

**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 II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **COMPUTATIONAL MATHEMATICS**Branch: **COMMON TO ALL**

Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

5x2M=10 M

1. If  $f(x) = x^3 - 2x - 5 = 0$ , by the method of false position, find the fourth approximation to the required root.
2. Evaluate  $\Delta \tan^{-1}x$ .
3. Write Newton's forward difference formulae for  $\frac{dy}{dx}$  and  $\frac{d^2y}{dx^2}$
4. Using modified Euler's method, the solution of the differential equation  $\frac{dy}{dx} = 2xy$ ,  $y(0) = 1$ ,  $h = 0.25$ , then find  $y(0.25)$
5. What is the classification of the equation  $f_{xx} + 2f_{xy} + f_{yy} = 0$

**PART-B**

Answer ALL questions of the following

5x10 M= 50M

1. a) Establish iterative formula for finding a real root of  $x^3 - K = 0$  ( $K > 0$ ) using Newton Raphson method. Hence find  $3^{1/3}$ .  
b) Solve the following system of equations by Gauss-Seidal iterative method.

$$x_1 + 10x_2 + x_3 = 6; 10x_1 + x_2 + x_3 = 6; x_1 + x_2 + 10x_3 = 6$$

**OR**

2. Solve the real root of the equation  $\log x = \cos x$  to 3 decimal places by Newton- Raphson method.
3. a) For the data using the Lagrange's Interpolation polynomial  $f(1.5)$  is

x	1	2	3
y	0	1	2

- b) Find  $f(22)$ , from the following data using Newton's Backward formula.

x	20	25	30	35	40	45
y	354	332	291	260	231	204

**OR**

4. Given the following data, find  $y$  for  $x \leq 75$  from following table using Newton's backward difference

x	0-20	20-40	40-60	60-80	80-100
y	8	17	26	22	7

5. a) Fit a curve of the form  $y = ax^b$  to the following data.

x	2	1	4	3	5	6
y	4.243	3.000	6.000	5.196	6.708	7.348

- b) A rocket is launched from the ground. Its acceleration is registered during the first 80 seconds and is given in the table below. Using Simpson's 1/3 rd rule, find the velocity of the rocket at  $t = 80$  seconds

t(sec)	0	10	20	30	40	50	60	70	80
f(cm/sec <sup>2</sup> )	30	31.63	33.34	35.47	37.75	40.33	43.25	46.69	50.67

OR

6. Calculate approximately the value of  $\int_0^6 \sin^4 x dx$  by using

(i) Trapezoidal rule (ii) Simpson's rule taking  $n = 6$ .

7. a) Solve  $\frac{dy}{dx} = (x^2 - y)$ ,  $y(0) = 2$ , Find  $y$  at  $x=0.1$  and  $x=0.2$  using modified Euler's method

- b) Use Taylor's Series method to solve the differential  $\frac{dy}{dx} = x^2 + y$ ,  $y(4) = 4$  and compute  $y(4.2)$  and  $y(4.4)$

OR

8. Use RK's fourth order method to find  $y(0.6)$  given  $y(0) = 1$  and  $\frac{dy}{dx} = \frac{y-x}{y+x}$  taking  $h = 0.2$ .

9. Use Gauss Seidel's method to solve  $u_{xx} + u_{yy} = 0$ , for the following mesh.

	20	20	30	30	20
50					50
60					60
50					50
70	70	80	90	80	70

OR

10. Solve the Poisson equation  $u_{xx} + u_{yy} = -81xy$ ,  $0 < x < 1$ ,  $0 < y < 1$  Given that  $u(0,y)=0, u(x,0)=0, u(1,y)=100, u(x,1)=100$  and  $h = 1/3$ .

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**I B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **PHYSICS OF MATERIALS**Branch: **COMMON TO CE,ME,MINING****Time: 3 hours****Max. Marks: 60****PART – A****Answer ALL questions of the following****5x2M=10 M**

1. What are smart magnets?
2. Write the relation between D, E and P.
3. Write LASER abbreviation.
4. What is Echelon effect?
5. Describe the different types of defects in a structure.

**PART-B****Answer ALL questions of the following****5x10 M= 50M**

1. a) What are hard magnetic materials? Give their properties and applications.  
b) Write a short note on the properties of anti -ferro magnetic materials?

**OR**

2. Draw and explain the hysteresis curve for a ferromagnetic substance.
3. a) Mention types of polarization.  
b) Define the electronic and ionic polarizations.

**OR**

4. a) Explain the orientation polarization. [4M]  
b) Explain the concept of internal field in solids. [6M]
5. a) What are Einstein coefficients and obtain relations between them. [6M]  
b) Give some four applications of Laser beam. [4M]

**OR**

6. a) Describe the terms population inversion, meta-stable state and pumping.  
b) Describe the construction and working of a ruby laser.
7. Write in detail the factors affecting the architectural acoustics and their remedies.

**OR**

8. a) What are piezo- and inverse piezo-electric effects?  
b) Describe the piezo-electric method of production of ultrasonic waves with suitable diagrams.
9. a) Write a short note on non-destructive testing (NDT) method.  
b) Explain eddy current testing method.

**OR**

10. a) Differentiate between cracking, spalling and staining.  
b) Mention the principle of X-ray radiography and describe the procedure of this testing.



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1. If  $S = S(x,y,z) = x^2 - x^2y + xy^2z^2$ , then find the value of grad S at the point (2,-1,-3).
2. What is dipole moment?
3. Give any two conditions needed for Laser action.
4. Define Fermi energy level.
5. What is photoconductivity?

**PART-B**Answer **ALL** questions of the following**5x10 M= 50M**

1. a) Explain why magnetic monopole does not exist? (3)  
b) If  $\mathbf{r}$  is a position vector of a point, prove that  $\text{curl } \mathbf{r} = 0$ . (4)  
c) What is the physical significance of curl of a vector. (3)

**OR**

2. a) Deduce the four Maxwell equations in free space. [6 M]  
b) Prove that  $\nabla \cdot (\mathbf{A} \times \mathbf{r}) = \mathbf{r} \cdot (\nabla \times \mathbf{A})$  where  $\mathbf{r}$  is a position vector  $\mathbf{r} = ix + jy + kz$ . [4 M]
3. a) Explain the concept of ferroelectricity. [4 M]  
b) Write a brief description of various types of polarization. [6 M]

**OR**

4. a) Define ionic polarization and obtain expression for ionic polarizability? [7 M]  
b) A solid elemental dielectric with density  $3 \times 10^{28}$  atom/m<sup>3</sup> shows an electronic Polarizability of  $10^{-40}$  F-m<sup>2</sup>. Assuming the internal dielectric field to be a Lorentz field calculate the dielectric constant of the material? [3 M]
5. a) Explain different methods used for pumping of atoms [4 M]  
b) What is a gas laser? Explain the working of He-Ne laser with relevant diagrams. [6 M]

**OR**

6. a) Explain the following terms [4 M]  
i) Absorption ii) Spontaneous and Stimulated emission processes,  
iii) Pumping and iv) Population inversion.  
b) Derive the relation between the probabilities of spontaneous and stimulated emissions in terms of Einstein's coefficients?

7. a) Discuss the formations of energy band structures in solids using energy versus inter-atomic distance curve.
- b) Discuss energy band structures for conductors, insulators and semi- conductors with neat diagrams.

**OR**

8. a) Explain briefly E-k curve.
- b) Explain Fermi distribution function and its variation with temperature.
9. Derive an expression for carrier concentration in intrinsic semiconductors.

**OR**

10. a) Differentiate drift and diffusion currents.
- b) What are the advantages and disadvantages of LED.

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Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

5x2M=10 M

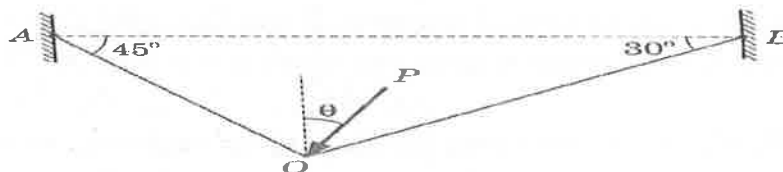
1. Define resultant of a force.
2. Explain the laws of friction with examples.
3. Differentiate between first moment and second moment of an area.
4. Explain curvilinear motion with suitable example.
5. Define free and forced vibrations.

**PART-B**

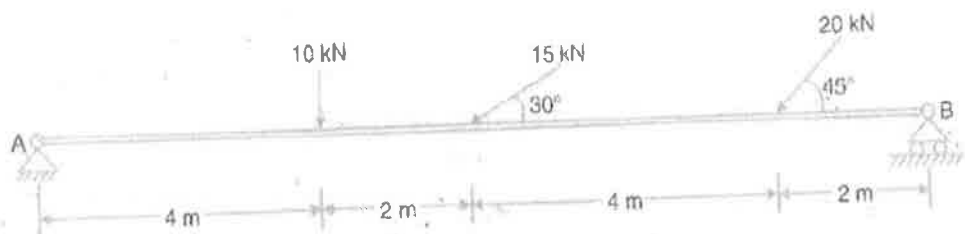
Answer ALL questions of the following

5x10 M= 50M

1. a) State and explain Triangle law of forces.  
b) A force  $P$  is applied at  $O$  to the string  $AOB$  as shown in figure below. If the tension in each part of the string is  $50\text{N}$ , find the magnitude and direction of force  $P$  for equilibrium conditions.

**OR**

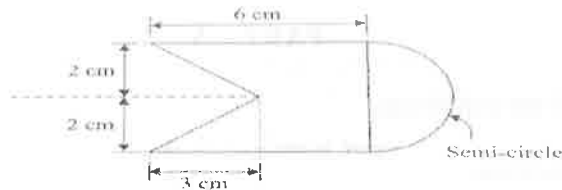
2. The beam  $AB$  of span  $12\text{m}$  shown in figure is hinged at  $A$  and is on rollers at  $B$ . Determine the reactions developed at  $A$  and  $B$  due to loading shown in figure.



3. a) Explain limiting friction  
 b) A block of 200 Kg mass rest on a rough horizontal plane. Find the force required to just pull the block by an inclined force P inclined at  $30^\circ$  to the horizontal. The coefficient of static friction between the contact surfaces is 0.3.

OR

4. Determine the centroid of the composite section shown in figure.



Figure

5. Determine the moment of inertia of a semicircular area is removed from a trapezium as shown in fig.

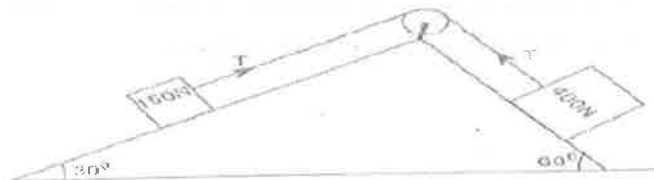


OR

6. Determine the mass moment of inertia of an equilateral plate of mass M and side 'a' about one of its sides.  
 7. A motor shaft attains a velocity of 1500 RPM. The angular acceleration of the shaft is highest when the motor attains the speed of 1500 RPM. In between 0 RPM and 1500 RPM, the angular acceleration is a linear function of speed. Find out the time to attain the full speed.

OR

8. Two weights of 150N and 400N lying on inclined surfaces are connected by a string that passes over a frictionless pulley as shown in figure. Assuming  $\mu=0.25$ , determine the velocity of system 3 seconds after the system is set in motion. What is the tension in the string at this instant?



9. Explain the mechanics involved in compound pendulum.

OR

10. Under what conditions does the work done upon a body becomes positive, zero and negative.



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**I B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **APPLIED CHEMISTRY**Branch: **COMMON TO EEE,ECE,CSE,IT**

Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

**5x2M=10 M**

1. Write any two difference of temporary and permanent hardness.
2. Define electrochemical cell.
3. Why is PVC used in chemical industries?
4. Why are gaseous fuels more advantageous than solid fuels?
5. What are Fullerenes?

**PART-B**

Answer ALL questions of the following

**5x10 M= 50M**

1. Write a brief account on (a) Caustic embrittlement (b) Boiler corrosion (c) Scales & Sludges.

**OR**

2. a) Differentiate between internal & external treatment.  
b) Calculate the temporary and permanent hardness of water having following composition :  $(\text{CaHCO}_3)_2 = 16.2 \text{ mg./lit.}$   $(\text{MgHCO}_3)_2 = 14.6 \text{ mg./lit.}$   $\text{Mg SO}_4 = 1.20 \text{ mg./lit.}$   $\text{CaSO}_4 = 13.6 \text{ mg./lit.}$   $\text{CaCl}_2 = 111 \text{ mg./lit.}$  and  $\text{MgCl}_2 = 9.5 \text{ mg./lit.}$
3. Write a short note on ( a) how the nature of metal effect on rate of corrosion.  
(b) Galvanization.

**OR**

4. Define corrosion. Give brief account on causes & effects of corrosion.
5. a) what is latex? How natural rubber is isolated?  
b) Define the following with suitable examples.  
i) polymer ii) plastics iii) Fibers iv) Rubbers.

**OR**

6. a) Describe the applications of conducting polymers.  
b) Explain the types of polymerizations with examples.
7. a) what is mean by Knocking? How it occurs.  
b) Explain octane & cetane rating.

**OR**

8. a) write a short on significance on renewable energy sources.  
b) Calculate the weight and volume of air required for complete combustion of 1Kg of Carbon.
9. Explain the concept of  $R_4M_4$  with special reference to Econoburette and survismeter.

**OR**

10. a) What are Composites ? .Give its classification and applications .  
b) What is Bio diesel? Give its method of preparation.



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**I B.TECH II SEMESTER SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019**Subject: **ENGINEERING GRAPHICS**Branch: **COMMON TO CE,ME,MINING****Time: 3 hours****Max. Marks: 60****Answer ANY FIVE questions of the following****5x12 M= 50M**

1. Draw epicycloid of rolling circle 40mm which rolls outside another circle base circle of 150mm diameter for one revolution. Draw a tangent and normal at any point on the curve.

**OR**

2. a) Construct a plain scale to compute time in minutes and distance covered by a train in km., when the train passes between two stations 250 km apart in five hours. The scale should have R.F. 1/500000. Show the distance covered in 45 minutes on the scale.  
b) A train is running at a speed of 40 km/hr. Construct a plane scale to read up to a km and a minute. The scale should measure up to 50 km. The RF of the scale is 1:25000. On the scale show the distance covered by the train in 39 minutes.
3. The projectors of the ends of a line AB are 5 cm apart. The end A is 2 cm above the H.P and 3cm in front of V.P. The end B is 1 cm below H.P. and 4 cm behind the V.P. Determine the true length, and its inclination with the two planes.

**OR**

4. A line AB, 80 mm long has its end A 10 mm below HP and 15 mm behind VP. If the line is inclined at  $40^\circ$  to HP and the top view makes  $50^\circ$  with VP. Draw the projections, if the line is in third quadrant.
5. A hexagonal prism, base 40mm side and height 70 mm is resting on one of its corners on the H.P. with its axis inclined at  $60^\circ$  to the H.P. draw the projection of the solid.

**OR**

6. A pentagonal prism of side of base 30mm axis 70mm is resting on one of its base edges in H.P. with its axis inclined at  $45^\circ$  to H.P. The top view of the axis is inclined at  $30^\circ$  to V.P. Draw the projections.
7. A cone, 50 mm base diameter and 70 mm axis is standing on its base on HP. It cut by a section plane  $45^\circ$  inclined to HP through base end of end generator. Draw projections, and development of surfaces of remaining solid.

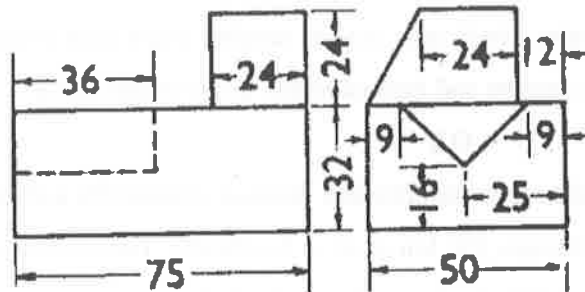
**OR**

8. A hexagonal prism, having a base with a 20mm side and 60mm height is resting on the base in HP such that one of the rectangular faces is parallel to the VP. It is cut by a plane perpendicular to VP and 60 degrees inclined to HP and cutting the midpoint of the axis of the solid. Draw development of lateral surface of the bottom part of the solid.

9. Describe any six commands in the modify toolbar of AUTOCAD software along with their syntax.

OR

10. Draw the isometric view of the object whose orthographic projections are shown below.



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Time: 3 hours

Max. Marks: 60

**PART – A**

Answer ALL questions of the following

5x2M=10 M

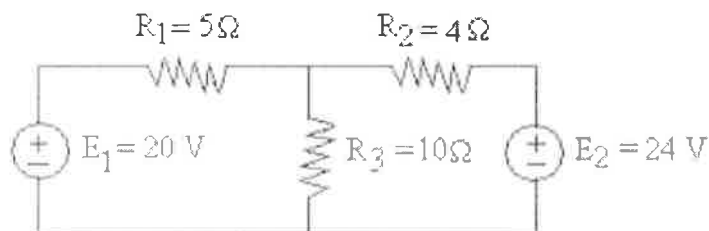
1. Define Passive elements.
2. Explain lenz's law.
3. Draw the phasor diagram for series RC circuit.
4. What is a PN junction? How is it formed?
5. What is the need for filters in power supplies?

**PART-B**

Answer ALL questions of the following

5x10 M= 50M

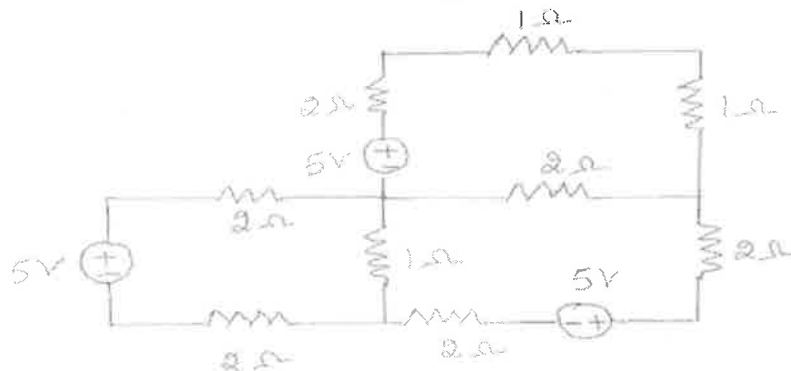
1. a) Using Nodal Analysis find the current through  $R_3$ .



- b) State and explain Kirchhoff's laws with an example.

**OR**

2. Find the currents in batteries as shown in figure



3. a) MMF b)Magnetic Flux c)Reluctance d)Flux Density e)Magnetic Field Strength.

**OR**

4. Explain the concept of DOT convention in solving magnetic circuits.

5. a) Explain steady state analysis of pure capacitance with sinusoidal excitation  
b) A 230V 50Hz AC supply is applied to a coil of 0.06H inductance and  $2.5\Omega$  resistance connected in series with  $6.8\mu\text{F}$  capacitance. Calculate i) impedance ii) current.

**OR**

6. Explain the steady state analysis of series R,L,C with sinusoidal excitation.  
7. a) Explain temperature dependence of VI characteristics of PN junction diode.  
b) Write about diode resistance.

**OR**

8. a) Write about barrier potential.  
b) A silicon diode has a reverse saturation current of 7.12 nanoA at room temperature of  $27^\circ\text{C}$ . Calculate its forward current if it is forward biased with a voltage of 0.7V.  
9. Explain the working of varactor diode and photo diode.

**OR**

10. Explain half wave rectifier with filter.