

LB

**Code : 17CE1202**

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**BUILDING CONSTRUCTION**  
(Civil Engineering)

Time : 3Hrs

Max. Marks : 60

*Answer SIX Questions*  
*Choosing ONE Question from each section*

\* \* \*

**SECTION - I**

1. What are the loads to be considered in a building? Explain about all the loads
  
2. (a) . What is Shallow foundation ?What are the requirements of a good foundation?  
(b) What are the different types and uses of shallow foundations?

**SECTION - II**

3. (a) What is brick masonry? List the different types of brick masonry's available  
(b) Write short notes with sketches of the following:  
(i)Dutch Bond (ii)English Bond (iii)Flemish bond (iv)Raking bond
  
4. What is meant by lintel? What are types of lintels? Explain the construction mechanism of lintel with neat sketch.

**SECTION - III**

5. What are the types of doors? Explain any three with neat sketches
  
6. (a) What are the different types of staircase? Explain each with a neat sketch

**SECTION - IV**

- 7 (a) What are GI sheets?  
(b) Under what situations would you use GI sheets?  
(c) What are the advantages &disadvantages of flat roofing?
  
- 8 Distinguish between mortar and plaster? What are the differences in the preparation of cement mortar and cement plaster?

### **SECTION - V**

- 9 (a) Explain the characteristics of fire resisting materials?  
(b) Explain the fire resisting properties of building materials?
- 10 (a) Discuss in brief about Thermal insulating materials?  
(b) What are the methods of thermal insulation? Explain any two in brief?

### **SECTION - VI**

- 11 (a) Define green building? What are the requirements of green building?  
(b) What is the need for green building? Write down the advantages and disadvantage of green building?
- 12 Take an example of any existing green building and explain its characteristics in detail

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**ELECTRONIC DEVICES**

(Common to EEE, ECE & CSE)

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section*

*All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) Derive the expression for Continuity equation and explain its importance.  
(b) Explain the drift and diffusion currents for a semiconductor.
2. (a) Explain the variation of semiconductor parameters with temperature with necessary expressions.  
(b) Derive the expression for conductivity in a Intrinsic semiconductor in terms of electron and hole concentration. Give the expression for Mass Action Law.

**SECTION - II**

3. (a) A Silicon diode has a Reverse Saturation current of 7.12nA at room temperature 27<sup>0</sup> C. Calculate its forward current if it is forward biased with a voltage of 0.7V.  
(b) Draw the energy band structure of open circuited diode and explain its operation.
4. (a) Explain the term diffusion capacitance of a forward biased diode and derive expression for it.  
(b) Draw the piecewise linear model of a diode and explain how diode works as a switch when forward and reverse biased.

**SECTION - III**

5. (a) Distinguish Avalanche and Zener breakdown mechanisms.  
(b) Draw the V-I characteristics of Zener diode and explain how it works as a regulator.
6. (a) Explain the working of Tunnel diode with the help of its V-I characteristics. What is the condition for sufficient tunneling.  
(b) Explain the working of Varactor diode and mention its applications.

**SECTION - IV**

7. (a) Draw the circuit and explain the characteristics (input and output) of BJT in CB configuration.  
(b) Define  $\alpha, \beta, \gamma$  of a transistor. Derive the relations between them.

- 8 (a) What is biasing. What is an operating point. List out the different types of biasing methods.
- (b) Explain the working of NPN transistor.

#### **SECTION - V**

- 9 (a) Explain in detail working of n-Channel JFET. Draw its Drain and Transfer characteristics.
- (b) Mention the expression for Saturation drain current of JFET and also find the slope of transfer characteristics at  $I_{DSS}$ .
- 10 (a) Compare BJT and JFET.
- (b) Explain the principle of MOSFET in enhancement mode with neat sketches and output characteristics.

#### **SECTION - VI**

- 11 (a) Draw the basic structure of a SCR and explain its characteristics.
- (b) Draw the circuit diagram of half wave rectifier using SCR and explain its operation.
- 12 (a) What is the drawback of SCR. Explain the operation of TRIAC with the help of its characteristics and mention its applications.
- (b) Draw the basic construction of DIAC and explain its operation.

Time: 3Hrs

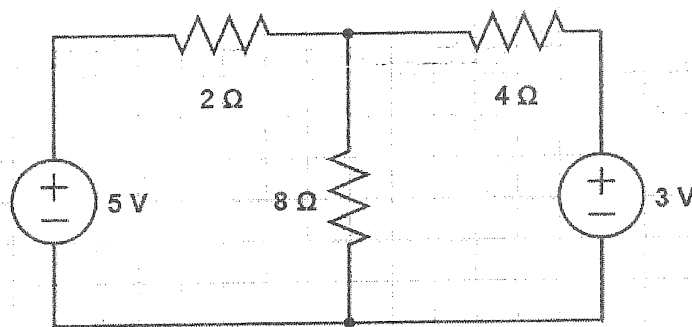
Max. Marks: 60

*Answer ONE Question from each section**All Questions carry equal marks*

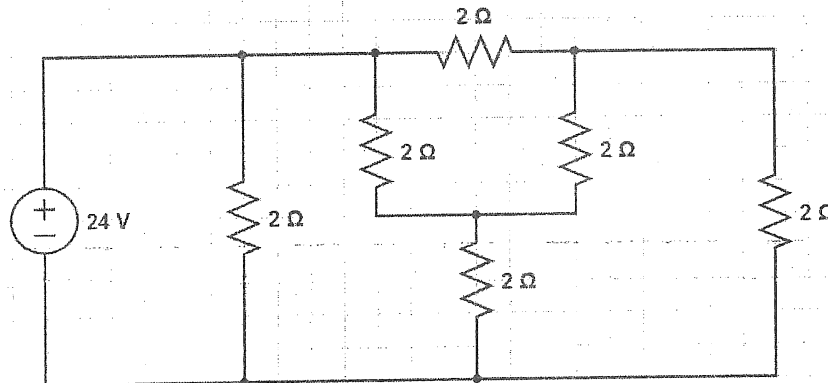
\* \* \*

**SECTION - I**

1. (a) Explain the division of current in parallel circuits.
- (b) Find loop currents and branch currents to the following circuit



2. (a) Give V-I relationship for the following
  - (i) Resistance
  - (ii) Inductance
  - (iii) Capacitance
- (b) Using star- delta conversion, Find the current  $I$  in the circuit as shown in the figure.

**SECTION - II**

3. (a) Define average value, RMS value, Form factor & Peak factor.
- (b) Determine the form factor value of a half wave rectifier.
4. Discuss the behavior of the inductive & capacitive element connected to an AC source along with the waveform & phasor diagram.

### SECTION - III

5. (a) Derive resonance frequency for Parallel RLC Circuit.  
(b) A RLC series circuit of  $8 \Omega$  resistance should be designed to have a bandwidth of 50 Hz. Determine the values of L & C so that the system resonates at 250 Hz.
6. (a) Show that for a series resonant circuit  $f_1 f_2 = f_r^2$  where  $f_1$  &  $f_2$  are half power frequencies &  $f_r$  is the resonant frequency.  
(b) A constant voltage at a frequency of 1Mhz is applied to an inductor in series with a variable capacitor when the capacitor is set to 500pF, the current has the maximum value, while it is reduced to one half when the capacitance is 600pF. Find  
(i) Resistance (ii) Inductance (iii) Q Factor of the inductor.

### SECTION - IV

- 7 (a) Draw the V-I characteristics of a diode and explain them.  
(b) Write the short notes on the following with neat sketches  
(k) Zener diode (ii) Tunnel diode
- 8 (a) Explain the break down in PN Junction diodes.  
(b) What are the dynamic characteristics of a diode? How do you obtain it from the static characteristics?

### SECTION - V

- 9 (a) With a neat circuit diagram, explain the operation of full wave bridge rectifier.  
(b) Write the advantages & disadvantages of bridge rectifier
- 10 (a) Describe the full wave rectifier with capacitor filter.  
(b) A full wave rectifier using a capacitor filter, has to supply 30V dc to a load resistance of  $1k\Omega$ . Assuming the diode & transformer winding resistance to be negligible, estimate the value of capacitor filter for a ripple factor of 0.01.

### SECTION - VI

- 11 (a) Explain the V-I characteristics of common emitter configuration.  
(b) Determine h- parameters from the characteristics of BJT.
- 12 (a) Differentiate between NPN and PNP junction transistors.  
(b) With the help of neat sketch explain the construction & working principle of BJT.

Code : 17ME1201

B.TECH. DEGREE EXAMINATION, MAY 2018

I B.Tech. II Semester

ENGINEERING MECHANICS - II  
(Mechanical Engineering)

Time : 3Hrs

Max. Marks : 60

Answer *ONE* Question from each section  
All Questions carry equal marks

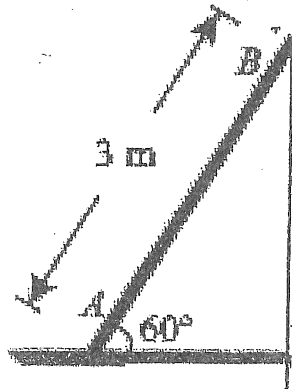
\* \* \*

**SECTION - I**

1. (a) A particle under constant deceleration is moving in a straight line and covers a distance of 20 m in first two seconds and 40 m in the next 5 seconds. Calculate the distance it covers in the subsequent 3 seconds and the total distance covered, before it comes to rest.
- (b) A ball is thrown vertically into the air at 39m/s. after 3.5 seconds another ball is thrown vertically. What initial velocity must second ball have to pass the first ball at 30 m from the ground?
2. (a) What are the motion curves? Explain them.
- (b) An electric train which starts from one station is uniformly accelerated for the first 10 seconds, during which period it covers 150 meters. It then runs with constant speed until it is finally retarded uniformly in the last 40 metres. Calculate the maximum speed and the time taken over the journey to the next stopping station which is 600m from the previous station.

**SECTION - II**

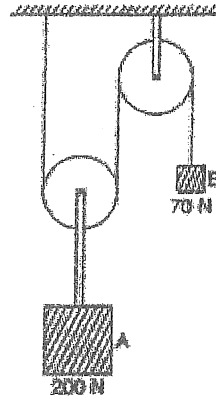
3. (a) Derive the equations of motion of a body moving along a circular path with uniform angular acceleration.
- (b) A ladder AB leaning against a wall and resting on floor slides down as shown in figure. If the velocity of the end A is 2 m/s towards left, for the position shown, determine
  - (i) The angular velocity of the ladder, and
  - (ii) The velocity of the end B.



4. (a) Derive the expression to determine the range of projectile and prove that range is maximum when the angle of projection is  $45^\circ$ .
- (b) A boy throws a ball so that it may just clear a wall 3.6 m high. The boy is at a distance of 4.8 m from the wall. The ball was found to hit the ground at distance of 3.6 m on the other side of the wall. Find the least velocity with which the ball can be thrown.

### SECTION - III

5. Determine the tensions in the strings and accelerations of blocks A and B weighing 200 N and 70 N connected by a string and a frictionless and weightless pulley as shown in figure.



6. A vertical lift of total mass 500 kg acquires an upward velocity of 2 m/s over a distance of 3 m of motion with constant acceleration, starting from rest. Calculate the tension in the cable supporting the lift. If the lift, while stopping, moves with a constant deceleration and comes to rest in 2 s, calculate the force transmitted by a man of mass 75 kg on the floor of the lift during that interval.

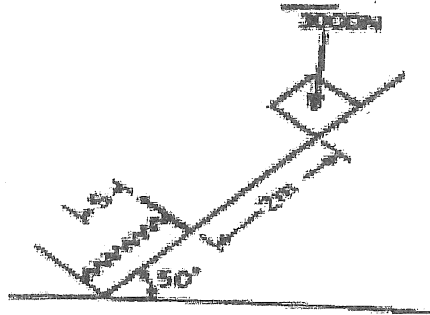
### SECTION - IV

7. A bullet of mass 25 gram, moving horizontally with a velocity of 600 m/s strikes a wooden block of mass 5 kg resting on a rough horizontal surface. The bullet after striking the block remains buried in the block and both travel a distance of 90cm, before coming to rest. Determine
- (i) Average resistance between block and horizontal surface
  - (ii) Coefficient of friction between block and horizontal surface
8. (a) Define and classify the impact. Discuss coefficient of restitution.
- (b) A ball is dropped from an unknown height on a horizontal floor from which it rebounds to a height of 8 m. if coefficient of restitution is 0.667, calculate the height from which the ball was dropped.



### SECTION - V

- 9 A 3000 N block starting from rest as shown in Fig.4 Slides down a 50° incline. After moving 2 m it strikes a spring whose modulus is 20 N/mm. If the coefficient of friction between the block and the incline is 0.2, determine the maximum deformation of the spring and the maximum velocity of the block.



- 10 (a) Derive the equations for velocity and acceleration of a particle moving with simple harmonic motion.  
(b) Two beams AC and CD of length 9 m and 10 m respectively are hinged at C. These are supported on rollers at the left and right ends (A and D). A hinged support is provided at B, 7m from A. Using the principle of virtual work, determine the force transmitted by the hinge C and the reaction at the support B, when a load of 700 N acts at a point 6 m from D.

### SECTION - VI

- 11 (a) Draw stress strain curve for mild steel and explain salient features.  
(b) The safe stress, for a hollow steel column which carries an axial load of 2100 KN is 125 MPa. If the external diameter of the column is 30 cm, determine the internal diameter.
- 12 (a) What is the procedure for finding thermal stresses in composite bar?  
(b) A rod is 2 m long at a temperature of 10°C. Find the expansion of the rod, when the temperature is raised to 80°C. If this expansion is prevented, find the stress induced in the material of the rod. Take  $E = 1 \times 10^5 \text{ MN/m}^2$  and  $\alpha = 0.000012$  per degree centigrade.



Code : 17SH1202

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**ENGINEERING PHYSICS**

(Common to CE & ME)

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section*

*All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) Define space lattice, unit cell, lattice parameters and packing fraction.  
(b) Prove that fcc is closely packed when compared to bcc and simple cube.
2. (a) Derive an expression for inter-planar spacing in cubic crystals.  
(b) Describe Laue method of X-ray diffraction and also mention its drawbacks.

**SECTION - II**

3. (a) What are internal fields and derive an expression for internal fields in dielectric materials.  
(b) Give an account of oriental polarization.
4. (a) Explain hysteresis behavior in ferromagnetic materials.  
(b) Compare hard and soft magnetic materials and also mention applications of magnetic materials.

**SECTION - III**

5. (a) Discuss about direct and indirect band gap materials.  
(b) What is Hall effect and derive an expression for Hall coefficient.
6. (a) Discuss about formation and I-V characteristics of p-n junction.  
(b) Explain working of solar cell and LED.

**SECTION - IV**

7. (a) Give an account of digital communication system.  
(b) Explain basic steps involved in analog/digital conversion.

- 8 (a) Compare digital and analog communication system.  
(b) Give an account of sampling theorem and explain how it is useful for communication system.

### **SECTION - V**

- 9 (a) Give an account of spontaneous and stimulated emission and also write condition for population inversion.  
(b) Discuss about construction, principle and working of Ruby laser.
- 10 (a) Give an account of types of optical fibers based on their refractive index and also explain transmission of light rays in those fibers.  
(b) Explain working of optical fiber communication system with the help of block diagram.

### **SECTION - VI**

- 11 (a) Write short notes on flux quantization and also mention few applications of super conductors.  
(b) Explain significance of cooper pair in BCS theory of superconductivity.
- 12 (a) Explain top down and bottom up approach of synthesis of nanomaterials in detail.  
(b) Discuss about thermal and mechanical properties of nanomaterials.

Code :17SH1203

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**Engineering Chemistry**

(Common to EEE, ECE & CSE)

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section*

*All Questions carry equal marks*

\* \* \*

**SECTION – I**

1. (a) Define reference electrode? Describe the construction of calomel electrode?  
(b) What is meant by standard electrode potential. How can it be measured ?
2. (a) What are Secondary batteries ?  
(b) Describe the construction of Li-ion cell. write cell reactions and its applications?

**SECTION – II**

3. (a) Define corrosion of metals and Explain the mechanism of electrochemical corrosion?  
(b) Write a note on Electroplating ?
4. (a) Give an account of the corrosion by other gases and liquid metal corrosion?  
(b) What is meant by Impressed current cathodic protection ?

**SECTION – III**

5. (a) What are the characteristics of electrical insulators ?  
(b) Define Refractories ? Write short note on the following
  - (i) Refractoriness
  - (ii) Thermal Conductivity
  - iii) Refractoriness under load
6. (a) Give the functions of lubricants  
(b) How is a viscous lubricants converted into grease.

#### SECTION – IV

7. (a) Define calorific value of a fuel. distinguish gross and net calorific value.  
(b) Describe the method of determination of calorific value of solid fuel by bomb calorimeter.
8. (a) How do you synthesise petrol by Fisher-Tropsch process?  
(b) Describe the analysis of flue gas by orsat's apparatus?

#### SECTION – V

9. (a) Explain the lime soda process for softening of water.  
(b) What is priming and foaming
10. (a) Describe the estimation of hardness by EDTA method?  
(b) What are the major disadvantages of hard water used for  
i) Domestic purpose  
ii) Industrial purpose.

#### SECTION – VI

11. (a) What is polymerization? explain the different types of polymerization with examples?  
(b) Write the merits and demerits of using plastics in place of metals.
12. (a) Write brief notes on i) PVC ii) Urea - Formaldehyde  
(b) Differentiate the natural rubber and synthetic rubber

## B.TECH. DEGREE EXAMINATION, MAY 2018

## I B.Tech. II Semester

ENGINEERING MECHANICS  
(Civil Engineering)

Time : 3 hours

Max Marks: 60

Answer SIX Questions, Choosing ONE Question from each section  
All questions carry equal marks

\*\*\*\*\*

SECTION - I

- 1 Replace the given system of forces acting on a body as shown in Fig.1 by a single force and couple acting at the point A.

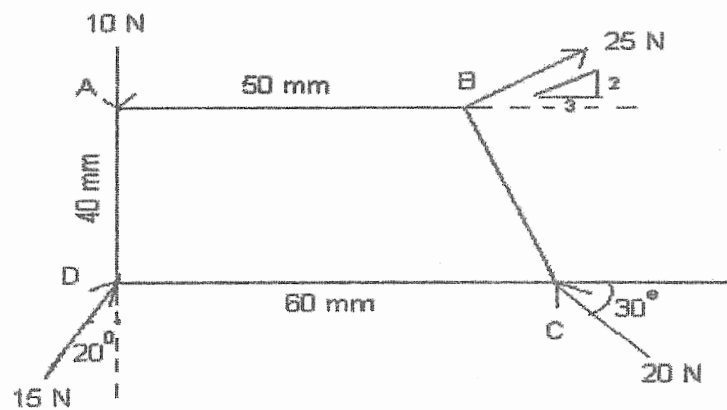
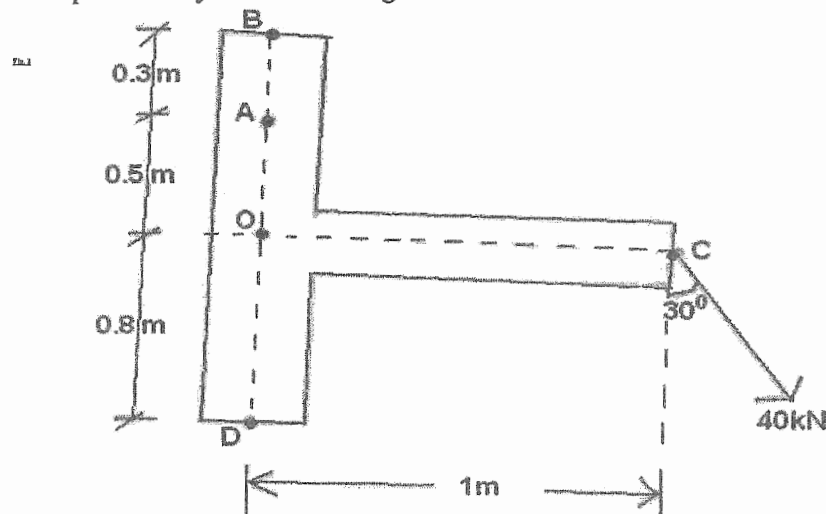


Fig. 1

2. A bracket is subjected to force as shown in Fig.2. Determine:  
a) An equivalent force couple system at A.  
b) An equivalent force couple system at B.  
c) An equivalent system consisting of 90 kN at B & another force at A.



## SECTION - II

- 3 Two blocks A and B connected by a horizontal rod are supported on two rough planes as shown in Fig. 3. The coefficients of friction are 0.3 between block A and the horizontal surface and 0.4 between block B and the inclined surface. If the block B weighs 125 N, what is the smallest weight of block A, that will hold the system in equilibrium.

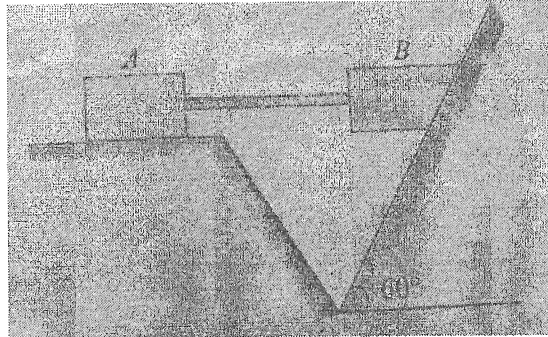


Fig. 3

- 4 A shaft rotating at 200 r.p.m. drives another shaft at 300 r.p.m. and transmits 6 kw through a belt, the belt is 100 mm wide and 10 mm thick. The distance between the shafts is 4000 mm. The smaller pulley is 500 mm in diameter. Neglect the centrifugal tension. Take  $\mu = 0.3$   
Calculate the stresses in  
(a) open belt (b) crossed belt.

## SECTION - III

- 5 (a) State Perpendicular axis theorem.  
(b) Locate the centroid of the area shown in Fig. 4.

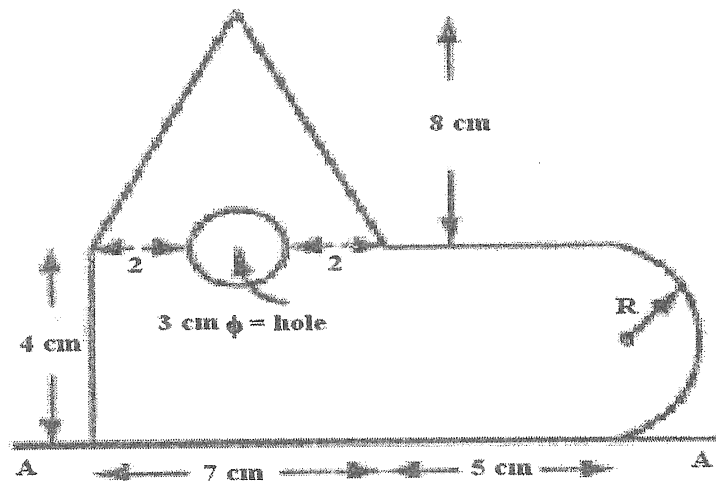
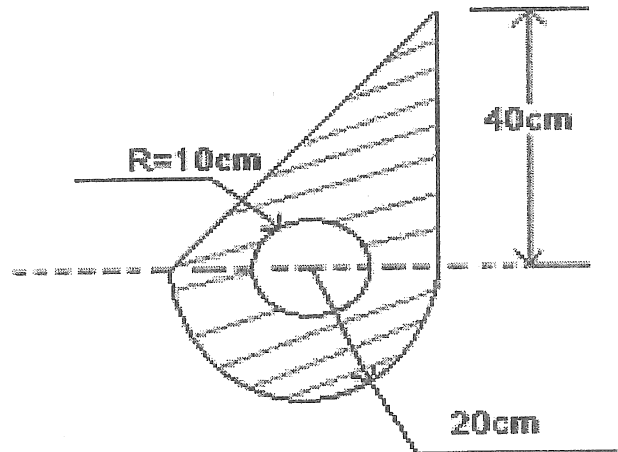


Fig. 4

- 6 (a) Define Polar Moment of Inertia.



- (b) Find the moment of inertia of the Fig. 5 about the horizontal centroidal axis.



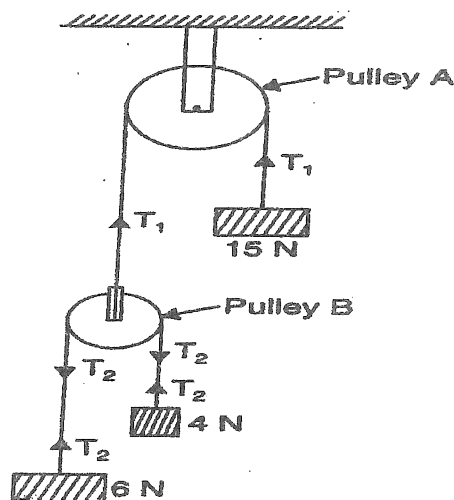
**Fig. 5**

**SECTION - IV**

- 7 (a) Distinguish between Rectilinear and Curvilinear motion.  
 (b) A stone is dropped into a well. The sound of the stone hitting the surface of the water is heard 5 seconds later. The velocity of the sound is 300 m/sec. Determine the vertical distance from the ground to the water surface. A second stone is now thrown with a velocity 'u'. If the sound is heard 4 seconds later, find the initial velocity 'u'.
- 8 (a) State three Newton's laws of motion.  
 (b) A stationary car attains a maximum permissible speed of 80 km/hr in a distance of 40 m. It continues at this speed for a distance of 200 m and then a uniform retardation brings it to stop in 10 sec. How far does the car travel from the starting point and what is the total elapsed time ?

**SECTION - V**

- 9 A system of weights connected by strings passing over pulleys A and B is shown in Fig. 6. Find the acceleration of the three weights, assuming weightless strings and ideal conditions for pulleys.



- 10 A wagon weighing 500 kN starts from rest, runs 30 m down one percent grade and strikes the bumper post. If the rolling resistance of the track is 5 N/kN, find the velocity of the wagon when it strikes the post. If the bumper spring which compresses 1 mm for every 15 kN, determine by how much the spring will be compressed.

SECTION - VI

- 11 Find the forces in the AB, CD & CE members of the truss shown in Fig. 7 using Method of sections. All the loads are in kN.

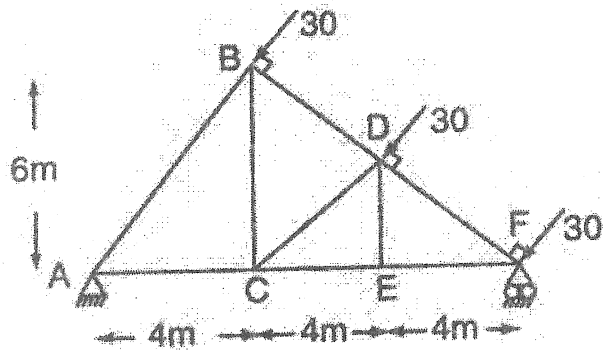


Fig. 7

- 12 (a) Briefly explain about Tension coefficient method  
 (b) Find the maximum possible span for a cable supported at the ends at the same level allowing a central dip of  $1/10$  of the span and a permissible stress of  $150 \text{ N/mm}^2$ . Steel weighs  $78 \text{ kN/m}^3$ . Assume that the cable is of parabolic shape.

Code : 17CS1202

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**DATA STRUCTURES**  
(Computer Science & Engineering)

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section*  
*All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. a. Write short notes on rate of growth.  
b. Discuss about more timing analysis.
2. a. Discuss about space analysis of an algorithm.  
b. What is non primitive data structure? Explain operations of non primitive data structure.

**SECTION - II**

3. What is stack? Explain operations of stack with algorithm and example.
4. a. Write short notes on Towers of Hanoi.  
b. Write short notes on priority queues.

**SECTION - III**

5. What is singly linked list? Explain insertion and deletion operations with algorithm and example.
6. What is doubly linked list? Explain insertion and deletion operations with algorithm and example.

**SECTION - IV**

7. What is binary tree? Explain in detail about various representations of binary tree.
8. a. Explain about manipulation of arithmetic expression with example.  
b. Explain about height balanced trees.

**SECTION - V**

9. Define graph and explain in detail about various representations of a graph.
10. a. Explain in detail about Breadth first search with suitable example.  
b. Write an algorithm for binary search.

**SECTION - VI**

11. Write an algorithm for selection sort and explain with an example.
12. What is collision? Explain various collision resolution techniques with example.



Code : 17ME1201

B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester**

**ENGINEERING MECHANICS - II**  
(Mechanical Engineering)

Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section*  
*All Questions carry equal marks*

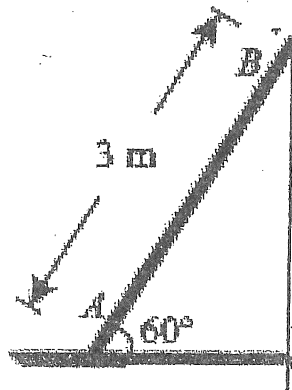
\* \* \*

**SECTION - I**

1. (a) A particle under constant deceleration is moving in a straight line and covers a distance of 20 m in first two seconds and 40 m in the next 5 seconds. Calculate the distance it covers in the subsequent 3 seconds and the total distance covered, before it comes to rest.
- (b) A ball is thrown vertically into the air at 39m/s. after 3.5 seconds another ball is thrown vertically. What initial velocity must second ball have to pass the first ball at 30 m from the ground?
2. (a) What are the motion curves? Explain them.
- (b) An electric train which starts from one station is uniformly accelerated for the first 10 seconds, during which period it covers 150 meters. It then runs with constant speed until it is finally retarded uniformly in the last 40 metres. Calculate the maximum speed and the time taken over the journey to the next stopping station which is 600m from the previous station.

**SECTION - II**

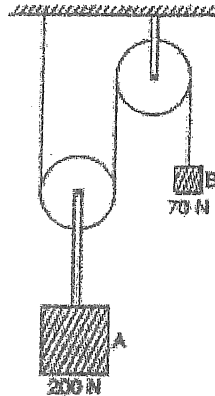
3. (a) Derive the equations of motion of a body moving along a circular path with uniform angular acceleration.
- (b) A ladder AB leaning against a wall and resting on floor slides down as shown in figure. If the velocity of the end A is 2 m/s towards left, for the position shown, determine
  - (i) The angular velocity of the ladder, and
  - (ii) The velocity of the end B.



4. (a) Derive the expression to determine the range of projectile and prove that range is maximum when the angle of projection is  $45^\circ$ .
- (b) A boy throws a ball so that it may just clear a wall 3.6 m high. The boy is at a distance of 4.8 m from the wall. The ball was found to hit the ground at distance of 3.6 m on the other side of the wall. Find the least velocity with which the ball can be thrown.

### SECTION - III

5. Determine the tensions in the strings and accelerations of blocks A and B weighing 200 N and 70 N connected by a string and a frictionless and weightless pulley as shown in figure.



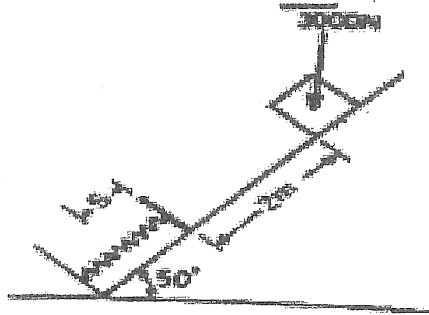
6. A vertical lift of total mass 500 kg acquires an upward velocity of 2 m/s over a distance of 3 m of motion with constant acceleration, starting from rest. Calculate the tension in the cable supporting the lift. If the lift, while stopping, moves with a constant deceleration and comes to rest in 2 s, calculate the force transmitted by a man of mass 75 kg on the floor of the lift during that interval.

### SECTION - IV

7. A bullet of mass 25 gram, moving horizontally with a velocity of 600 m/s strikes a wooden block of mass 5 kg resting on a rough horizontal surface. The bullet after striking the block remains buried in the block and both travel a distance of 90cm, before coming to rest. Determine
- (i) Average resistance between block and horizontal surface
  - (ii) Coefficient of friction between block and horizontal surface
8. (a) Define and classify the impact. Discuss coefficient of restitution.
- (b) A ball is dropped from an unknown height on a horizontal floor from which it rebounds to a height of 8 m. if coefficient of restitution is 0.667, calculate the height from which the ball was dropped.

### SECTION - V

- 9 A 3000 N block starting from rest as shown in Fig.4 Slides down a 50° incline. After moving 2 m it strikes a spring whose modulus is 20 N/mm. If the coefficient of friction between the block and the incline is 0.2, determine the maximum deformation of the spring and the maximum velocity of the block.



- 10 (a) Derive the equations for velocity and acceleration of a particle moving with simple harmonic motion.  
(b) Two beams AC and CD of length 9 m and 10 m respectively are hinged at C. These are supported on rollers at the left and right ends (A and D). A hinged support is provided at B, 7m from A. Using the principle of virtual work, determine the force transmitted by the hinge C and the reaction at the support B, when a load of 700 N acts at a point 6 m from D.

### SECTION - VI

- 11 (a) Draw stress strain curve for mild steel and explain salient features.  
(b) The safe stress, for a hollow steel column which carries an axial load of 2100 KN is 125 MPa. If the external diameter of the column is 30 cm, determine the internal diameter.
- 12 (a) What is the procedure for finding thermal stresses in composite bar?  
(b) A rod is 2 m long at a temperature of 10°C. Find the expansion of the rod, when the temperature is raised to 80°C. If this expansion is prevented, find the stress induced in the material of the rod. Take  $E = 1 \times 10^5 \text{ MN/m}^2$  and  $\alpha = 0.000012$  per degree centigrade.





B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester****CIRCUITS & NETWORKS**

(Common to EEE &amp; ECE)

Time : 3Hrs

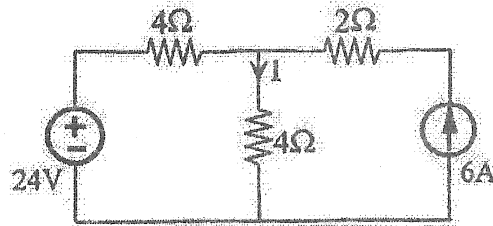
Max. Marks : 60

Answer ONE Question from each section  
All Questions carry equal marks

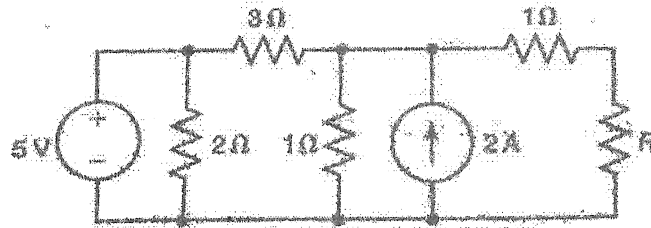
\* \* \*

**SECTION - I**

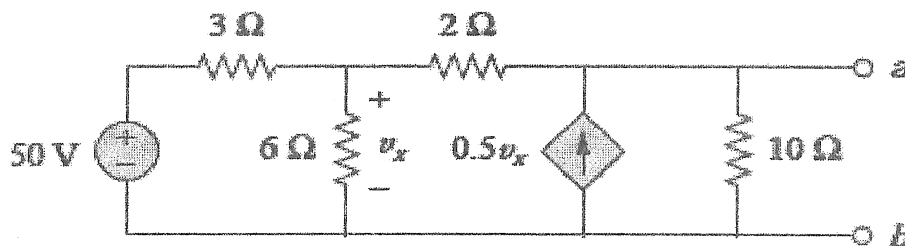
1. (a) Determine the current  $I$  in the circuit shown in fig. by applying Superposition theorem.



- (b) Find the value of  $R$  in the circuit shown in fig, such that maximum power transfer takes place. What is the amount of this power?



2. (a) State and explain the Millman's theorem.  
(b) Determine Norton equivalent circuit for the network shown in fig.

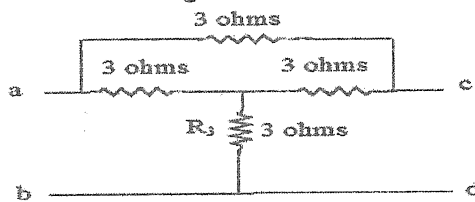


## SECTION - II

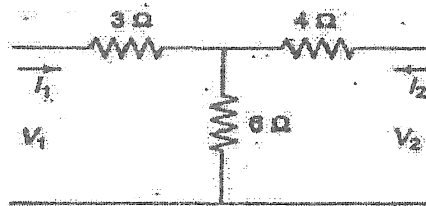
3. (a) Derive the relations between line current and phase currents in a delta connected 3-phase network.  
(b) Each phase of a balanced star connected load consists of  $R = 10$  ohms and  $C = 10 \mu\text{F}$ . Calculate the line current and total real and reactive powers when a symmetrical 400 V, 50 Hz, 3-phase supply is applied to it.
4. A 440 V, 50 Hz, 3-phase supply has delta-connected load having  $(31 + j59) \Omega$  between R and Y,  $(30 - j40) \Omega$  between Y and B and  $(80 + j60) \Omega$  between B and R. Find
- The line current for the sequence RYB.
  - The value of total three phase active power.
  - The value of total three phase reactive power and
  - Draw the phasor diagram.

## SECTION - III

5. (a) Obtain the Y- Parameters of a passive  $\pi$  network whose admittances are  $Y_A$ ,  $Y_B$  and  $Y_C$ , where  $Y_C$  appears in series branch.  
(b) Determine the Y-parameters for the bridge T network shown below.



6. (a) Deduce the relation between h - Parameters and ABCD Parameters.  
(b) Two identical networks shown in fig, below are connected in series. Find the equivalent Z - Parameters.



## SECTION - IV

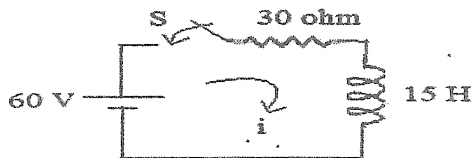
7. (a) Briefly explain the significance of poles and zeros.  
(b) A system function has zeros at  $(-2 \pm j3)$  and  $-4$ , and poles at  $-2$ ,  $(-1 \pm j5)$ . Plot the pole-zero diagram and get its time domain response.
8. (a) What are the restrictions on the location of poles and zeros?

- (b) Draw the pole zero diagram for the given network function  $I(s)$  and obtain  $i(t)$

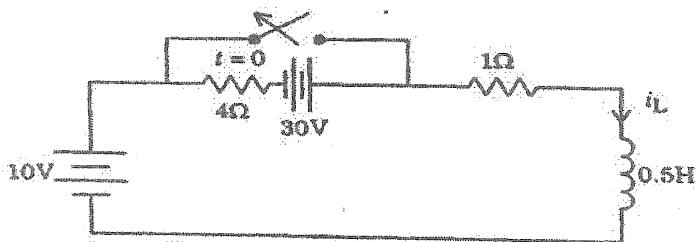
$$I(s) = \frac{5s}{(s+1)(s^2+4s+8)}$$

**SECTION - V**

- 9 (a) A series RL circuit with  $R = 30 \Omega$  and  $L = 15H$  has a constant voltage  $E = 60 V$  at  $t = 0$  as shown in below figure. Determine the current  $I$ , the voltage across the resistor and the voltage across the inductor.

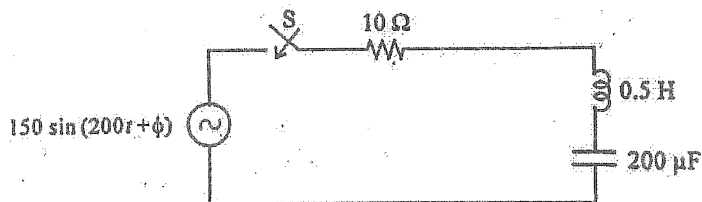


- (b) Derive the DC response of an RC circuit using time domain and draw the responses of voltages across capacitor and resistor.
- 10 (a) Find the expression for the current if a RL network is excited with DC input using Laplace transform method.
- (b) The switch shown below has been closed for long time:
- Find  $i_L$  for  $t < 0$ .
  - Find  $i_L(t)$  for all "t" after the switch opens at  $t = 0$ .



**SECTION - VI**

- 11 (a) Find the expression for the current if a RC network is excited with sinusoidal input using differential equation approach method.
- (b) Determine the current when switch is closed at  $\Phi = 0^\circ$  for a series of RC circuit. Voltage  $v = 100 \cos(500t + \Phi)$  V is applied at  $\Phi = 45^\circ$ . Resistance  $R = 15 \Omega$  and  $C = 100 \mu F$ .
- 12 In the circuit shown in fig. determine current equation using time domain, when the switch is closed at  $\Phi = 30^\circ$





B.TECH. DEGREE EXAMINATION, MAY 2018

**I B.Tech. II Semester****ENGINEERING MATHEMATICS - I**

(Common to All Branches)

Time : 3Hrs

Max. Marks : 60

*Answer ONE question from each section  
All questions carry equal marks.*

\* \* \*

**SECTION - I**

1. Find the values of  $\lambda$  for which the equations  $(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$ ,  
 $(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$ ,  $2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$  are consistent,  
 and find the ratios of  $x : y : z$  when  $\lambda$  has smallest of these values. What happens  
 when  $\lambda$  has the greatest of these values.

2. (a) Find the eigen values and eigen vectors of the matrix  $\begin{bmatrix} 3 & 1 & 4 \\ 0 & 2 & 6 \\ 0 & 0 & 5 \end{bmatrix}$ .

- (b) Prove that any square matrix  $A$  and its transpose  $A'$  have the same Eigen values.

**SECTION - II**

3. (a) Solve  $\frac{d^2y}{dx^2} - 4\frac{dy}{dx} + 4y = 8(x^2 + e^{2x} + \sin 2x)$ .

- (b) Solve  $\frac{d^2y}{dx^2} - 2\frac{dy}{dx} + y = xe^x \sin x$ .

4. Solve  $\frac{d^4y}{dx^4} + 2\frac{d^2y}{dx^2} + y = x^2 \cos x$ .

**SECTION - III**

5. Find the volume of the greatest rectangular parallelepiped that can be inscribed in  
 the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ .

6. Find the dimensions of the rectangular box, open at the top, of maximum capacity  
 whose surface area is 432 sq. cm.

### SECTION - IV

7 Change the order of integration in  $I = \int_0^1 \int_x^{\sqrt{2-x^2}} \frac{x}{\sqrt{x^2+y^2}} dx dy$  and hence evaluate it.

8 Find the volume of the ellipsoid  $\frac{x^2}{a^2} + \frac{y^2}{b^2} + \frac{z^2}{c^2} = 1$ .

### SECTION - V

9 (a) Find the directional derivative of  $f = x^2 - y^2 + 2z^2$  at the point  $P(1,2,3)$  in the direction of  $\overline{PQ}$  where  $Q$  is the point  $(5,0,4)$ . Also calculate the magnitude of the maximum directional derivative.

(b) Find the angle between the surfaces  $x^2 + y^2 + z^2 = 9$  and  $z = x^2 + y^2 - 3$  at the point  $(2, -1, 2)$ .

10 (a) Prove that  $\text{div}(\text{grad } r^n) = n(n+1)r^{n-2}$ .

(b) Prove that  $\nabla \cdot (f \vec{G}) = \nabla f \cdot \vec{G} + f(\nabla \cdot \vec{G})$ .

### SECTION - VI

11 Verify Greens theorem for  $\oint_C (xy + y^2) dx + x^2 dy$  where  $C$  is the boundary of the region bounded by  $y = x$  and  $y = x^2$ .

12 Verify Divergence theorem for  $\vec{F} = (x^2 - yz)\vec{i} + (y^2 - zx)\vec{j} + (z^2 - xy)\vec{k}$  taken over the rectangular parallelepiped  $0 \leq x \leq a, 0 \leq y \leq b, 0 \leq z \leq c$ .

B.TECH. DEGREE SUPPLEMENTARY EXAMINATION, MAY 2018

**I B.Tech.****ENGINEERING MATHEMATICS – I**  
(Common to All Branches)

Time : 3Hrs

Max. Marks : 60

*Answer FIVE Questions, Choosing ONE Question from each section  
All Questions carry equal marks*

\* \* \*

**SECTION - I**

1. (a) Determine whether the following equations will have a nontrivial solution, if so solve them.

$$4x + 2y + z + 3w = 0, \quad 6x + 3y + 4z + 7w = 0, \quad 2x + y + w = 0$$

- (b) If  $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$ , verify Cayley – Hamilton theorem. Hence find  $A^{-1}$ .

2. Reduce the quadratic form  $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$  to the canonical form by using the orthogonal transformation and hence find its rank, index, signature & nature.

**SECTION - II**

3. (a) Verify Lagrange's Mean value Theorem for the function  $f(x) = (x-1)(x-2)(x-3)$  in the interval  $[0, 4]$

(b) Show that  $\frac{\sin^{-1}x}{\sqrt{1-x^2}} = x + \frac{4x^3}{3!} + \dots$

4. (a) Find  $c$  of Cauchy's mean value theorem on  $[a, b]$  for  $f(x) = e^x$  and  $g(x) = e^{-x}$  ( $a, b > 0$ )
- (b) A rectangular box open at the top has a capacity of 32 cubic feet. Find the dimensions of the box requiring least material for its construction

**SECTION - III**

- 5 (a) Evaluate  $\int_0^1 \frac{x^2}{\sqrt{1-x^5}} dx$  in terms of  $\beta$  function
- (b) Show that the evolute of the cycloid  $x = a(\theta - \sin \theta)$ ;  $y = a(1 - \cos \theta)$  is another cycloid
- 6 Trace the curve  $r = a(1 + \cos \theta)$

**SECTION - IV**

- 7 (a) Evaluate the following integral by transforming into polar coordinates

$$\int_0^a \int_0^{\sqrt{a^2-x^2}} y \sqrt{x^2 + y^2} dx dy$$

- (b) Evaluate  $\int_{y=0}^1 \int_{x=y}^1 \int_{z=0}^{1-x} x dx dy dz$
- 8 (a) Change the order of integration and evaluate  $\int_0^1 \int_{x^2}^{2-x} xy dx dy$
- (b) Find the volume bounded by the cylinder  $x^2 + y^2 = 4$ , and the planes  $y + z = 4$  and  $z = 0$ .

**SECTION - V**

- 9 (a) Find the directional derivative of  $\phi(x, y, z) = x^2 yz + 4xz^2$  at the point  $(1, -2, -1)$  in the direction of the normal to the surface  $f(x, y, z) = x \log z - y^2$  at  $(-1, 2, 1)$

- (b) Find the constants  $a, b, c$  such that the vector

$$\vec{A} = (x + 2y + az)\vec{i} + (bx - 3y - z)\vec{j} + (4x + cy + 2z)\vec{k}$$

is irrotational. Also find  $\phi$  such that  $\vec{A} = \nabla \phi$ .

- 10 Verify stokes theorem for  $\vec{F} = (2x - y)\vec{i} - yz^2\vec{j} - y^2z\vec{k}$  over the upper half surface of the sphere  $x^2 + y^2 + z^2 = 1$  bounded by the Projection on the  $xy$ -plane



Code : 17SH1201

B.TECH. DEGREE EXAMINATION, MAY 2018  
**I B.Tech. II Semester**

**PROFESSIONAL ENGLISH**  
(Common to All Branches)

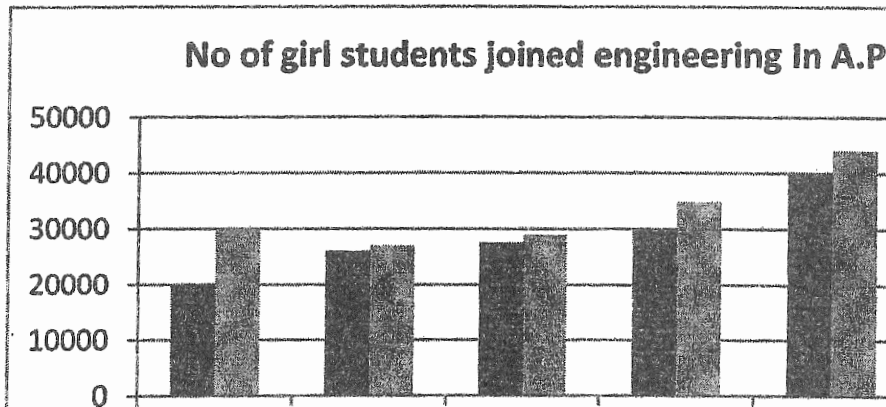
Time : 3Hrs

Max. Marks : 60

*Answer ONE Question from each section  
All Questions carry equal marks*

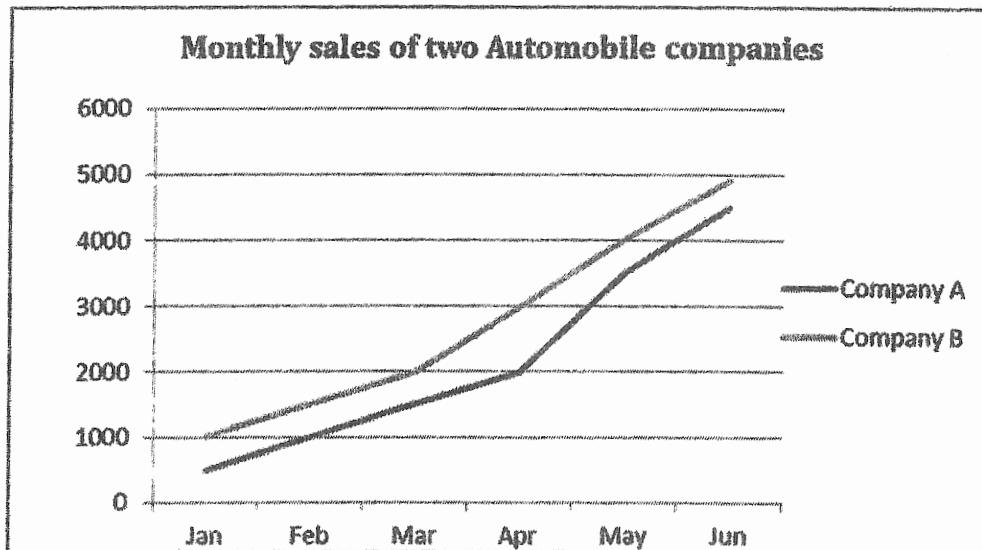
**SECTION - I**

1. (a) Interpret the following data in your own sentences in about 300 words.



- (b) 1. Grass : Soil :: (water : salty/seaweed : silver/fish : pond/ocean : boat)
- 2. Lion : Animal :: (mango : tree/flower : rose/ plant : root/ grass : stem)
- 3. Aeroplane : Sky :: (Ship: load/rocket:water/train:track/car:space)

2. (a) Compare and contrast the following line diagram.



- (b) Write the meanings and make sentences by using the following homonyms:
1. Hear, here
  2. Root, route
  3. Fair, fare.

### **SECTION - II**

3. (a) What are the guidelines for writing an effective e-mail.
- (b) Write the meanings of the following idioms and use them in your own sentences
1. In a nut shell.
  2. Greek and Latin
  3. Born with silver spoon
4. (a) What is an e-mail? What are the various advantages of an e-mail?
- (b) Write the meanings of the following one word substitutes.
1. Democracy
  2. Geology
  3. Autobiography

### **SECTION - III**

5. (a) Analyze the following issue.  
"Internet has made the world a global village".
- (b) Write the right words by using the following prefixes
1. Inter-
  2. Bio-
  3. Auto-
6. (a) Analyze the following argument.  
India's major companies will have to take quick action to include more number of women directors in their boards for effective administration. At present their number is very low.
- (b) Write the right words by using the following suffixes
1. -logy
  2. -ing
  3. -less

### **SECTION - IV**

7. (a) What is a project proposal? What is the significance of writing a project proposal ?
- (b) Write synonyms.
- i. Adequate
  - ii. Sophisticated
  - iii. Abuse
8. (a) What are the steps involved in taking notes during a lecture on a non- technical topic?
- (b) Write antonyms
- i. Joy
  - ii. Debit
  - iii. Benevolent

**SECTION - V**

- 9 (a) What strategies do you follow in making notes from a technical text.
- (b) Write any six words of your choice which are often confused.
- 10 (a) You are planning to organize a cultural festival on your campus. Prepare a proposal including various factors for conducting the festival to submit it to the principal.
- (b) Write any six words of your choice which are often confused.

**SECTION - VI**

- 11 (a) Discuss the strategies involved in summarizing a text.
- (b) Fill in the missing words of the following passage with the options given below.  
The \_\_\_\_\_ sources like biomass, animal \_\_\_\_\_ wind and water will serve as \_\_\_\_\_ to commercial \_\_\_\_\_ like coal, \_\_\_\_\_ and electricity. They are non-polluting and also help to preserve the \_\_\_\_\_.  
(fuels, alternatives, wastes, oil, renewable, environment)
- 12 (a) Write a review of any book which you have read recently.
- (b) i. Rahul went to Niagara falls and it was \_\_\_\_\_ (memory).  
ii. After reaching exam center, Jyothi realized that she had forgot to bring a hall-ticket. the examiner said she is \_\_\_\_\_ (neglect).  
iii. It was a \_\_\_\_\_ (strain) job.

\* \* \* \* \*

