find the gain of the system using signal flow graph approach for a given block diagram as shown in Figure below.



3. a) Explain time domain specification
   b) For a negative feedback control system
   $G(s) = \frac{10}{s(0.45+1)}$ and $H(s) = \frac{5}{s+4}$. Using generalized error series determine the steady state error of the system when the input applied is $r(t) = 1+3t+4t^2$.

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4. a) Define and derive the breakaway point on the root locus
   b) Determine the number of roots of a given polynomial with real parts between zero and –1, $8s^2 + 44s^4 + 126s^3 + 219s^2 + 258s + 85 = 0$

5. a) Derive the relation between phase margin and damping ratio
   b) Sketch the polar plot for a given open loop transfer function.

$$G(s) = \frac{10}{s(s+1)(s+3)}$$

6. A unit feedback system has an open loop transfer function

$G(s) = \frac{K}{s(s+1)(0.2s+1)}$. Design a phase lag compensator to meet the following specifications.

Velocity error constant = 8

Phase margin $\geq 40^o$

7. a) Explain the concepts of state, state variables and state model
   b) Determine the state model of the system characterized by the differential equation $(s^4 + 2s^2 + 8s^3 + 4s + 3)\ Y(s) = 10\ U(s)$

Code No: RT22026 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May – 2016
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**

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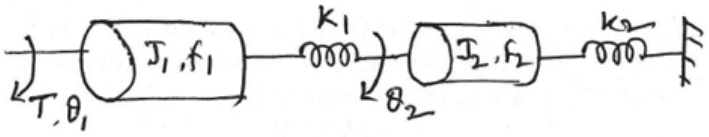
PART –A

1. a) Illustrate between open loop and closed loop control systems
   b) What are the standard test signals used in time domain analysis
   c) What is the effect of addition of poles on root locus
   d) What are the merits of frequency domain analysis
   e) What are the different types of electrical compensators
   f) Define the concept of state in state space analysis.

PART -B

2. a) Describe the AC servo motor and draw its torque vs speed characteristics
   b) Find the transfer function $\frac{\theta_2(s)}{T(s)}$ for a given rotational mechanical system is as shown in below figure



3. a) Define the steady state error and error constants of different types of inputs
   b) A unity feedback system has a forward path transfer function $G(s) = \frac{9}{s(s+1)}$.
   Find the value of damping ratio, undamped natural frequency of the system, percentage over shoot, peak time and settling time.

4. a) Explain the special cases in Rouths stability criterion
   b) Sketch the root locus for the characteristic equation is
   $s(s+1)(s+2) + k(s+1.5) = 0$

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5. a) Derive the correlation between time domain and frequency domain specifications
   b) Sketch the Bode plot and determine the Gain margin and phase margin

   For the transfer function is given, G(s) == $\frac{10}{s(1+0.4s)(1+0.1s)}$

6. A unity feedback system has an open loop transfer function

   G(s) = $\frac{K}{s(s+3)(s+10)}$ design a suitable lag compensation so that phase margin is $\geq 45^0$ and velocity error constant, $K_v \geq 15$

7. a) State and explain the concepts of Controllability and Observability.

   b) Given G(s) = $\frac{2}{s^2+5s+6}$, obtain the state space model of the system in the diagonal canonical form.

Code No: RT22026 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May – 2016
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**

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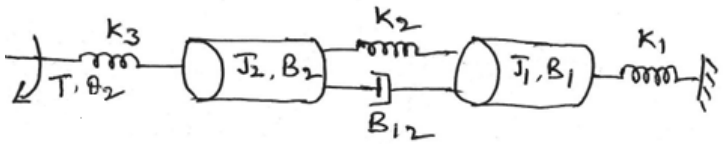
PART –A

1. a) Define the closed loop control system with diagram
   b) What is the different between type and order of a system
   c) What are the merits of root locus
   d) What are the frequency domain specification
   e) What is the need of lead-lag compensator
   f) What is controllability

PART –B

2. a) Explain the construction and operating principle of synchro transmitter with neat diagrams
   b) Derive the transfer function $\frac{\theta_2(s)}{T(s)}$ for the given rotational mechanical system shown in below figure



3. a) Derive the generalized error constants
   b) A unity feedback control system has a loop transfer function, $G(s) = \frac{10}{s(s+2)}$. Find the rise time, percentage overshoot, peak time and settling time for a step input of 12 units.

4. a) What are the necessary and sufficient conditions of stability for linear time invariant systems?
   b) The open loop transfer function of a unity feedback control system is given by $G(s) = \frac{k}{s(s+3)^2}$. Sketch the root locus plot of the closed loop system for positive values of k and there from determine the value of k that would make the system stable.

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5. a) Discuss the calculation of gain crossover frequency and phase crossover frequency with respective to the polar plots

   b) Determine the resonant frequency ω_r, resonant peak M_P and bandwidth for the system whose transfer function is

   $$G(j\omega)= \frac{5}{5+ j2\omega+(j\omega)^2}$$

6. Consider the open loop transfer function with unit feedback system,

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

   Design the lead-lag compensator so that

   a) Velocity error constant K_v is 5 sec^{-1}

   b) Phase margin not greater than 40^o

   c) Gain margin not greater than 10 db

7. a) State and prove the properties of STM

   b) Reduce the matrix A to diagonal matrix, $A = \begin{bmatrix} 3 & -2 \\ -1 & 2 \end{bmatrix}$

Code No: RT22044 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May – 2016
EM WAVES AND TRANSMISSION LINES
(Com to ECE, 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**

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Note: Smith chart is need to solve the problems.

PART –A

1. a) A sheet of charge lies in y-z plane at x=0 and has uniform surface charge density of 5.0 ρ C/m^2 .Find the electric field at a point , P(-5,0,0) on x-axis. (4M)
   b) Prove that ∇ XH = jωD + J (3M)
   c) Define elliptical polarization with suitable equation? (4M)
   d) Define Parallel polarization and perpendicular polarization (4M)
   e) Classify the types of transmission lines? (3M)
   f) What is meant by stub? Explain its use in transmission lines. (4M)

PART –B

2. a) In a spherical region the electric displacement is given by D=10r ^{2} a $_r$ mC / m ^{2}. Find the total charge enclosed by the volume specified by r=40cm , θ =π/4 And Φ=2π. (8M)
   b) Derive the magnetic field 'H' at a point 'p' due to a finite current element (8M)

3. How to convert differential form of 4-Maxwell equations into integral form? Explain? (16M)

4. a) Derive Wave equations in free space? (8M)
   b) An elliptical polarized wave has an Electric field of E=sin (ωt-βz) a $_x$ + 2sin (ωt-βz + 75 ^{0}) a $_y$ V/m. Find the power per unit area Conveyed by the wave in free space. (8M)

5. a) Prove that E $_I$ = - E $_r$ when the wave is normal incidence on a perfect Conductor? (8M)
   b) A perpendicularly polarized wave is incident at an angle of θ $_{I =}$ 15 ^{0} . It 's Propagating from medium 1 to medium 2 . Medium 1 is defined by ε $_{r1}$ =8.5 , μ $_{r1}$ =1 , σ $_1$ =0 and medium 2 is free space . If E $_I$ =1.0 mV/m , Determine E $_r$. H $_I$, H $_{r.}$ (8M)

6. a) From basic Transmission line, derive the secondary constant Equations? (8M)
   b) A lossy cable which has R=2.25Ω/m ,L=1.0μH/m, C=1 pF/m , and G=0 operates at f=0.5GHZ .Find the attenuation constant of the line. (8M)

7. a) For a transmission line which is terminated in normalized impedance Zn, VSWR = 2 . Find the normalized impedance magnitude. (8M)
   b) Write short notes on different lengths of transmission lines with shortend Load? (8M)

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Code No: RT22044 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May – 2016
EM WAVES AND TRANSMISSION LINES
(Com to ECE, 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**

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PART –A

1. a) An electron has a velocity of 1 Km /s along a_x in a magnetic field whose Magnetic flux density is B =0.2 a_x - 0.3a_y + 0.5 a_z Wb/m^2. Determine the electric field intensity if no force is applied to the electron. (4M)
   b) Represent the second maxwell's equation in integral form (3M)
   c) Define good conductors and good dielectrics ? (4M)
   d) Define Brewster angle? (3M)
   e) Define primary constants & secondary constants? (4M)
   f) What is the equivalent circuit element of transmission line of length l =λ/4 at Short end and open end (4M)

PART –B

2. a) Define potential difference? Mention the characteristics of potential difference? (8M)
   b) Prove that H= -I/ 2πρ a_Φ at point 'p' due to infinite current Element? (8M)

3. How to convert 4-Maxwell's equations into phasor form? Explain? (16M)

4. a) Define uniform plane wave and derive the general solution of uniform plane wave equation (8M)
   b) An circularly polarized wave has an electric field of E = Sin (ωt-βz) a_x V/m. Find power per unit area conveyed by the wave in free space? (8M)

5. a) Define and derive the reflection coefficient of a wave incidence is normal on dielectric ? (8M)
   b) Find the depth of penetration ,δ of an EM wave in copper at f= 60 Hz and f=100 MHz . For Copper , σ = 5.8 x 10^7 mho /m , ε_r =1 , μ_r =1 (8M)

6. a) Define the term characteristic impedance and derive the expression for it. (8M)
   b) A Transmission line in which no distortion is present has the following parameters : Z_0 =50 Ω, α=0.020 m^{-1} , v=0.6 v_0 . Determine R, L, G, C and Wavelength at 0.1 GHz. (8M)

7. a) Write short notes on reflection coefficient and VSWR? Derive the relation between them ? (8M)
   b) By using smith chart, Find the input impedance of 75 Ω losses transmission line of length 0.1λ,When the load is short. (8M)

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Code No: RT22044 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May – 2016
EM WAVES AND TRANSMISSION LINES
(Com to ECE, 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**

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PART –A

1. a) Calculate the capacitance of parallel plate capacitor of 'N' dielectric slabs with Different thickness? (4M)
   b) What are the boundary conditions between dielectric –dielectric and dielectric Conductor (4M)
   c) Mention the characteristics of E-H fields in Uniform plane wave ? (4M)
   d) Define Poynting Vector Theorm? (3M)
   e) What are the different types of loading? Explain. (3M)
   f) What is the equivalent circuit element of transmission line of length $l = \lambda/2$ at short end and open end? (4M)

PART –B

2. a) Prove that the energy stored in capacitor $W_c = \frac{1}{2} CV^2$ Joules (8M)
   b) The vector magnetic potential , A due to direct current in a conductor in free Space is given by $A = (x^2 + y^2)\, a_z\ \mu Wb/m^2$. Determine the magnetic Field produced by the current element at(1,2,3). (8M)

3. a) Explain the inconsistency in Ampere's law? (8M)
   b) Prove that E_{tan} is continuous and D_{norm} is discontinuous at boundary between 2-dielectric materials? (8M)

4. a) Prove that the intrinsic impedance of the Uniform plane wave is 377Ω (8M)
   b) What is meant by polarization? Explain. (8M)

5. a) Define and derive the transmission coefficient of a wave incidence in normal On dielectric? (8M)
   b) Discuss about power loss in a plane conductor. (8M)

6. a) Prove that the velocity of propagation is same in distortion less line and loss Less transmission line? (10M)
   b) List out the applications of transmission lines (6M)

7. a) Find the input impedance of a 75Ω lossless transmission line of length (0.1λ) If it is terminated in open circuit(using smith chart) (8M)
   b) Write short notes on different lengths of Transmission lines with open end load? (8M)

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Code No: RT22044 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May – 2016
EM WAVES AND TRANSMISSION LINES
(Com to ECE, 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**

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PART –A

1. a) The vector magnetic potential , A due to a direct current in a conductor in free space is given by $A = (x^2 + y^2)\, a_z$ $\mu Wb/m^2$. Find 'B '. (3M)
   b) If $D = 2x^2 a_x + a_y + 2z^2$ pC/m^2 , derive volume charge density (4M)
   c) Find the depth of penetration , δ of an EM wave in copper at f=60 Hz . For copper , $\sigma = 5.8 \times 10^7$ mho /m , $\mu_r = 1$, $\varepsilon_r = 1$. (4M)
   d) The magnetic field , H of a plane wave has a magnitude of 5 mA/m in a Medium defined by $\varepsilon_r = 4$, , $\mu_r = 1$.Determine the impedence of medium? (4M)
   e) Define Infinite transimission line? (3M)
   f) Define Reflection coefficient and range of reflection coefficient? (4M)

PART –B

2. a) Three parallel line charges , $\rho_{L1} = 5nC/m$, $\rho_{L2} = 4nC/m$, $\rho_{L3} = -6nC/m$ are located at (0,0), (3,0) and (0,4)m respectively . Find D and E at (3,4). (8M)
   b) A charge of 12C has velocity of $5a_x + 2a_y - 3a_z$ m/s . Determine F on the charge in the field of i) $E = 18a_x + 5a_y + 10a_z$ V/m
   ii) $B = 4a_x + 4a_y + 3a_z$ Wb/ $m^{2.}$ (8M)

3. a) Prove that H_{tan} is discontinuous and B norm is continuous at boundary Between 2 –mediums? (8M)
   b) $X < 0$ defines region 1 and $x>0$ defines region 2 . Region 1 is characterized by $\mu_{r1} = 3.0$ and region 2 characterized by $\mu_{r2} = 5.0$. If the magnetic field in region 1 is given by $H_1 = 4.0a_x + 1.5a_y + 3.0a_z$, A/m , find $\mathbf{H}_2$ and B_2. (8M)

4. a) When the amplitude of the magnetic field in a plane wave is 2A/m, (8M)
   i) Determine the magnitude of the electric field for the plane wave in free space
   ii) determine the magnitude of the electric field when the wave Propagates in a medium which is characterized by $\sigma = 0$, $\mu = \mu_0$ and $\varepsilon = 4\varepsilon_0$.
   b) Prove that E & H are perpendicular to each other in Uniform plane wave ? (8M)

5. a) What is Brewster Angle? Derive the expression for Brewster angle? (8M)
   b) The magnetic field , **H** of a plane wave has a magnitude of 5 mA/m in a medium defined by $\varepsilon_r = 4$, , $\mu_r = 1$. Determine i) the average power flow ii) The maximum energy density in the plane wave. (8M)

6. a) Define phase & group velocities in transmission line and derive the relation between them? (8M)
   b) A lossless transmission line used in a TV receiver has a capacitance of 50pF/m and an inductance of 200 nH/m .Find the characteristic impedance for section of a line 10 meter long? (8M)

7. a) Write short notes on stub matching technique? (8M)
   b) For a uniform transmission line , the open and short circuit impedances are given by $Zoc = 50 + j\,25\Omega$, $Zsc = 60 - j20\Omega$. Find Z_0 of the line. (8M)

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Code No: RT22055 **R13** SET - 1

II B. Tech II Semester Regular Examinations, April/May - 2016
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and 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**

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PART –A

1. a) Construct a finite automata that accepts {0,1}+. (4M)
   b) List out the properties of recursive and recursively enumerable language. (4M)
   c) Differences between DFA and NFA with examples. (4M)
   d) What is a regular set? Give examples for it. (3M)
   e) How to remove Ambiguity from grammars? Explain with an example. (4M)
   f) Define universal Turing machine and universal language. (3M)

PART -B

2. a) Construct a finite state automata that accepts the language $\{a^ib^jc^k/i,j,k>0\}$. (8M)
   b) What is a Finite state machine? Give the mathematical representation of FSM. Explain each component. (8M)

3. a) Show that the language $L= \{a^nb^nc^n: n\geq 0\}$ is not context free. (8M)
   b) Briefly explain about various operations on Strings with suitable examples. (8M)

4. Define the DFA and regular expression. DFA accepts all strings corresponding to the expression 1*01(0+11)*. Also explain how to convert DFA to regular expression by eliminating states. (16M)

5. a) Convert the following regular expression into NFA with ∈ transition. (8M)
   i) 1*0+1101 ii) (0+1)*
   b) Give the properties of regular expressions and state and prove Arden's theorem. (8M)

6. Remove all ∈ and unit production rules from the following CFG (16M)
   S → AaA/ CA/ BaB
   A → aaBa/ CDA / aa / DC
   B → bB / bAB / bb/ aS
   C → Ca / bc / D
   D → bD / A

7. a) Design a Turing machine that accepts the language $L =\{ WW^R / W\in (0+1)^*$ and W^R is reverse of W} (10M)
   b) What is post correspondence problem? Explain with an example. (6M)

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Code No: RT22055 **R13** SET - 2

II B. Tech II Semester Regular Examinations, April/May - 2016
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and 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**

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PART –A

1. a) Construct a finite automaton that accepts $\{0,1\}^*$ (4M)
   b) Write any one application of CFG with example. (4M)
   c) What are the differences between DFA and NFA? (4M)
   d) Obtain the regular expression to accept strings of a's , b's and c's such that fourth symbol from the right is a and ends with b. (4M)
   e) Differentiate Chomskey and Gueibach normal forms (3M)
   f) Role of Checking of symbols in a Turing machine. (3M)

PART -B

2. a) Construct a finite state automata that accepts those strings over {a,b} that contain aaa as substring. (8M)
   b) What is an Automaton? Give its classification. Give the applications of automata in real world. (8M)

3. a) Write detail note on recursive enumerable languages with an example. (6M)
   b) Compare and contrast between regular grammar and unrestricted grammar with example. (10M)

4. a) Convert the regular expression (ab+aba)* to a NFA. (8M)
   b) Construct a Non Deterministic Finite automaton (NDFA) with $\in$-moves for the regular expression (10+11)*00. (8M)

5. a) Briefly explain how to convert regular expression into Automata with an example. (8M)
   b) Mention the differences between DFA, NFA and e-NFA. (8M)

6. a) Construct a Greibach Normal Form grammar equivalent to the following CFG (8M)
   S → AA / 0
   A → SS / 1
   b) Prove that the following grammar of arithmetic expression is ambiguous. (8M)
   E → E+E / E*E / (E) / (id)

7. a) Draw a transition diagram for Turing machine and explain it in detail. (6M)
   b) Design a Turing machine to accept the set of al palindrome over {0,1}*. Draw a transition diagram for the Turing machine of the above. (10M)

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Code No: RT22055 **R13** SET - 3

II B. Tech II Semester Regular Examinations, April/May - 2016
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and 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**

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PART –A

1. a) Components of finite state automata. (4M)
   b) Give three examples of context sensitive grammar which are not context-free. (3M)
   c) Advantages and disadvantages of NDFA. (4M)
   d) What is Two-way DFA? Give its advantages of DFA. (4M)
   e) Show that the language L={ $a^n b^n$/ $n \geq 1$} is unambiguous. (4M)
   f) When do you say that a Turing machine accepts a string? (3M)

PART -B

2. a) Construct a finite state automata that recognizes all possible strings over the alphabet {0,1} ending with two consecutive zeros. (8M)
   b) Construct a finite state automata with $\in$-transition for the regular expression r=01*+10 (8M)

3. a) Show that the union of two recursive languages is recursive and the union of two recursive enumerable languages is also recursively enumerable. (8M)
   b) Explain the properties of recursive and recursively enumerable language in detail with an example. (8M)

4. a) Construct a DFA to accept the language L={w/w has both an even number of 0's and even number of 1's}. (8M)
   b) Explain the steps in the design of NFA with $\in$ - moves from NFA. (8M)

5. a) Construct a finite state automata equivalent to the regular expression (0+1)*(00+11)(0+1)* (8M)
   b) Explain the algorithm for optimization of DFA with suitable example. (8M)

6. a) Consider the CFG with the following production rules: (8M)
   S → aB/ bA
   A → bAA / aS/ a
   B → aBB / bS/ b
   Give the right most derivation and draw derivation tree for the string *abbaab*
   b) Find a Greibach normal form grammar equivalent to the following CFG. (8M)
   S → ASB/ AB
   A → a
   B → b

7. Design a Turing Machine which can multiply two positive integers. (16M)
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Code No: RT22055 **R13** SET - 4

II B. Tech II Semester Regular Examinations, April/May - 2016
FORMAL LANGUAGES AND AUTOMATA THEORY
(Computer Science and 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**

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PART –A

1. a) Draw a diagram for finite automata which represents a bank. (4M)
   b) What are context sensitive languages? Write one example. (3M)
   c) Draw a NFA which accepting the set of all strings whose second last symbol is 1. (4M)
   d) List the four components used to form a context free grammar. (4M)
   e) Chomsky normal form Vs Griebach normal form. (4M)
   f) Give examples of an undecidable problem. (3M)

PART –B

2. a) .Define the following terms, with an example for each: (8M)
      i) String ii) Alphabet iii) Powerset iv) Language
   b) Construct a finite state automata with $\in$-transition for the regular expression (ab+aba)* (8M)

3. a) Show that any non trivial property of the recursively enumerable language is undecidable. (8M)
   b) Define pumping lemma. How it is used in context free languages? (8M)

4. a) For the regular expression given below, obtain an NFA without $\in$-moves. (8M)
      (0+1)*(00+11)
   b) Discuss about equivalence of NFA and DFA. (8M)

5. a) Prove that regular sets are closed under union and complementation. (8M)
   b) Construct an NFA equivalent to the regular expression 10+(0+11)0*1 (8M)

6. a) Design a Moore machine that accepts all strings of 0's and 1's treated as binary integer number return a remainder 1 when divided by 3. (8M)
   b) Convert the following grammar into Chomsky Normal Form. (8M)
      S → aB/ bA
      A → bAA / aS/ a
      B → aBB / bS/ b

7. Design A Turing Machine to recognize the language $\{1^n2^n3^n/n\geq1\}$. (16M)

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Code No: R22023 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations, April/May - 2016
SWITCHING THEORY AND LOGIC DESIGN
(Com. to EEE, ECE, ECC, BME, EIE)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What is binary number system? Illustrate with the help of an example as to how can we convert a binary number (both integer and fractional) into its equivalent decimal number. (7M)
   b) What is a hexadecimal number system? List all the digits or symbols of this number system and Illustrate with the help of an example as to how can we convert a hexadecimal number (both integer and fractional) into its equivalent decimal number. (8M)

2. a) If a hamming code is constructed using odd parity and received code is 110101101, find if there is any error in it an also its bit position. (8M)
   b) Implement the following function using only NAND gates. (7M)
   $f = x'y'z' + x(yz + y'z')$

3. a) Draw the circuit of a adder- subtractor circuit and explain its operation in detail using suitable example for each case. (10M)
   b) Draw the circuit of a half adder and explain its operation. (5M)

4. Minimize the given function using tabular method and identify essential prime - implicants and prime implicants and write the minimal SOP expressions. (15M)
   $f(a,b,c,d,e) = \sum (0,1,2,8,9,10,11,15,17,21,23,25,27,31)$

5. a) Implement 32X1 MUX using 4X1 MUX (8M)
   b) Implement the following Boolean function using a decoder, (7M)
   $f = \pi (0,1,3,5,6,7,9,11,13,15)$

6. a) Design a 4-bit binary to gray code converter using PROM. (8M)
   b) Design a combinational logic circuit using PLA for the following functions; (7M)
   $f_1(a,b,c) = \sum m (0,1,3,5,6)$
   $f_2(a,b,c) = \sum m (1,2,3,5,6,7)$

7. a) Design a mod-7 up-down counter using SR flip-flops, also draw its logic diagram. (8M)
   b) Differentiate between synchronous sequential circuits and asynchronous sequential circuits and draw logic diagram of examples for each type. (7M)

8. Implement the Mealay sequential circuit defined by the following state table using JK flip-flops (15M)

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

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Code No: R22035 **R10** SET - 1

II B. Tech II Semester Supplementary Examinations, April/May - 2016
METALLURGY AND MATERIAL SCIENCE
(Com. to ME, AME, MM)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain crystallization of metals? Draw the cooling curves for pure metal and alloy?
   b) Compute the percentage ionic character of the interatomic bond for each of the following compounds: MgO, CsF, CdS, and FeO (8M+7M)

2. a) What are Hume Rothery rules? Explain with examples
   b) What is solid solution? Explain the types of solid solutions? (8M+7M)

3. a) Explain any two methods of construction of equilibrium diagrams.
   b) What is phase rule? What are the uses of phase diagrams? (8M+7M)

4. a) What are the different types of cast irons? Explain the properties of cast irons.
   b) Give the properties and applications of Hadfield manganese steels and tool steels. (10M+5M)

5. a) Which type of heat treatment process is done to steels to get coarse pearlite? Explain.
   b) Explain the construction of TTT diagrams? (8M+7M)

6. a) What is Cupronickel? Discuss the properties and the applications of cupronickels?
   b) What are the commercial alloys of aluminum? Briefly describe their uses. (8M+7M)

7. a) What are crystalline ceramics? Explain
   b) What are nano materials? Give their properties and applications? (8M+7M)

8. a) Classify composites and describe Metal - matrix composites?
   b) Briefly describe pultrusion and filament winding processes. (8M+7M)

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