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 SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: ENGINEERING DRAWING

Branch: COMMON TO ALL

Time: **3 hours**   Max. Marks: **75**

Answer ALL questions of the following   **5x15Mark=75 Marks**

1. a) Construct a hyperbola, with the distance between the focus and the directrix is 50 and
   eccentricity as 3/2. Also, draw normal and tangent to the curve at a point 30 from the directrix. [9M]
   b) Construct the involute of pentagon of 25mm side.   [6M]

<div align="center">OR</div>

2. a) Construct a diagonal scale of 2:75 to read meters, decimeters and centimeters and long enough to
   measureupto 6m. Mark on it a distance of 2.47m.   [6M]
   b) Draw an epicycloids generated by a rolling circle having a 50mm diameter and a directing circle
   with a 150mm diameter. Also, draw a tangent and a normal to the curve, at 115mm from the
   centre of the directing circle.   [9M]

3. A point P is 15 above H.P and 20 in front of V.P. Another point Q is 25 behind V.P and 40 below
   H.P. Draw the projections of the points P and Q. Keeping the distance between their projectors equal
   to 90. Draw straight lines joining i) their top views ii) their front views

<div align="center">OR</div>

4. An isosceles triangle ABC with a 60 mm base AB and altitude 80 mm has its base in the V.P. and
   inclined at 30° to the H.P. The corner A is 15 mm above the H.P. and the corner C is in the H.P.
   Draw the projection of the plane.

5. A hexagonal pyramid of base side 30mm and axis 50mm, rests on one of its base corners on the
   ground with axis inclined at 45° to the HP. Draw its projections when a vertical plane containing the
   axis and the corner that lies in the HP is inclined at 30° to the VP.

<div align="center">OR</div>

6. A cone 50 mm diameters and axis 60mm long rest with its base on H.P. It is cut by a section plane
   perpendicular to H.P. and inclined at 60° to V.P. and at a distance of 10mm from the axis. Draw the
   sectional front view and true shape of the section.

7. A Vertical cone with diameter of base 90 and axis 100 long is penetrated by a horizontal cylinder of
   50 diameters. The axis of the cylinder intersects the axis of the cone at a point 30 from the base.
   Draw the projections of the solids, showing the lines of intersection.

8. Draw the development of lateral surface of the cone with a 50 mm base diameter and a 70 mm long axis. The cone is resting on H.P. on its base.

9. A frustum of a square pyramid of 25mm base edge and height 40mm is placed on top of a sphere of diameter 40mm. Draw the isometric projection of the combination of the solids

<div align="center">OR</div>

10. Draw the front view, top view and side view of the object whose isometric view is shown in the Figure below (All dimensions are in mm) show dimensions.
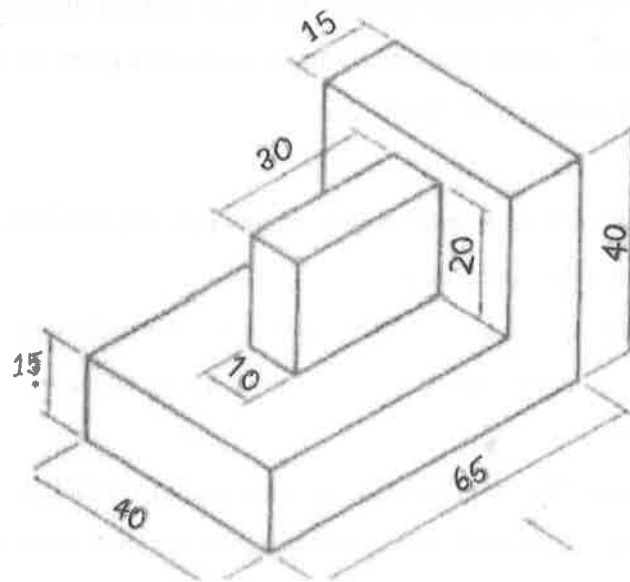
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I B.TECH SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **MATHEMATICS-I**

Branch: **COMMON TO ALL**

Time: 3 hours   **Max. Marks: 75**

PART – A

I. Answer ALL questions of the following   **5x1Mark=5 Marks**

1. Find the rank of the matrix $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & 0 \\ 1 & 1 & 1 \end{bmatrix}$.

2. Write the statement of Cauchy's mean value theorem.

3. Find the value of $\int_0^\infty e^{-x^3} dx$.

4. Solve $(D^2+D-6) y = 0$ where $D = \frac{d}{dx}$.

5. Find $L\{sin^2 2t\}$.

II. Answer ALL questions of the following   **10x2Marks=20 Marks**

1. Find a and b such that A = $\begin{bmatrix} a & 4 \\ 1 & b \end{bmatrix}$ has 3 and -2 as eigenvalues.

2. Show that the matrix $\begin{bmatrix} 2 & 3 + 4i \\ 3 - 4i & 2 \end{bmatrix}$ is Hermition.

3. Find the jacobian of the functions x = r sinα cosβ, y = r sinα sinβ, z=cosα.

4. Discuss the maxima and minima of the function $x^2 + y^2 + 6x + 12$.

5. Evaluate $\int_0^2 \int_1^3 \int_1^2 xy^2 \, zdz \, dy \, dx$.

6. Evaluate $\int_0^1 x^3 (1 - \sqrt{x})^5 dx$.

7. Solve $(D^2 - 3D + 2)y = e$ where $D = \frac{d}{dx}$.

8. If radioactive carbon-14 has half-life of 5750 years, what will remains of one gram after 3000 years?

9. Find the Laplace transform of Dirac delta function.

10. Find the Inverse Laplace transform of $cot^{-1}s$.

PART-B

Answer ALL questions of the following   **5x10 Marks= 50Marks**

1. Find two non singular matrices P and Q such that PAQ is in Normal form hence find rank of

A where A = $\begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 3 & 1 & 1 \end{bmatrix}$.

OR

2. If $A = \begin{bmatrix} 3 & 10 & 5 \\ -2 & -3 & -4 \\ 3 & 5 & 7 \end{bmatrix}$ then verify whether eigenvectors of A are linearly independent or not.

3. A rectangular box open at the top is to have a volume of 32 cubic units. Find the dimensions of the box requiring least material for its construction.

OR

4. Verify Lagrange's mean value theorem for the function $f(x) = cos^2x$ in $\left(0, \frac{\pi}{2}\right)$.

5. Evaluate $\int_0^\infty \frac{x^a}{a^x} dx$.

OR

6. Change the order of integration and evaluate $\int_0^\pi \int_x^\pi \frac{siny}{y} dy\, dx$.

7. Solve $(D^2+2) y = x^3 + x^2 + e^{-2x} + cos3x$, where $D = \frac{d}{dx}$.

OR

8. Solve $(D^2 - 2D + 2)y = e^x \, tanx$, by the method of variation of parameters.

9. Solve $(D^2 + 1)y = t$, y=1, Dy=0 when t=0 by laplace techniques.

OR

10. Find Laplace trance form of $t^2 sintcos2t$.

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I B.TECH SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **MATHEMATICAL METHODS**

Branch: **COMMON TO EEE,ECE,CSE,IT**

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer ALL questions of the following   5x1Mark=5 Marks

1. State Gauss's backward interpolation formula.

2. State Runge-Kutta third order formula.

3. State Euler's fourier series formulae.

4. Form the partial differential equation by eliminating arbitrary constants $z=(x^2+a)(y^2+b)$.

5. What is an irrotational vector?

II. Answer ALL questions of the following   10x2Marks=20 Marks

1. If the interval of differencing is unity, Prove that $\Delta \tan^{-1}\frac{(n-1)}{n} = \tan^{-1}\frac{1}{2n^2}$.

2. Find a straight line that best fits the following data

x	1	2	3	4	5
y	14	27	40	55	68

3. Find a real root of $x^3-5x+3=0$ bi bisection method.

4. Evaluate $\int_0^\pi \sin x \, dx$ by Trapezoidal rule.

5. Mention Dirichlet conditions for fourier expansion.

6. Express $f(x) = x$ as fourier series in $(-\pi, \pi)$.

7. Form the differential equation, given $z = f(x-it) + g(x-it)$.

8. Solve $px - qy = y^2 - x^2$.

9. Find the directional derivative of $2xy + z^2$ at $(1, -1, 3)$ in the direction of $\bar{i} + 2\bar{j} + 3\bar{k}$.

10. If $\bar{A}$ is irrotational vector, evaluate $div\,(\bar{A} \times \bar{r})$ where $\bar{r} = x\bar{i} + y\bar{j} + z\bar{k}$.

PART-B

Answer ALL questions of the following   5x10 Marks= 50Marks

1. Using legranges formula, fit a polynomial to the data and find f(2)

x	0	1	3	4
y	-12	0	6	12

OR

2. Fit the curve $y = a\,e^{bx}$ to the following data.

x	0	1	2	3	4	5	6	7	8
y	20	30	52	77	135	211	326	550	1052

3. Find a real root of $xe^x = 2$ using Regular-falsi method.

OR

4. Use gauss-seidel iteration method to solve the system $10x+y+z = 12$, $2x+10y+z = 13$, $2x+2y+10z = 14$.

5. Find the fourier series of the following function $f(x) = \begin{cases} 0, & -\pi < x < 0 \\ \frac{\pi x}{4}, & 0 < x < \pi \end{cases}$ Also deduce that

$$\frac{\pi^2}{8} = 1 + \frac{1}{3^2} + \frac{1}{5^2} + \frac{1}{7^2} + \cdots \ldots \ldots \ldots \ldots$$

OR

6. Find the fourier transform of $f(x) = \begin{cases} a^2 - x^2, & if\ |x| < a \\ 0, & if\ |x| > a > 0 \end{cases}$ Hence show that

$$\int_0^\infty \frac{\sin x - \cos x}{x^3} dx = \frac{\pi}{4}.$$

7. Solve i) $(x^2\text{-yz})p + (y^2\text{-zx})q = z^2 - xy$ 　　　　ii) Solve $p + q = \sin x + \sin y$.

OR

8. Find the temperature u(x,t) in a bar OA of length l which is perfectly insulated laterally and whose ends O and A are kept at $0°$ C, given that the initial temperature at any point P of the rod (where OP = x) is given as $u(x, 0) = f(x), (0 \le x \le l)$.

9. Find the work done in moving a particle in the force field $\bar{F} = 3x^2\bar{i} + (2xz - y)\bar{j} + z\bar{k}$ along the straight line from (0,0,0) to (2,1,3).

OR

10. State green's theorem. Evaluate by green's theorem $\oint_c (y - \sin x)dx + \cos x\ dy$ where C is the triangle enclosed by the lines $y = 0$, $x = \frac{\pi}{2}$, $\pi y = 2x$.

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I B.TECH SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: ENGINEERING PHYSICS

Branch: COMMON TO ALL

Time: 3 hours   **Max. Marks: 75**

PART – A

I. Answer ALL questions of the following   **5x1Mark=5 Marks**

1. Define reverberation.
2. What is met-stable state?
3. Mention any two ferro magnetic materials.
4. Define unitcell.
5. State hall effect.

II. Answer ALL questions of the following   **10x2Marks=20 Marks**
1. Explain the physical siginificance of wave function(ψ).
2. Write a short note on damped oscillations.
3. Mention some appications of optical fibers.
4. Describe briefly about effective mass of electron.
5. What is population inversion?
6. Define surface to volume ratio.
7. What is indirect band gap semiconductor?
8. Define electric dipole and dipole moment.
9. What is interstitial defect?
10. Define atomic radius and coordinate number.

PART-B

Answer ALL questions of the following   **5x10 Marks= 50Marks**

1. a) Basing on miller indices, derve interplanar spacing of cubic system. [4M]
   b) Write a short note on Edge and Screw dislocations with neat diagrams. [6M]
   ### OR
2. a) Calculate the wavelength associated with an electron of 1.5 eV energy. [3M]
   b) Derive schrodinger's Time Independent Wave equation. [7M]
3. a) Describe the construction and working principle of Helium-Neon Laser with neat diagram.[6M]
   b) Distinguish between spontaneous and stimulated emissions. [4M]
   ### OR
4. a)Derive Clausius-Mossotti equation. [4M]
   b) Define Piezo-electicity and Ferro electricity. [6M]
5. a) Classify materials into conducts,insulators and semiconductors. [7M]
   b) Write a short note on Bloch theorem. [3M]
   ### OR
6. a) Discuss about origin of Nanotecnology. [2M]
   b) Describe Sol-gel method for fabricating of nanomaterials. [6M]
   c) What is Quantum confinement. [2M]
7. a) ClassifyDia, Para and Ferro magnetic materials on the basis of magnetic moment. [6M]
   b) What is Bohr's Magneton. [4M]

OR

8. a) Explain the concept of superconductivity. [3M]

    b) What are TYPE-I and TYPE-II superconductors. [5M]

    c) Mention some applications of superconductors. [2M]

9. a) Explain the concept of superimposition of waves and also describeabout Young's double slit experiment with aneat diagram. [6M]

    b) Discuss about diffraction grating. [4M]

OR

10. a) Describe Newton's rings experiment with a neat diagram.

    b) Explain the theory of Double refraction.

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I B.TECH SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: **ENGINEERING CHEMISTRY**

Branch: **COMMON TO ALL**

Time: 3 hours   **Max. Marks: 75**

PART – A

I. Answer ALL questions of the following   **5x1Mark=5 Marks**

1. Define primary cell.
2. How can we remove temporary hardness?
3. What is the monomer of natural rubber?
4. Define octane number of a fuel.
5. Calculate number of degrees of freedom at triple point.

II. Answer ALL questions of the following   **10x2Marks=20 Marks**

1. Write about Galvanic corrosion?
2. Represent Calomel electrode and give its electrode reaction.
3. What are the disadvantages of Scales and Sludges?
4. How exhausted Zeolites are regenerated?
5. Differentiate between chain and step-growth polymerization.
6. Give the preparation of biodegradable polymer poly-lactic acid.
7. What are the requirements of a good fuel?
8. Differentiate between LPG and CNG.
9. Write any four important applications of adsorption.
10. Write the applications of colloids.

PART-B

Answer ALL questions of the following   **5x10 Marks= 50Marks**

1. a) What are secondary cells? Explain the working Ni-Cd cell and write its applications.

   b) What are the advantages and disadvantages of fuel cells.

OR

2. a) Describe the construction and working of H2-02 Fuel cell.

   b) Calculate the single electrode potential of Copper electrode placed in a 0.05M CuSO4.

3. Calculate the temporary, permanent and total hardness of sample of water containing the following dissolved salts: $CaSO_4$=16.2 mg, Mg (HCO_3) =1.40 mg, $MgCl_2$=9.5 mg.

OR

4. a) Describe the method of softening of hard water by Ion-Exchange method.

   b) A standard hard water is prepared by dissolving 0.51g CaCO3 in 400ml of distilled water .50ml of this water required 25ml of EDTA solution. 50ml of hard water sample required 20ml of EDTA solution. The same sample after boiling required 14 ml of EDTA solution. Calculate the temporary and permanent hardness of water.

5. a) Write the preparation and applications of Conducting Polymers.

   b) Write the preparation and applications of Nano materials.

OR

6. a) Give the preparation, properties and applications of Nylon-6,6.

   b) Describe nano materials preparation by chemical vapour deposition methods?

7. a)What is analysis of coal? Explain the proximate analysis and give its significance.

   b) Define calorific value of a fuel. Describe the determination of it by Junkers gas calorimeter.

OR

8. a) How to prepare synthetic petrol by Fischer-Tropsch's method.

   b) Explain refining of petroleum?

9. a) Draw well-labelled phase diagram for Pb-Ag system and explain by applying phase rule.

   b) What is adsorption? Explain Freundlich adsorption isotherm.

OR

10. a) Bring out the differences between physical and chemical adsorption.

    b) Define Phase, component and degree of freedom with example.

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I B.TECH SUPPLEMENTARY EXAMINATIONS, DECEMBER-2019

Subject: COMPUTER PROGRAMMING

Branch: ME

Time: 3 hours   Max. Marks: 75

PART – A

I. Answer ALL questions of the following   5x1Mark=5 Marks

1. What is the difference between break and continue statements?
2. Define a function.
3. Write any two string manipulation functions.
4. What are self referential structures?
5. Define a stack.

II. Answer ALL questions of the following   10x2Marks=20 Marks

1. What is the output of the following program?

   ```
   Void main( )
   {
           printf("%c",100);
   }
   ```

2. Why 'goto' statements are less frequently used in 'C' programs?
3. What is a recursion? Explain with an example.
4. What are the advantages of Recursive functions?
5. Write the memory allocation functions.
6. Why addition of two pointers is impossible?
7. Differentiate between structure and union.
8. Explain Command line arguments.
9. Which algorithm is the best sorting algorithm? Justify your answer.
10. Write briefly about Enqueue operation.

PART-B

Answer ALL questions of the following   5x10 Marks= 50Marks

1. Explain in detail about Bitwise operators in C with examples

OR

2. a) Write a program to evaluate the sum of series of

$$X - \frac{x^3}{3!} + \frac{x^5}{5!} + \frac{x^7}{7!} + \text{----------} \frac{x^n}{n!}$$

b) What happens if you create a loop that never ends?

3. Explain how matrices can be represented using two dimensional arrays. Explain with code how Transpose of a matrix can be done.

OR

4. Explain various storage classes along with their merits and demerits.

5. What is a pointer? How pointers are declared and initialized. Write a function program in C to swap two values using pointers.

OR

6. a) What is a string? Explain various string I/O functions in 'C' with illustrative examples.

b) What are the applications of pointers?

7. Write a C program to count characters and lines in a given file?

OR

8. Explain the following functions. i) fopen ( ) ii) ftell ( ) iii) ferror ( ) iv)fclose ( ).

9. Define searching. Write a C program to implement the Binary Search.

OR

10. Explain Linear Search technique with example.