

**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)  
Gundlupochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: Engineering Mathematics -I

Branch: Common to CE, EEE, ME, ECE, CSE, IT &amp; MINING

Time: 3 hours

Max. Marks: 70

Answer ALL questions of the following

5x 14 Marks= 70 Marks

1. (a) Reduce the matrix  $\begin{bmatrix} 1 & 2 & 3 & 0 \\ 2 & 4 & 3 & 2 \\ 3 & 2 & 1 & 3 \\ 6 & 8 & 7 & 5 \end{bmatrix}$  to the echelon form and find its rank.

- (b) Find the inverse of the matrix  $\begin{bmatrix} 8 & 4 & 3 \\ 2 & 1 & 1 \\ 1 & 2 & 1 \end{bmatrix}$  by Gauss Jordan method.

**OR**

2. (a) For what values of  $a$  and  $b$ , the equations  
 $x + ay + z = 3$ ,  $x + 2y + 2z = b$ ,  $x + 5y + 3z = 9$   
 are consistent. When will these equations have a unique solution.  
 b) Solve the system of equations  
 $10x + y + z = 12$ ,  $2x + 10y + z = 13$ ,  $2x + 2y + 10z = 14$   
 by LU decomposition method.

3. (a) Find the inverse of the matrix  $\begin{bmatrix} 2 & 1 & 1 \\ 0 & 1 & 0 \\ 1 & 1 & 2 \end{bmatrix}$  by using Cayley Hamilton theorem. Also find the

matrix represented by  $A^8 - 5A^7 + 7A^6 - 3A^5 + A^4 - 5A^3 + 8A^2 - 2A + I$ . (10)

- b) If  $\lambda$  is an eigen value of the matrix  $A$ , then show that  $\lambda^m$  is an eigen value of  $A^m$ . (4)

**OR**

4. Verify the Cayley- Hamilton theorem for the matrix  $\begin{bmatrix} 1 & 2 & 3 \\ 2 & 4 & 5 \\ 3 & 5 & 6 \end{bmatrix}$  and find  $A^{-1}$ . Express

 $B = A^8 - 11A^7 - 4A^6 + A^5 + A^4 - 11A^3 - 3A^2 - 2A + I$  as a quadratic polynomial in  $A$

5. Test the convergence of the series

(i)  $\frac{x}{1+x} - \frac{x^2}{1+x^2} + \frac{x^3}{1+x^3} - \dots$

(ii)  $\sum_{n=1}^{\infty} \frac{(x-1)^n}{n^2}$

OR

6. (a) Test for convergence of the series  $1 + \frac{2^2}{3^2} + \frac{2^2 \cdot 4^2}{3^2 \cdot 5^2} + \frac{2^2 \cdot 4^2 \cdot 6^2}{3^2 \cdot 5^2 \cdot 7^2} + \dots$

(b) Show that the alternating series is convergent  $\sum_{n=1}^{\infty} \frac{(-1)^n \sqrt{10n}}{n+2}$

7. (a) If  $f(x) = \left(\frac{\pi-x}{2}\right)^2$  in the range 0 to  $2\pi$ , find Fourier series of  $f(x)$ .

(b) Find the Fourier series of  $f(x) = 2x - x^2$  in  $(0,3)$

and hence evaluate  $\frac{1}{1^2} - \frac{1}{2^2} + \frac{1}{3^2} - \frac{1}{4^2} + \dots$

OR

8. (a) Find the Fourier series for  $f(x) = \begin{cases} 0, & -2 < x < -1 \\ 1+x, & -1 < x < 0 \\ 1-x, & 0 < x < 1 \\ 0, & 1 < x < 2 \end{cases}$

(b) Find the half range sine series of the function

$$f(x) = \begin{cases} x, & 0 < x < \frac{\pi}{2} \\ \pi - x, & \frac{\pi}{2} < x < \pi \end{cases}$$

9. (a) Prove that  $\frac{b-a}{1+b^2} < \tan^{-1} b - \tan^{-1} a < \frac{b-a}{1+a^2}$  if  $0 < a < b$ .

Hence show that  $\frac{\pi}{4} + \frac{3}{25} < \tan^{-1} \frac{4}{3} < \frac{\pi}{4} + \frac{1}{6}$ .

(b) Find the volume got by the revolution of the area bounded by  $x$ -axis, the catenary  $y = a \cosh\left(\frac{x}{a}\right)$  about the  $x$ -axis between the ordinates  $x = \pm a$ .

OR

10. (a) Find the Taylor's series expansion for  $f(x) = \log \cos x$  about the point  $x = \pi/3$  upto four terms.

(b) Find the area of the surface formed by the revolution of  $y^2 = 4ax$  about its axis, by the arc from the vertex to one of the latusrectum.

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Gundlupochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: Engineering Mechanics

Branch: Common to CE, ME AND MINING

Time: 3 hours

Max. Marks: 70

Answer ALL questions of the following

5x 14 Marks= 70 Marks

1. a. State and prove Lami's theorem [4]
- b. Find the resultant of the force system acting on the hook shown Fig.1. [10]

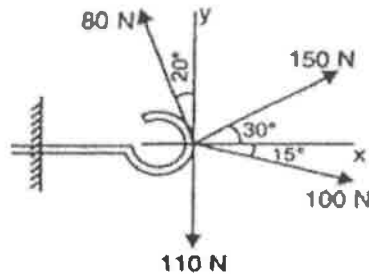
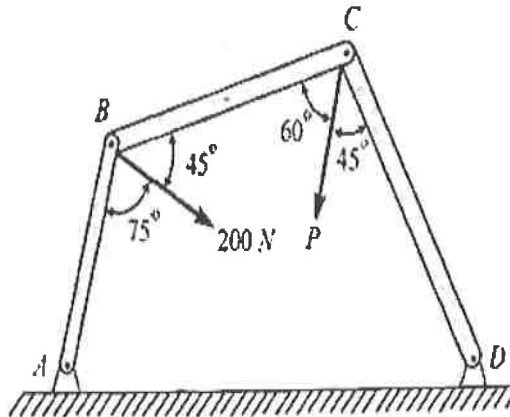


Fig.1.

OR

2. a. State the principle of transmissibility. [2+2+10]
- b. What is meant by equilibrant?
- c. Three bars, pinned together B and C and supported by hinges at A and D as shown in figure below form a four - link mechanism. Determine the value of P that will prevent motion.



3. a. Differentiate between center of gravity and centroid. [4]
- b. Determine the centroid of the shaded area shown in the Figure.1 [10]

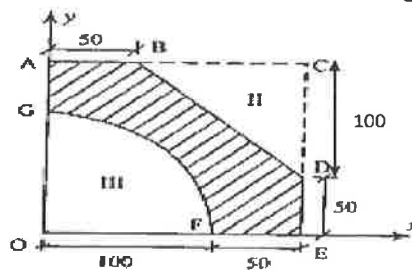


Figure.1

OR

4. a. Define the terms Angle of repose and coefficient of Friction [4]  
 b. A block of weight 250 N is in contact with a plane inclined at  $30^\circ$  with the horizontal. A force  $P$  parallel to and acting up the plane is applied to the body. If the coefficient of static friction is 0.2. (a) what is the value of  $P$  to just cause the motion of the block up the plane? (b) what is the value of  $P$  to prevent the block from moving down the plane? (c) If  $P = 100$  N, what is the magnitude and direction of the frictional force? [10]
5. Derive the mass moment of inertia of a solid cylinder of radius  $R$  and height  $h$  about the centroidal axes.

OR

6. a. Find the mass moment of inertia of a thin rod of length  $L$  about its centroidal axes. [7M]  
 b. Calculate the moment of inertia for an area shown in the Fig.2. [7M]

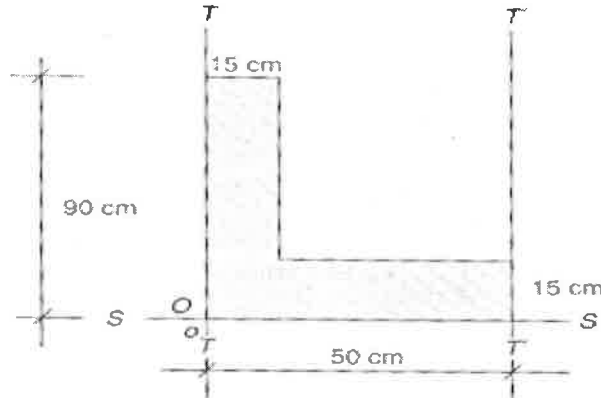
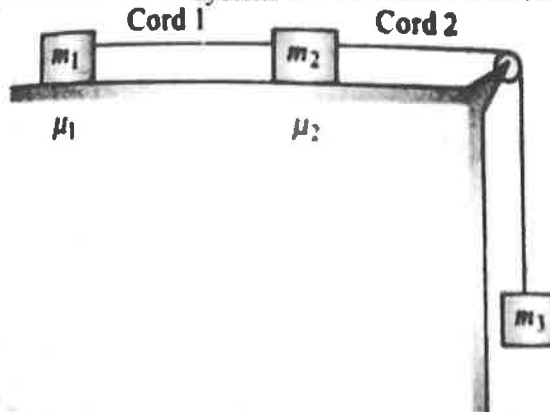


Fig.2.

7. a. State D'Alembert's principle. [4]  
 b. A motor car takes 10 seconds to cover 30 meters and 12 seconds to cover 42 meters. Find the uniform acceleration of the car and its velocity at the end of 15 seconds. [10]
- OR
8. Three blocks of masses  $m_1$ ,  $m_2$ , and  $m_3$  are connected by two cords as shown below. Obtain an expression for the acceleration of the system and determine tension in the cord. [14]



9. a. Explain the terms 'amplitude' and 'frequency' [4]  
 b. A particle is moving with simple harmonic motion and performs eight complete oscillations per minute. If the particle is 50 mm from the centre of the oscillation, determine the amplitude, the velocity of the particle and maximum acceleration. Given that the velocity of the particle at a distance of 70 mm from centre of oscillation is 0.6 times the maximum velocity. [10]

OR

10. a) Derive the equation for kinetics of the bodies rotating about fixed axis. [4]  
 b) A flywheel weight 50k N and having radius of gyration 1m losses its speed from 400rpm to 280rpm in two minutes. Calculate i) the retarding torque acting on it. ii) change in its kinetic energy during the above period. [10]

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**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: Engineering ChemistryBranch: **Common to: CE, ME and MINING**Time: **3 hours**Answer **ALL** questions of the following**Max. Marks: 70****5x 14 Marks= 70 Marks**

1. (a) Write a short note chlorination of water. 4M  
(b) Calculate the amount of Lime Soda required for softening of 50000 liters of water containing the following salts per liter  $Mg(HCO_3)_2=7.5$  mg/l ;  $Ca(HCO_3)_2=8.1$  mg/l ;  $MgCl_2=2.0$  mg/l ;  $CaSO_4=13.6$  mg/l;  $MgSO_4=12.0$  mg/l and  $NaCl=4.7$  Mg/l. 10M

OR

2. a) Explain in detail about boiler corrosion.  
b) Describe the carbonate and phosphate conditioning of water to overcome the boiler – feed problem.
3. (a) Explain about crystal field splitting of d-orbitals in octahedral crystal fields.  
(b) Write down the MO Configuration of  $O_2$ .

OR

4. a. Writ the Crystal field splitting of  $[Ni(CO_4)]$  complex.  
b. What are Salient features of crystal field theory?
5. (a) What is reference electrode? Describe the construction of Calomel electrode.  
(b) Write mechanism of electrochemical (wet) corrosion.

OR

6. a) Write a note on i) Water line corrosion ii) Galvanic corrosion  
b) Explain electroless plating in detail.
7. a. Describe the classification of isomers.  
b. What is meant by chirality? Write examples.

OR

8. a. Explain determination of optical activity by center of symmetry.  
b. Write a short note on coupling constant.
9. (a) Explain the mechanism of  $SN^1$  reaction with suitable example.  
(b) Explain Cannizaro(Oxidation-Reduction) reaction with suitable example.

OR

10. (a) Write Diels-Alder reaction and its mechanism with suitable examples.  
(b) What are reaction Intermediates? Explain formation and stability of carbocations



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Branch: Common to CE, ME AND MINING

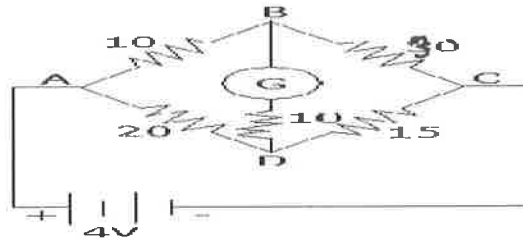
Time: 3 hours

Max. Marks: 70

Answer ALL questions of the following

5x 14 Marks= 70 Marks

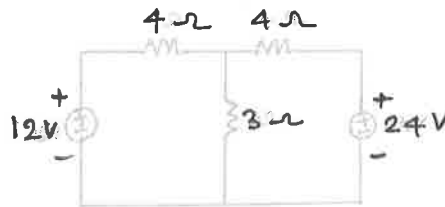
1. a) Determine the current in 15 Ohm resistor of the circuit as shown in fig. (all resistances are in ohms). [7]



- b) Write short notes on Resistance, Inductance and capacitance. [7]

OR

2. a) Write short notes on nodal and mesh analysis. [6]  
b) Find current in  $3\Omega$  resistor by using superposition theorem in the circuit of Fig. below. [8]



3. a) Define the following: i) RMS value ii) Average value and iii) Power factor with respect to an AC circuit. [6]  
b) A coil having a resistance of 10 ohms and an inductance of 0.2H is connected in series with a  $100\mu\text{F}$  capacitor across a 230V, 50Hz supply, Calculate: i) Impedance ii) Current iii) Active and Reactive power. [8]

OR

4. a) Explain analysis of single phase pure resistive circuit. [8]  
b) A  $318\mu\text{F}$  capacitor is connected across 230V, 50Hz supply. Find i) capacitive reactance ii) RMS value of current iii) write down equation for voltage and current. [6]

5. a) Explain working principle of Transformer [7]  
b) The primary winding of a 50 Hz single phase transformer has 480 turns and fed from 6400 v supply. The secondary winding has 20 turns. Find the peak value of flux in the core and the secondary voltage. [7]

OR

6. a) Derive an expression for the torque developed by a DC motor. [7]  
b) With the help of neat diagram, illustrate how Brake test is done on 3-Phase Induction Motor? [7]
7. a) Explain energy band diagram of p-n diode [5]  
b) Explain Transition and Diffusion capacitances. [9]

OR

8. a) Explain the operation of a full wave bridge rectifier with relevant waveforms. [10]  
b) Explain about the working of L-C Filter, and  $\pi$ - section Filter. [4]
9. Explain Briefly about CE connection. Draw input and output characteristics and explain how they are obtained [14]

OR

10. a) Explain transistor acts as amplifier. [5]  
b) Comparison between BJT and JFET [5]  
c) Applications of JFET [4]



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**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: ENGINEERING GRAPHICSBranch: **Common to CE & MINING****Time: 3 hours****Max. Marks: 70****Answer ALL questions of the following****5x 14 Marks= 70 Marks**

1. A point P is 15mm above H.P and 20mm in front of VP. Another point Q is 25mm behind VP and 40mm below HP. Draw the projections of P & Q keeping the distance between their projectors equal to 90mm. Draw straight lines joining i) their top views and ii) their front views.

OR

2. Construct an Ellipse when the distance of the focus from the directrix is equal to 70 mm and eccentricity is  $\frac{3}{4}$ . Draw a normal and tangent to the curve from a point on it at a distance of 40 mm from the focus.
3. A room is 4.8m/4.2m/3.6m high. Determine graphically the distance between a top corner and the bottom corner diagonally opposite to it.

OR

4. A) A 100mm long line is parallel to and 40mm above HP. Its two ends are 25mm and 50mm in front of VP. Draw its projections and find its inclination with VP.  
B) A line PQ 90mm long is in the HP and makes an angle of  $30^\circ$  with VP. Its end P is 25mm in front of VP draw its projections.
5. Draw the projections of a pentagonal prism, base 25 side and 100 mm long, resting on one of its rectangular faces on the ground, with the axis inclined at  $45^\circ$  to the VP.

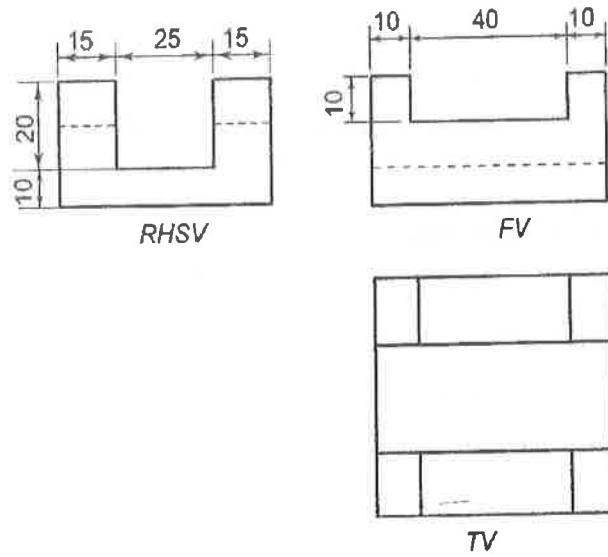
OR

6. A Cone, base 75 mm diameter and axis 75 mm long, has its axis parallel to the VP. A horizontal section plane cuts the cone through the midpoint of the axis and inclined at  $45^\circ$  to HP. Draw the front view, sectional top view.
7. Draw the isometric view of right regular cone of 100 mm long and 20 mm base radius, when the  
i) . Axis is vertical      ii). Axis is horizontal

OR

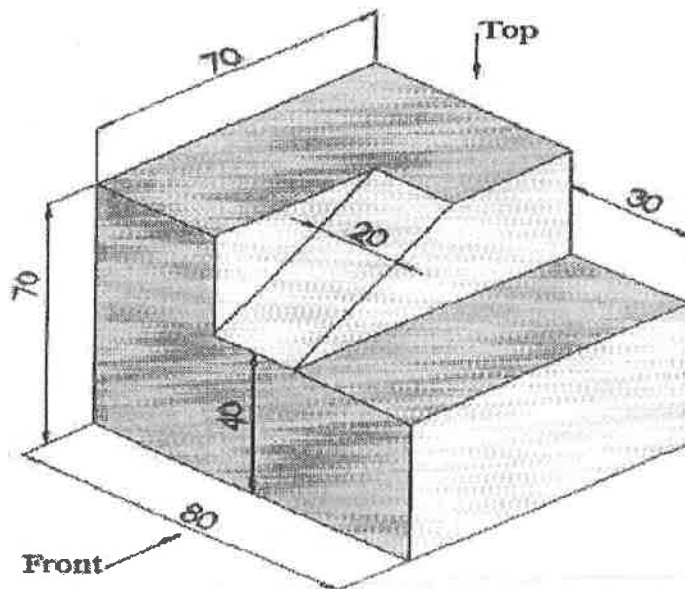
8. Draw the isometric view of right regular cylinder of 120 mm long and 30 mm base radius, when the  
i) . Axis is vertical      ii). Axis is horizontal

9. Draw the isometric projection of the given orthographic views of a casting.



OR

10. Draw the Orthographic view's (front view, top view and right side view) of the following Figure.



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**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: ENGINEERING GRAPHICS

Branch: ME

Time: 3 hours

Max. Marks: 70

Answer ALL questions of the following

5x 14 Marks= 70 Marks

1. A fixed point is 75 mm from a fixed straight line. Draw the locus of a point P moving such a way that its distance from the fixed straight line is (i) twice its distance from the fixed point ii) equal to its distance from the fixed point .Name the curves.

OR

2. Draw the path that would be traced by an end of the string, when it is unwound from the circumference of the disc, which is in the form of a square having a 30 mm side .
3. Draw the projections of a circle of 75 mm diameter having the end A of the diameter AB in the horizontal plane and the surface inclined at  $30^{\circ}$  to HP and perpendicular to VP.

OR

4. A line PQ 75 mm long is inclined  $40^{\circ}$  HP and  $30^{\circ}$  VP. It's one end P 20 mm above HP and 25 mm in front of VP. Draw the projections.
5. A Square pyramid, base 50 mm side and axis 75 mm long, is resting on the ground .It is cut by a section plane through the midpoint of the axis inclined at  $30^{\circ}$  to HP and perpendicular to VP. Draw the front view and Sectional top view.

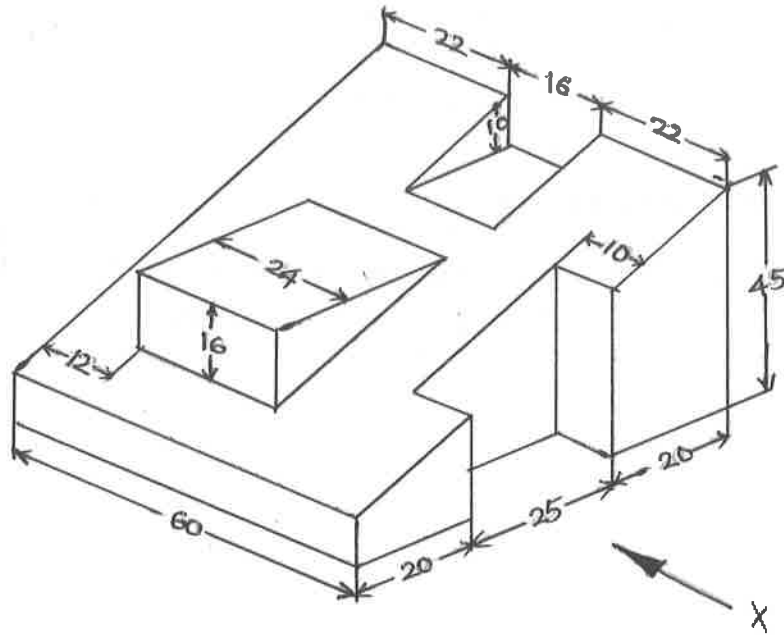
OR

6. A triangular prism, base 30 mm side & axis 50 mm long is lying on the ground on one of its rectangular faces with the axis inclined at  $30^{\circ}$  to the VP. It is cut by a horizontal plane at a distance of 15 mm above the ground. Draw its front view & sectional top view.
7. A cylinder of base 40 mm diameter & 60 mm height is resting on its base on HP .Draw the development of the cylinder

OR

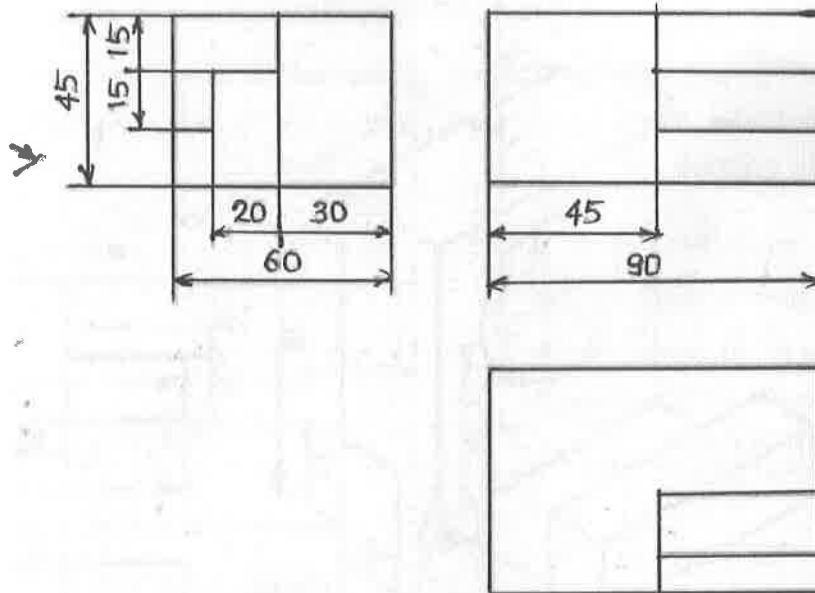
8. A) A pentagonal pyramid of base of side 30mm and axis 50mm long is resting on its base on HP. Draw the development of solid.
- B) A pentagonal prism of base of side 30mm and axis 60mm long is resting on its base on HP. Draw the development of lateral surface.

9. Draw the orthographic front view, top view and right side view of the given casting.



OR

10. Draw the Isometric view for the following Orthographic views.



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1. a. Explain the various flowchart symbols [5]  
b. Draw a flowchart to find positive and negative numbers in a given list of integers. [5]  
c. Explain any four basic types of constants with an example each.  
OR
2. a. Write an algorithm and draw flowchart for finding greatest among three given numbers. [4]  
b. Briefly explain about the basic data types that C language supports. [5]  
c. Convert decimal 725 to binary, octal and hexadecimal number systems. [5]
3. a). Explain about nested if. [5M]  
b). Write a C program to find GCD of any given two numbers. [5]  
c). Distinguish between if and switch statements? [4M]  
OR
4. a. Write a C program to generate all prime numbers between 1 and n, when the value for n is given by user. [7]  
b. Explain about the iterative statements with examples. [7]
5. a). How pointer can be used for accessing multi dimensional arrays? Discuss. [7M]  
b). Explain about dynamic memory management. [7M]  
OR
6. a. How to declare string? Differentiate between character array and strings? [7]  
b. How can a pointer be used to access individual elements of an array? Explain with an example. [7]
7. a). Differentiate between structure and union. [5M]  
b). How to pass pointer variables as function arguments? Explain with examples. [5M]  
c). What are nested structures? Explain. [4M]  
OR
8. a. Explain how to pass one dimensional arrays to functions. [7]  
b. Differentiate between array of structure and pointer to structure. [7]
9. a). Write a C program for file operations. [7M]  
b). Sort the following 10 elements using bubble sort technique. Write the algorithm for the same. 85  
53 96 35 27 87 37 12 90 23  
OR
10. a). Sort the following 10 elements using insertion sort technique. Write the algorithm for the same. 85  
85 53 96 35 27 87 37 12 90 23 [5M]  
b). What is the use of rewind()? [5M]  
c). what are the drawbacks of linear search? [4M]



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1. a) Write short notes on the following 10M  
 i. Characteristics of effective writing  
 ii. Types of reading
- b) Write meanings for the following roots and frame a word using the root. 4M  
 i. ion  
 ii. ous  
 iii. ness  
 iv. cord

OR

2. (a) What is the central theme of the poem *The Road not Taken* by Robert Frost? 10M
- (b) Fill in the blanks with suitable 'prepositions'. 2M  
 (i) This is the person \_\_\_\_\_ whom I received information.  
 (ii) He gave a gift \_\_\_\_\_ his daughter.  
 (iii) Who are you afraid \_\_\_\_\_ ?  
 (iv) He put his arm \_\_\_\_\_ her.
- (c) Supply appropriate **article** for the following: 2M  
 (i) \_\_\_\_\_ stitch in time saves nine. (The/A/An)  
 (ii) \_\_\_\_\_ Bible is a sacred book. (The/A/An)  
 (iii) \_\_\_\_\_ father in him forgave the son. (The/A/An)  
 (iv) He is \_\_\_\_\_ M.B.A degree holder. (The/A/An)
3. (a) Explain the significance of intensive and extensive reading techniques for effective reading. 8M
- (b) For each of the sentences, write another one using a **homonym** of the word in bold. 2M  
 (i) *Ignited Minds* is an excellent **book**.  
 (ii) I **saw** a beggar on the road.  
 (iii) **Will** you marry me?  
 (iv) Pleasetear this piece of paper.
- (c) Convert the following into **complex** sentences: 4M  
 (i) He asked my my father's name.  
 (ii) Give every man his due.  
 (iii) Robbers set fire to the property belonging to my friend.  
 (iv) You cannot succeed without honesty.

OR

4. (a) According to APJ Kalam "becoming a knowledge super power is a very important mission for the nation". Discuss 10M  
 (b) For each of the sentences, write another one using a **homonym** of the word in bold. 4M
- (i) I **can** hit six sixes in an over.  
 (ii) The **bark** of that tree is brown.  
 (iii) Give me your **address**.  
 (iv) What do you **mean** by that?
5. a) Write an essay on 'Women empowerment in fighting domestic violence' 7M  
 b). According to Kipling, what should be one's attitude to unexpected loss? as explained in the poem "IF" 7M
- OR
6. (a) Describe how Subbaiah's greed led to his tragic death in the story *Half a Rupee Worth*. 10M  
 (b) Give the meaning and make a sentence for each of the **idioms** given below. 4M
- (i) Bell the cat.  
 (ii) By hook or by crook.  
 (iii) Red-letter day.  
 (iv) Black sheep.
7. a) At East Technical High School, Owens quickly made a name for himself as a nationally recognized sprinter, setting records in the 100 and 200-yard dashes as well as the long jump. After explain his journey as an athlete. 10M  
 b). **Supply question tag for the following sentences** 3M
- i) He is an engineer -----  
 ii) She doesn't know Hindi-----  
 iii) The test will have started by then-----  
 iv. Choose the correct synonym for the word 'beneficial' and use it in a context. 1M
- beneficial**  
 a. promptness                      b. keenness                      c. valuable                      d. liveliness
- OR
8. a) What message can we draw from Langston Hughes' poem *I, Too* on racial discrimination? 10M  
 b) Write **one-word substitute** for the following: 4M
- (i) A word formed from first letters of certain words.  
 (ii) An unmarried woman.  
 (iii) Study of human race.  
 (iv) Person of one country living in another.
9. a) What are PT. Barnum's suggestions to control the expenditure? 7M  
 b) Barnum understood that people enjoy being fooled if they know participants in the ruse. Explain 7M
- OR
10. (a) Do you think the title of the poem *Human Family* is apt? Write your views. 10M  
 (b) Convert the sentences given below to **direct speech**: 4M
- (i) Raavan declared that he preferred death to dishonor.  
 (ii) He said that he had to leave then.  
 (iii) He told us that we mustn't smoke in the bus.  
 (iv) He asked me why I had not eaten anything.



**MALLA REDDY ENGINEERING COLLEGE (AUTONOMOUS)**(Affiliated to JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD)  
Gundlapochampally (H), Maisammaguda (V), Medchal (M), Medchal-Malkajgiri (Dist), Hyderabad**I B.TECH I SEMESTER REGULAR END EXAMINATIONS, DECEMBER-2018**Subject: Applied PhysicsBranch: **Common to: EEE, ECE, CSE and IT**

Time: 3 hours

Max. Marks: 70

Answer ALL questions of the following

5x 14 Marks= 70 Marks

1. (a) Discuss the de Broglie hypothesis of the duality of mater particles. (6)
- (b) Write any four postulates of Quantum mechanics. (4)
- (c) An applied voltage of 344 V accelerated the electrons to diffract from a crystal. The first diffraction maximum occurs when the glancing angle is  $60^\circ$ . Determine the wave length of the matter wave (4)

OR

2. a) Derive and discuss the solutions for energy of a particle in a one dimensional infinite potential well assuming time-independent Schrodinger wave equation. (10)
- b) Find the energy of the electron moving in a one dimensional infinitely high potential box of 0.1nm width. (4)
3. a) Explain Kronig-penny model of solids. (8)
- b) Discuss how the theory leads to the concept of band structure of solids (6)

OR

4. a) Explain about the merits and demerits of Quantum free electron theory (8)
- b) An electron is confined in one-dimensional potential well of width  $3 \times 10^{-10}$  m. Find the kinetic energy of electron when it is in the ground state. (6)
5. (a) Derive the expression for hole density in valance band of an intrinsic semi conductor. (8)
- (b) Compute the concentration of intrinsic charge carriers in a germanium cristal at 300K (energy gap=0.72 eV and  $m_e^* = m_e$ ). (6)

OR

6. a) Obtain the expression for carrier concentration in P-type semiconductor. (10)
- b) Write briefly, about the effect of temperature and doping concentration on fermi level. (4)
7. a) Explain optical fiber communication system with block diagram. (8)
- b) Explain the different methods used for pumping. (6)

OR

8. a) Explain different types of optical fibers. (8)
- b) What are the different applications of optical fibers? (6)
9. (a) Derive the electromagnetic wave equation for free space and deduce the expression for speed of light. (8)
- (b) What is Lenz's law and write its physical significance. (6)

OR

10. a) Define emf and discuss the Faradays law of electromagnetic induction. (8)
- b) If  $\vec{A} = 2x\hat{i} + 2y\hat{j} + 3z\hat{k}$ ,  $\vec{B} = y\hat{i} + (x^2 + y^2)\hat{j} + (yz + zx)\hat{k}$  then find curl A and curl B at point (2,2,-2). (6)

