

II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016
BUILDING PLANNING AND DRAWING
(Civil Engineering)

Time: 3 hours

Max. Marks: 70

Note: 1. Question Paper consists of two parts (**Part-A** and **Part-B**)
2. Answer any **Three** questions in **PART-A**
3. Answer **One** question from **PART-B**

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**PART-A**

(14 × 3 = 42M)

1. a) What are the objectives of building bylaws  
b) Write briefly about Open Space Requirements of buildings.
  
2. a) List out different purposes of rooms in a residential building?  
b) Explain the standard requirements of the following in a residential building.
  - i) Bed Room
  - ii) Drawing cum Dining Room
  
3. a) Write the importance and necessity in planning of industrial buildings?  
b) Write the importance and necessity in planning of hotels and motels
  
4. Explain CPM and PERT network plan?
  
5. a) Write the importance and necessity in planning of buildings for recreation.  
b) Explain the importance of height of buildings according to building bye-laws?



**PART-B**

(Answer any ONE question on drawing sheet)

(1 × 28 = 28M)

6. Draw the King Post Truss of 6.00 m clear span with all required elements like Purlins, rafters and battens. The cross sectional details are as follows.
- King post: 10cm × 10cm - 1.8 m Height
  - Principal Rafter: 12cm × 10cm - 3.5m long
  - Common Rafter: 10cm × 6cm - 80cm spacing
  - Eave Board: 10cm × 8cm
  - Cleats: 8cm × 8cm - 15cm long
  - Purlins: 12cm × 8cm
  - Battens: 4cm × 4cm
- Assume cross section of any other connection elements if required.
7. Draw the plan and sectional elevation along AB for the LINE diagram given below (Figure 2). Assume suitable Foundation details.

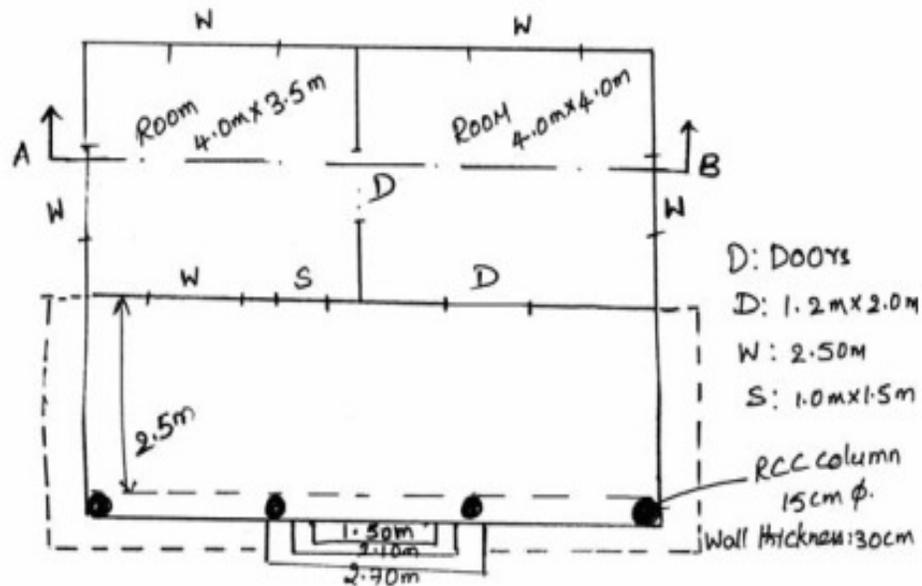


Figure 2

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**ENVIRONMENTAL STUDIES**  
 (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 is the importance of the Stockholm-Summit, when it is held? (4M)
- b) Explain water logging and salinity. (4M)
- c) Explain ecosystem diversity with examples. (4M)
- d) What are the water born diseases. (4M)
- e) What is rehabilitation? (3M)
- f) What is EMP. (3M)

**PART -B**

2. a) Define and explain food chain, food web & ecological pyramid with suitable examples. (8M)
- b) Describe population growth and explosion; explain its impacts on the environment. (8M)
3. a) What are the environmental effects of extracting and using mineral resources? (8M)
- b) Give brief note on land degradation and man induced landslides. (8M)
4. a) India is a mega biodiversity nation, Justify your answer. (8M)
- b) Explain endangered and endemic species of biodiversity. (8M)
5. a) Define soil pollution, explain its causes, effects and control measures. (8M)
- b) What is the role of an individual in prevention of pollution? (8M)
6. a) Explain water pollution prevention and control Act. (8M)
- b) Explain rain water harvesting methods with neat diagram. (8M)
7. a) Explain Objectives and Scope of Environmental Audit. (8M)
- b) Describe evolution of EIA in India. (8M)

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**KINEMATICS OF MACHINERY**  
 (Com. to ME, AME, MM)

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) Explain the term kinematic link. Give the classification of kinematic link. (4M)
- b) Explain about Grasshopper mechanism (3M)
- c) Define rubbing velocity at a pin joint. What will be the rubbing velocity at pin joint when the two links move in the same and opposite directions ? (4M)
- d) Define the following terms as applied to cam with a neat sketch : (3M)
  - i) Pressure angle, and ii) Stroke of the follower.
- e) Write a short notes on classification of toothed wheels. (4M)
- f) What are the various types of the torques in an epicyclic gear train ? (4M)

**PART -B**

2. a) What is the significance of degrees of freedom of a kinematic chain when it functions as a mechanism? Give examples. (6M)
- b) Sketch and explain the various inversions of a four bar chain. (10M)
3. a) Explain why two Hooke's joints are used to transmit motion from the engine to the differential of an automobile. (8M)
- b) The angle between the axes of two shafts connected by Hooke's joint is  $18^\circ$ . (8M) Determine the angle turned through by the driving shaft when the velocity ratio is maximum and unity
4. The crank and connecting rod of a theoretical steam engine are 0.5 m and 2 m long respectively. The crank makes 180 r.p.m. in the clockwise direction. When it has turned  $45^\circ$  from the inner dead centre position, determine : (16M)
  - i) velocity of piston , ii) angular velocity of connecting rod ,
  - iii) velocity of point E on the connecting rod 1.5 m from the gudgeon pin , iv) velocities of rubbing at the pins of the crank shaft, crank and crosshead when the diameters of their pins are 50 mm, 60 mm and 30 mm respectively ,v) position and linear velocity of any point G on the connecting rod which has the least velocity relative to crank shaft.



5. Derive the expressions for displacement, velocity and acceleration for a circular arc cam operating a flat-faced follower (16M)
- a) when the contact is on the circular flank, and
- b) when the contact is on circular nose
6. a) A pinion of 20 involute teeth and 125 mm pitch circle diameter drives a rack. The addendum of both pinion and rack is 6.25 mm. What is the least pressure angle which can be used to avoid interference? With this pressure angle, find the length of the arc of contact and the minimum number of teeth in contact at a time. (8M)
- b) Write short notes on helical and bevel gears. (8M)
7. a) Obtain the velocity ratio of an epicyclic gear train by tabular method? (8M)
- b) A compound train consists of six gears. The number of teeth on the gears are as follows : (8M)

|              |    |    |    |    |    |    |
|--------------|----|----|----|----|----|----|
| Gear :       | A  | B  | C  | D  | E  | F  |
| No. of teeth | 60 | 40 | 50 | 25 | 30 | 24 |

The gears *B* and *C* are on one shaft while the gears *D* and *E* are on another shaft. The gear *A* drives gear *B*, gear *C* drives gear *D* and gear *E* drives gear *F*. If the gear *A* transmits 1.5 kW at 100 r.p.m. and the gear train has an efficiency of 80 per cent, find the torque on gear *F*.

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**ELECTRONIC CIRCUIT ANALYSIS**  
 (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**

**PART -A**

1. a) What is the expression for harmonic distortion in tuned amplifiers? (4M)
- b) Which configuration is the best in cascade for an output stage and for an intermediate stage? (4M)
- c) Calculate the junction to ambient thermal resistance for a device dissipating 600 mW into an ambient of 60°C and operating at a junction temperature of 120°C. (4M)
- d) Explain the significance of the gain bandwidth product. (4M)
- e) What are the different types of Tuned Amplifiers and explain various areas of applications. (3M)
- f) Explain the limitations of RC phase shift oscillator. (3M)

**PART -B**

2. a) Derive the expression for  $f_T$  of a transistor. (8M)
- b) Derive an expression for Voltage gain, input resistance, output resistance of a source follower at high frequencies. (8M)
3. a) What are different types of distortions possible in amplifiers? (8M)
- b) Discuss about effect of  $C_b$  on frequency response of RC coupled amplifier. (8M)
4. a) What are various basic amplifiers used in a single feedback amplifier circuit and explain them. (8M)
- b) Using Linear analysis and negative feedback circuit analyze common collector circuit. (8M)
5. a) Derive the expression for frequency of oscillation and condition for sustained oscillation of a Hartley oscillator. (8M)
- b) Draw Wien bridge oscillator using BJT and show that the gain must be at least 3 for the oscillations to occur (8M)
6. a) A single transistor is operating as an ideal class B amplifier with a 10-K load. A dc meter in the collector circuit reads 8mA. How much signal power is delivered to the load? (8M)
- b) Explain the operation of a class A push-pull power amplifier and list out its advantages and disadvantages. (8M)
7. a) Draw the circuit for BJT tuned class B/C amplifier. Explain its working (8M)
- b) What is a stagger tuned amplifier? Explain its advantages and disadvantages. (8M)

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**PROBABILITY AND STATISTICS**  
 (Com. to CSE, IT, CHEM, PE, PCE)

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 random variable and cumulative distribution. Give an example of each.
- b) A coin is tossed until a tail appears. What is the expectation of the number of tosses?
- c) If we can assert with 95% that the maximum error is 0.05 and  $p=0.2$ , find the size of the sample.
- d) Write the application of t-test.
- e) Find the 'r' If  $\sigma_x = \sigma_y = \sigma$  and the angle between the regression lines is  $\tan^{-1} \frac{4}{3}$ .
- f) What is change variation and assignable variation (3M+4M+4M+3M+4M+4M)

**PART-B**

2. a) A continuous Random variable X has the distribution function

$$F(x) = \begin{cases} 0 & \text{if } x \leq 1 \\ k(x-1)^2 & \text{if } 1 \leq x \leq 3 \\ 1 & \text{if } x > 3 \end{cases} \quad \text{Find i) } f(x) \text{ ii) } k \text{ iii) mean.}$$

- b) Find the mean and standard deviation of a normal distribution in which 7% of items are under 35 and 89% are under 63. (8M+8M)
3. a) Find the moment generating function of the random variable whose moments are  $M_r = (r+1)! 2^r$
- b) let X be the a random variable with the following distribution.

|        |     |     |     |
|--------|-----|-----|-----|
| x      | -3  | 6   | 9   |
| P(X=x) | 1/6 | 1/2 | 1/3 |

Find  $E[X]$ ,  $E[X^2]$ ,  $E[2X+1]^2$ . (8M+8M)



4. A population consists of six numbers 4,8,12,16,20,24 consider all samples of size two. Which can be drawn without replacement from this population. Find
- The population mean.
  - The population standard deviation.
  - The mean of the sampling distribution of means.
  - The standard deviation of the sampling distribution of means. (16M)

5. a) Write about
- Critical region
  - Left tailed test
  - Right tailed test
  - Two tailed test.
- b) Three different machines are used for a production. On the basis of the outputs, set up One-way ANOVA table and hence, test whether the machines are equally effective. (8M+8M)

| OUTPUTS   |            |             |
|-----------|------------|-------------|
| Machine-I | Machine-II | Machine-III |
| 10        | 9          | 20          |
| 5         | 7          | 16          |
| 11        | 5          | 10          |
| 10        | 6          | 14          |

6. a) By the method of least squares fit a parabola of the form  $y=a+bx+cx^2$  to the following data.

|   |      |       |       |       |       |
|---|------|-------|-------|-------|-------|
| X | 2    | 4     | 6     | 8     | 10    |
| Y | 3.07 | 12.85 | 31.47 | 57.38 | 91.29 |

- b) Obtain the rank correlation coefficient for the following data. (8M+8M)

|   |    |    |    |    |    |    |    |    |    |    |
|---|----|----|----|----|----|----|----|----|----|----|
| X | 68 | 64 | 75 | 50 | 64 | 80 | 75 | 40 | 55 | 64 |
| Y | 62 | 58 | 68 | 45 | 81 | 60 | 68 | 48 | 50 | 70 |

7. a) Discuss the basic principles underlying control Charts. Explain in brief how control limits are determined for
- P-chart
  - C-chart.
- b) A drilling machine bores holes with a mean diameter of 0.5230 cm and a Standard deviation of 0.0032 cm. calculate the 2-sigma and 3-sigma upper and lower control limits for means of samples 4, and prepare a control Chart. (8M+8M)

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**ELECTRICAL CIRCUIT ANALYSIS - II**  
 (Electrical and Electronics Engineering)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks

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- Star connected alternator supplies a delta connected load. The impedance of load branch is  $(3+j4) \Omega$ /phase. The line voltage is 250V. Determine.
    - The current in the load branch;
    - power consumed by the load;
    - power factor of the load; and
    - Reactive power of the load.
  - The following unbalanced star-connected impedances are connected to a 440V, three phase, system:  $Z_R=j40\Omega$ ,  $Z_Y=j4 \Omega$ , and  $Z_B = -j4 \Omega$ , Calculate the line currents by using
      - Kirchhoff's laws
      - Star-Delta conversion
    - Explain how the three-phase power is measured using two-wattmeter method in an unbalanced three phase system.
  - A source voltage of 50 V is applied to series RL circuit at  $t = 0$  as shown in Figure 1. Using Laplace Transform method, determine the circuit current  $i(t)$  for all  $t \geq 0$ . Assume zero initial conditions.

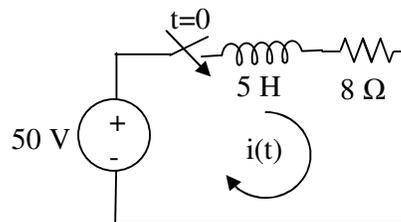
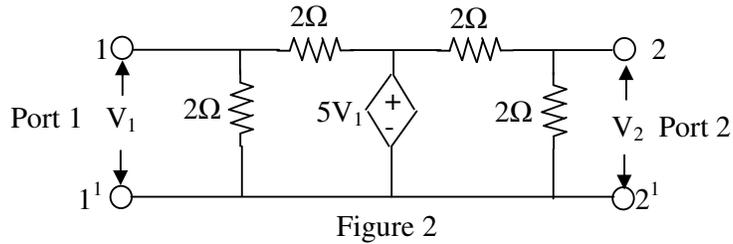


Figure 1

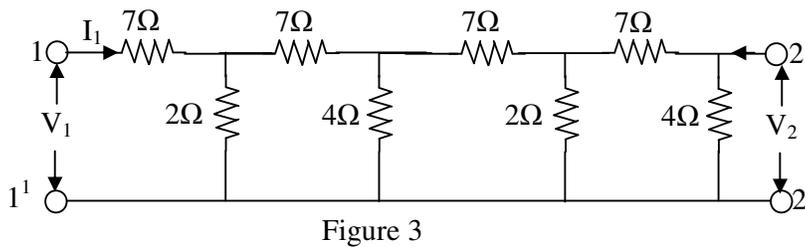
- A series R-C circuit consists of  $R = 20\Omega$  and  $C = 0.2 \text{ F}$  with a constant voltage of 30 V is applied to the circuit at  $t = 0$ . Obtain the current expression and also find voltage across resistor and capacitor
- An R-L-C series circuit with  $R=2 \text{ ohms}$ ,  $L=2 \text{ H}$ ,  $C=2 \text{ F}$ , are excited by an AC voltage of  $v(t)=20 \sin 2t$ . Find the current in the network for  $t>0$ . Assume at  $t=0^-$  the network was unenergized.



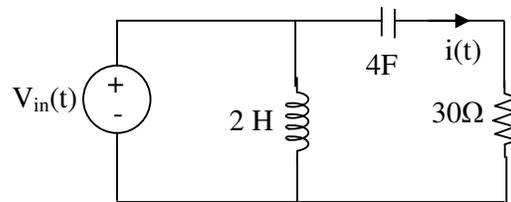
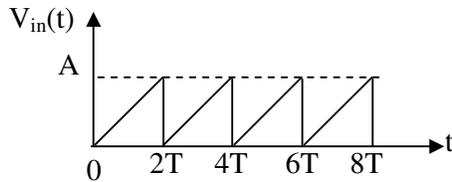
5. Determine the Z-parameters for the network shown in Figure 2.



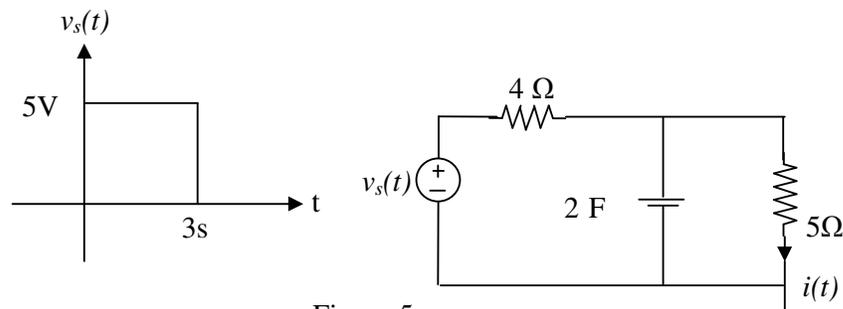
6. Determine the y-parameters of the network shown in Figure 3.



7. The voltage having the waveform shown in Figure 4a, is applied to the circuit shown in Figure 4b. Determine  $i(t)$ .



8. Determine the total solution for  $i(t)$  in the circuit of Figure 5 via the Fourier transform.



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## II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016

## MECHANICS OF SOLIDS

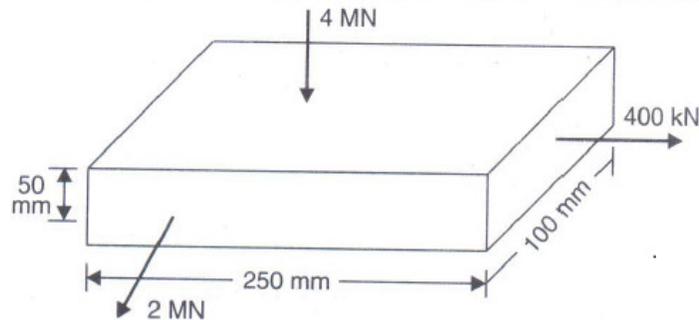
(Com. to ME, AME, MM)

Time: 3 hours

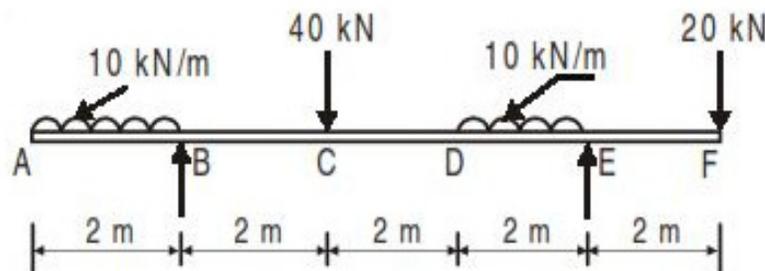
Max. Marks: 75

Answer any **FIVE** Questions  
All Questions carry **Equal** Marks

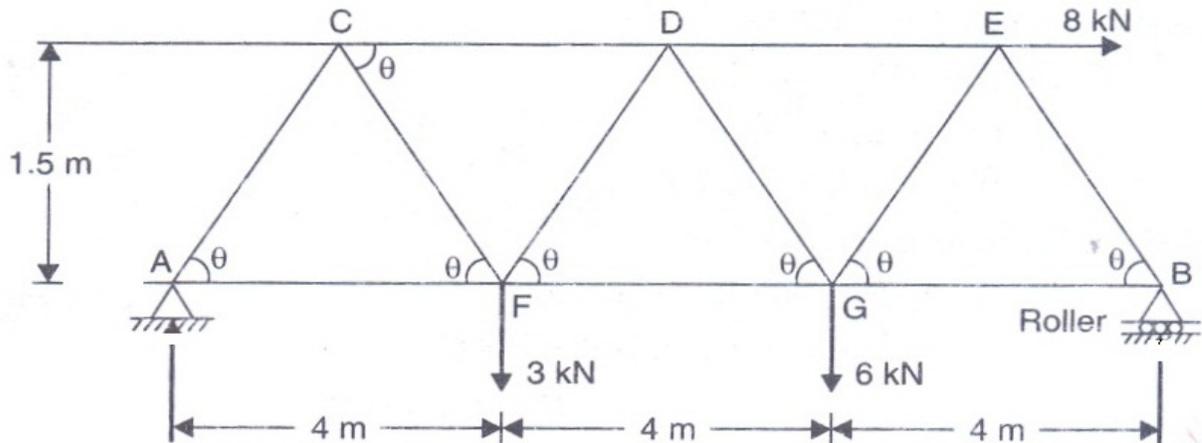
1. a) A steel rod of 20mm diameter passes centrally through a copper tube of 50mm external diameter and 40mm internal diameter. The tube is enclosed at each end by rigid plates of negligible thickness. The nuts are tightened lightly home on the projecting parts of the rod. If the temperature of the assembly is raised by  $50^{\circ}\text{C}$ , calculate the stresses developed in copper and steel. Take  $E_s = 200\text{GN/m}^2$  and  $E_c = 100\text{GN/m}^2$  and  $\alpha$  for steel and copper as  $12 \times 10^{-6}$  per  $^{\circ}\text{C}$  and  $18 \times 10^{-6}$  per  $^{\circ}\text{C}$ .
- b) A metallic bar  $250\text{mm} \times 100\text{mm} \times 50\text{mm}$  is loaded as shown in Figure. Find the change in volume. Take  $E = 2 \times 10^5 \text{N/mm}^2$  and Poisson's ratio = 0.25. Also find the change that should be made in the 4MN load, in order that there should be no change in the volume of the bar. (8M+7M)



2. a) A horizontal beam 10m long is carrying a uniformly distributed load of  $1\text{kN/m}$ . The beam is supported on two supports 6m apart. Find the position of the supports, so that bending moment on the beam is as small as possible. Also draw the shear force and bending moment diagrams.
- b) Draw the shear force and bending moment diagrams for given in below figure loaded diagram. (8M+7M)



3. a) A 280 mm × 120mm I-beam is to be used as a cantilever 3.6m long. Find the uniform distributed load which can be carried by the beam if the permissible stress is 125 MPa.  $I = 75 \times 10^6 \text{ mm}^4$ . If the cantilever is strengthened by 10mm thick steel plates welded at the top and bottom flanges to withstand a 40% increased load, find the width of the plates and the length over which the plates should be extend, the maximum stress being the same.
- b) A rectangular beam 300mm deep is simply supported over a span of 4m. Determine the U.D.L per meter which the beam may carry, if the bending stress should not exceed 120  $\text{N/mm}^2$ . Take  $I = 8 \times 10^6 \text{ mm}^4$ . (10M+5M)
4. An I-section beam 350×150mm has a web thickness of 10mm and flange thickness of 20mm. If the shear force acting on the section is 40kN, sketch the shear stress distribution across the section and also calculate the total shear force carried by the web. (15M)
5. Determine the forces in the truss shown in figure which is subjected to horizontal and vertical loads. Mention the nature of forces in each case. (15M)



6. Find the deflection of a simply supported beam with an eccentric point load (15M)
7. a) Derive the Expressions for circumferential stress and longitudinal stress for thin cylinders.
- b) A cylindrical thin drum 80 cm in diameter and 3m long has a shell thickness of 1 cm. If the drum is subjected to an internal pressure of  $2.5 \text{ N/mm}^2$ , determine  
 (i) change in diameter (ii) change in length and (iii) change in volume. (8M+7M)
8. a) Derive the hoop stress for a thick cylindrical shell due to internal fluid pressure.
- b) Determine the maximum and minimum hoop stress across the section of a pipe of 400mm diameter and 100mm thick, when the pipe contains fluid at a pressure of  $8 \text{ N/mm}^2$ . Also sketch the radial pressure distribution and hoop stress distribution across the section. (10M+5M)

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**II B. Tech II Semester Supplementary Examinations, Nov/Dec-2016**  
**ELECTRONIC CIRCUIT ANALYSIS**  
 (Com. to ECE, EIE)

Time: 3 hours

Max. Marks: 75

Answer any **FIVE** Questions  
 All Questions carry **Equal** Marks  
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1. Derive the equations for voltage gain, current gain, input impedance and output admittance for a BJT using the approximate h-parameter model for (i) CE configuration (ii) CB configuration (iii) CC configuration (15M)
2. a) What is meant by feedback in amplifiers, explain the types of feedback (8M)
 b) Explain the circuit diagram of negative feedback amplifier and obtain the expression for its closed loop gain (7M)
3. a) Write down the expression for frequency of oscillation in Hartley and Colpitts Oscillators (8M)
 b) A Colpitts Oscillator is designed with $C_2=100\text{pF}$ and $C_1=7500\text{pF}$. The inductance is variable, determine the range of inductance values, if the frequency of oscillation is to vary between 950 and 2050 KHz (7M)
4. a) What are multistage amplifiers, derive the equation for the overall gain of a multistage amplifier in terms of the individual voltage gains (8M)
 b) Draw the equivalent circuit of RC coupled amplifier in the mid frequency range, high frequency range and low frequency range and derive the equations for current gain, voltage gain, upper 3 dB frequency and lower 3 dB frequency (7M)
5. a) Determine the hybrid $-\pi$ parameters of a Transistor operating at Collector Current $I_C(Q)=2\text{mA}$, $V_{CE}(Q)=20\text{V}$ and $I_B(Q)=20\mu\text{A}$. Transistor specifications are $\beta_0=100$, unity gain frequency $f_T=50\text{MHz}$, $C_{OB}=3\text{pF}$, $h_{iE}=1.4\text{K}\Omega$, $h_{re}=2.5*10^{-4}$, $h_{oe}=25\mu\text{mhos}$. Assume that the Operating temperature is 300°K . (8M)
 b) Explain about hybrid π capacitances and hybrid π conductances (7M)
6. a) What is Class B amplifier, Derive the expression for efficiency (8M)
 b) If the ideal push-pull amplifier operates at maximum dissipation, show that its efficiency is 50% (7M)
7. a) What is a Q-factor, Derive the expression for Q-factor of a capacitor (8M)
 b) Explain the effect of cascading single tuned amplifiers on Bandwidth (7M)
8. a) Explain about Series voltage regulators and shunt regulators (8M)
 b) Define regulator, and explain the different types of regulators (7M)

