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

II B. Tech II Semester Supplementary Examinations, Nov/Dec-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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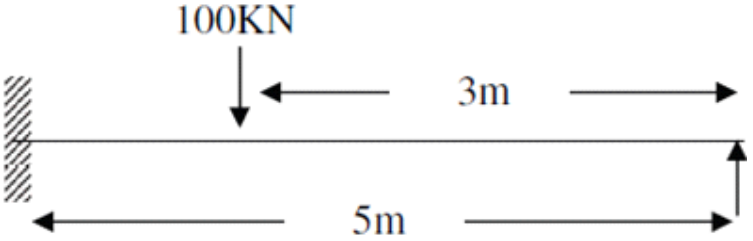
PART –A **[22M]**

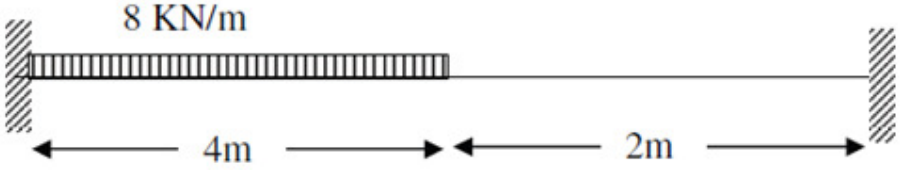
1. a) Write the difference between statically determinate and indeterminate structure?
   b) Write down the compatibility conditions for a fixed beam.
   c) What is a continuous beam? Explain the significance of choosing the bending moment as redundant by clapeyron in place of support reactions?
   d) Explain the terms Static Indeterminacy, Kinematic Indeterminacy and Degree if Indeterminacy.
   e) Explain briefly about strain energy in linear elastic system.
   f) Draw the influence diagram for a shear force at any section of a simply supported beam?

PART –B **[3×16=48M]**

2. Find the support moment for the propped cantilever loaded as shown in below figure if the support rotates clockwise by 0.003 radians. EI= 1×10^6 kgm^2.



3. Find fixed end moments for the fixed beam shown in below figure.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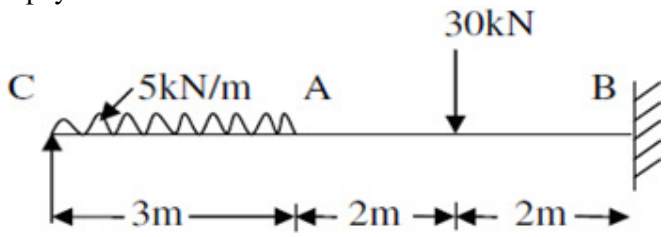
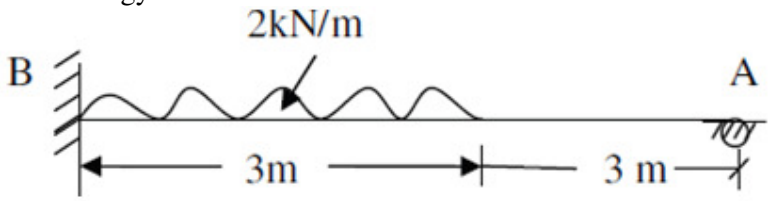
4. Draw the Shear force and bending moment diagram for the beam shown in below Figure. Use Clapeyorn's theorem of three moments. EI=1x10^5 N/mm^2.



5. A continuous beam is built in at A and it is carried over rollers at B and C with spans of AB and BC being 10m. The beam carries a uniformly distributed load of 7.5KN/m over AB and a point load of50KN over BC 2.5m from the support B, which sinks by 20mm. Values of E and I are 2 * 10^5N/mm^2 and 2 *$10^9$$mm^4$. Calculate the support moments and draw bending moment diagram giving critical values. Use Slope deflection method.

6. Determine the Reaction at A and the moment at B as shown in below Figure. Use Strain Energy method.



7. A System of five loads 75kN, 150kN, 150kN, 75kN and 50kN crosses a beam of 15m span with75kN leading the distance between the loads are 2.4m, 3.0m, 2.4m and 1.8m respectively. Find Maximum Bending Moment at the center of the span. Also find the absolute Maximum Bending Moment on the beam.

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Code No: RT22026 **R13** SET - 1

II B. Tech II Semester Supplementary Examinations, Nov/Dec-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) Why negative feedback is preferred in control systems. (3M)
   b) What do you mean by a signal flow graph? (3M)
   c) Name the standard test signals used in control systems and why are they needed. (3M)
   d) What do you mean by zero state response? (2M)
   e) Define the Phase cross over frequency. (2M)
   f) What is the requirement of gain margin and phase margin for a stable system? (3M)
   g) What is the basis for the selection of a particular compensator? (3M)
   h) What do you mean by decomposition of a transfer function? (3M)

PART-B

2. a) Compare in detail about Block diagram and signal flow graph methods. (8M)
   b) Derive the transfer of AC servo motor. (8M)

3. a) Explain the time response of under damped 2nd order system along with its transient response specifications (8M)
   b) The open – loop transfer function of a unity feedback system is (8M)

   $G(s) = \frac{8}{s(s+6)}$ Determine the nature of response of the closed – loop system for a unit – step input. Also determine the rise time, peak time, peak over shoot and settling time.

4. A unity feedback control system is characterized by the open loop transfer function (16M)

   $G(s) = \frac{K(s+11)}{s(s+5)(s+9)}$ Using the Routh criterion

   i) Calculate the range of values of K for the system to be stable. ii) What is the marginal value of K for stability? Determine the frequency of oscillations if any iii) Check for K = 1, all the roots of the characteristic equation of the above system have the damping factor greater than 0.5.

5. a) Explain the procedure to determine the gain margin and phase margin of a system from its Bode plot? (8M)
   b) A feedback system has G(s) H(s) = $\frac{100(s+4)}{s(s+0.5)(s+10)}$ Draw the Bode plot and comment on stability. (8M)
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6. a) Derive the expression for the transfer function of a lead compensator. (10M)
   b) What are the effects of phase – lead compensation? (6M)

7. Write short notes on the following: (16M)
   (a) Controllability and observability
   (b) State transition matrix
   (c) Diagonalization

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

II B. Tech II Semester Supplementary Examinations, Nov/Dec-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) Define line charge and surface charge distributions. (3M)
   b) Explain the significance of boundary conditions. (4M)
   c) How can you determine the direction of wave propagation? (3M)
   d) Write the application of poynting theorem. (4M)
   e) Compare the transmission line characteristics of lossy, lossless and distortion less transmission lines. (4M)
   f) Sketch the input impedance of a lossless line for shorted and open circuited conditions. (4M)

PART -B

2. a) Define Electric potential and derive the relationship between electric potential and electric field. (8M)
   b) A circular loop located on $x^2 + y^2 = 9$, $z = 0$ carries a current of 10 A along $\mathbf{a}_\phi$. Determine **H** at (0, 0, 4) and (0, 0, -4). (8M)

3. a) What is inconsistency of Ampere's law? Explain how Maxwell modified this law. (8M)
   b) In free space, $\mathbf{E} = 20\cos(\omega t - 50x)\,\mathbf{a}_y$ V/m, Calculate $\mathbf{J_d}$, **H** and ω. (8M)

4. a) Derive the expression for intrinsic impedance in a lossy dielectric medium. (8M)
   b) Given that $\mathbf{E} = 40\cos(10^8 t - 3x)\mathbf{a}_y$ V/m (8M)
      (i) Determine the direction of wave propagation.
      (ii) The velocity of the wave and the wavelength.

5. a) Discuss about reflection and refraction of plane waves for oblique incidence with **E** perpendicular to the plane of incidence. (8M)
   b) An elliptically polarized wave in air has x and y components: (8M)
      $E_x = 4\sin(wt - \beta z)$ V/m
      $E_y = 8\sin(wt - \beta z + 75^0)$ V/m.
      Find the poynting vector.

6. a) What are secondary constants of transmission lines and explain their significance. (8M)
   b) An air line has a characteristic impedance of 70 Ω and a phase constant of 3 rad/m at 100 MHz. Calculate the inductance per meter and the capacitance per meter of the line. (8M)

7. a) Explain about double stub matching. (8M)
   b) Define reflection coefficient of a transmission line and derive the expression for it. (8M)

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

II B. Tech II Semester Supplementary Examinations, Nov/Dec-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) What is the role of Automata in real world?
   b) Define Context-Sensitive Language? Give example.
   c) List down the Advantages of Non-Deterministic Finite Automata?
   d) State and explain the the Components of Regular Expression?
   e) Give an eaxmple to show the Elimination of Unit Productions?
   f) Describe Multiple Tape Turing Machine? Is it true that multiple tape turing machine is superior to single tape turing machine in the language acceptance? Justify your answer?
   (3M+4M+4M+4M+4M+3M)

PART-B

2. a) Construct a finite automata that accepts those strings over {a,b} that contain *aaa* as substring.
   b) Write a short notes on Automata Classification? (8M+8M)

3. a) Describe in detail about recursive enumerable languages?
   b) What is push down automata? Show how context free languages accepted by push down automata? (8M+8M)

4. Construct a Deterministic Finite State Automata equivalent to the NFA given below $M=\{(q_0,q_1,q_2,q_3), \{0,1\}, \delta, q_0, \{q_3\}\}$ where δ is defined by the following transition table

δ	0	1
q_0	(q_0,q_1)	(q_0)
q_1	(q_2)	(q_1)
q_2	(q_3)	(q_3)
q_3	null	(q_2)

(16M)

5. a) Construct an NFA equivalent to the regular expression 1*0+1101 and (0+1)*.
   b) Construct the regular grammar to generate the following Language $L=\{ a^n b^m \mid n,m \geq 1\}$
   (8M+8M)

6. a) Construct equivalent grammar in Chomsky Normal Form for the grammar
   G=({S,A,B, {a,b}, S->bA/aB, A->bAA/aS/a, B->aBB/bS/b } ,S}
   b) Give an example to explain the Relation between Regular Grammar and Finite Automata?
   (10M+6M)

7. Design a Turing Machine to recognize the language $L=\{ 1^n 2^n 3^n \mid n \geq 1\}$ (16M)

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

II B. Tech II Semester Supplementary Examinations, Nov/Dec-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) What are the effects of grain boundaries on the properties of metal?
   b) Calculate the average area (in $inch^2$ and mm^2) of a grain if the steel has ASTM grain size number? (8M+7M)

2. a) Write short note on intermediate and electron compounds with examples.
   b) Explain the concept of alloying with some examples. (8M+7M)

3. a) What are congruent melting intermediate phases? Give examples
   b) What is invariant reaction? Explain the types of invariant reactions. (8M+7M)

4. a) Explain spheroidal graphite cast iron and alloy cast iron?
   b) What are die steels? Write their applications (10M+5M)

5. a) Name the heat treatment process in which martensite structure is formed. Explain.
   b) What is normalizing? Write about cryogenic treatment of alloys. (8M+7M)

6. a) Write short note on properties of Brasses and Bronzes.
   b) What are the different types of aluminium alloys used in aerospace applications? Write their composition. (8M+7M)

7. a) Write about abrasive materials.
   b) What are Cermets? Write their applications. (8M+7M)

8. a) Write about C-C composites?
   b) Explain the factors affecting the strength of composites. (8M+7M)

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