MR11 & MR12

Code No.:10M01/20M01

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, JUNE-2018

Subject: **Mathematics-I**

Branch: **CE, ME, ECE, CSE & IT**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) Form the differential equation by eliminating the arbitrary constants A and B from $y = e^x (A \cos x + B \sin x)$ (5M)

   b) Solve $\cos^2 x \cdot \frac{dy}{dx} + y = Tanx$ (5M)

   c) A bacterial culture, growing exponentially increases from 100 to 400 gms in 10 hours. How much was present after 3 hours. (5M)

2. a) Solve $(D-2)^2 y = x^2 \sin x + e^{2x} + 3$ (8M)

   b) Solve $(D^2+1) y = \operatorname{cosec} x$ (7M)

3. a) Verify Rolle's theorem for the function $f(x) = \frac{\sin x}{e^x}$ in $[0, \pi]$ (7M)

   b) Discuss the maxima and minima of $u = x^4 + y^4 - 2x^2 + 4xy - 2y^2$, $x > 0$, $y > 0$ (8M)

4. a) Find the envelope of the family of ellipses $\frac{x^2}{a^2} + \frac{y^2}{b^2} = 1$ for which a+b=c. (7M)

   b) Trace the curve r= a sin 3θ (8M)

5. a) Find the length of the curve $y = \log\left(\frac{e^x-1}{e^x+1}\right)$ (7M)

   b) Change the order of integration and evaluate $\int_0^1 \int_{x^2}^{2-x} x\, y\, dy\, dx$ (8M)

6. Verify Green's theorem in the plane for $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where 'C' encloses the region bounded by $y = \sqrt{x}$ and $y = x^2$

7. a) Find (i)$L(te^{-t} \sin 2t)$ ii) $L^{-1}\left[\frac{2S^2-6S+5}{S^3-6S^2+11S-6}\right]$ (7M)

   b) Using laplace transform solve $y^{II} + 2y^{I} + 5y = e^{-t} \sin t$ given that $y(0), y^{I}(0) = 1$ (8M)

8. a) Test for convergence the series whose n^{th} term is $\frac{x^{2n-2}}{\sqrt{n}(n+1)}$ (8M)

   b) Examine the following series for absolute and conditional convergence (7M)

   $$\frac{1}{5\sqrt{2}} - \frac{1}{5\sqrt{3}} + \frac{1}{5\sqrt{4}} - \ldots\ldots + (-1)^x \frac{1}{5\sqrt{n}} + \ldots\ldots$$

Code No.: **10M02/20M02**

MR11 & MR12

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I B.TECH SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Mathematical Methods**

Branch: **CSE**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) Solve the following system of equations
   $x + y - z + w = 0,\ x - y + 2z - w = 0,\ 3x + y + w = 0$ (7M)
   b) Solve the system of equations by L U decomposition method.
   $x + y + z = 1,\ 3x + y - 3z = 5,\ x - 2y - 5z = 10$ (8M)
2. Determine the diagonal matrix orthogonally similar to the real symmetric matrix. [15]

$$\begin{bmatrix} 8 & -6 & 2 \\ -6 & 7 & -4 \\ 2 & -4 & 3 \end{bmatrix}$$

3. Reduce the quadratic form $2x^2+y^2+z^2+2xy-2xz-4yz$ to canonical form find the rank, index, signature and nature of the quadratic form.
4. a) Find a real root of the equation $2x-\log x=7$ using iteration method [8+7]
   b) Find y(54) given that y(50)=205, y(60)=225, y(70)=248 and y(80)=274 using Newtons forward difference formula
5. a) Fit a straight line $y= a+bx$ from the following data

x	0	1	2	3	4
y	1	1.8	3.3	4.5	6.3

   b) Fit a curve of the form $y=a+bx+cx^2$ for the following data

x	0	5	10	15	20	25
y	12	15	17	22	24	30

6. Using Adam's-Basforth method to obtain the solution of the equation $y' = x - y^2$ at x=0.8. Given that y(0) = 0, y(0.2) = 0.02, y(0.4) = 0.0795, y(0.6) = 0.1762 **[15]**
7. a) Find the Fourier series in $[-\pi,\pi]$ for the function $f(x)\begin{cases} 1+\frac{2x}{\pi} for -\pi \le x \le 0 \\ 1-\frac{2x}{\pi} for\ 0 \le x \le \pi \end{cases}$ (7)
   b) Expand the function $f(x) = \begin{cases} \pi x\ for\ 0 < x < 1 \\ 0\ for\ 1 < x < 2 \end{cases}$ into Fourier series (8)
8. a) solve $(x+pz)^2 + (y+qz)^2 = 1$ (8)
   b) Solve $(x^2 - y^2 z^2)\,p + 2xyz = 2xz$ (7)

Code No.: **10P01/20P01**

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I B.TECH SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Engineering Physics**

Branch: **Common to ME, EEE, CSE & IT**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) What are the basic requirements of acoustically good hall? [7M]
   b) Explain the various factors affecting architectural acoustics and their remedies. [8M]

2. a) Explain various types of bondings in crystals with examples. (9+6)
   b) What is cohensive energy? Calculate cohensive energy of NaCl molecule.

3. a) What are matter waves? Derive an expression for the wavelength associated with an electron. 5M
   b) Describe Davisson and Germer experiment to establish the wave nature of electron. 5M
   c) Calculate the de Brogile wavelength of an electron moving with velocity of 4.0x104 m/s. 5M

4. a) What is a sensor? Explain the basic working principle of sensors.
   b) Write a detailed note on thermal, optical and magnetic sensors (5+10)

5. a) Define dielectric constant, electric susceptibility and displacement vector.
   b) What is orientation polarization? Derive an expression for it.
   c) Calculate the polarization of a dielectric of relative permittivity 1.35 when a field of $6x10^4$V/m is applied. (3+8+4)

6. a) Define magnetic field strength, magnetic induction and intensity of magnetization.
   b) Explain the origin of magnetic moment in magnetic materials.
   c) A magnetic material has a magnetization of 2200 amp/m, and flux density of 0.0044 Weber/m^2. Calculate the relative permeability of the material. [3+8+4M]

7. a) Mention the characteristics of laser.
   b) Explain various steps involved in the production of laser.
   c) Describe the construction and working of He-Ne laser (4+4+7)

8. a) What are nanomaterials? Write a note on quantum confinement effect and surface to volume ratio.
   b) Explain how TEM can be used to characterize nanomaterials.
   c) Write the applications of nanotechnology in various fields. [5+6+4M]

Code No.: **10C01/20C01**

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I B.TECH SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Engineering Chemistry**

Branch: **ME & IT**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) Explain the reasons for the following:
   i) Why NH_3 — NH_4C1 buffer solution added during determination of hardness of water by EDTA method.
   ii) Why is calgon conditioning better than phosphate conditioning in the treatment of boiler feed water.
   b) What is osmosis? How is reverse osmosis used for desalination of water.
   c) Calculate the quantity of lime and soda required for softening 20,000 litres of water containing CO_2= 20mg/L , $Ca(HCO_3)_2$ = 20 mg/L; $Mg(HCO_3)_2$ = 25mg/L; HCl = 8.4Mg/L; $Al_2(SO_4)_3$ = 40mg/L, $MgCl_2$ = 12mg/L

2. a) Explain why rusting of iron is quicker in saline water than in ordinary water?
   b) Give a brief account on galvanization and tinning.
   c) Discuss the cathodic protection. How is it useful to prevent the corrosion?

3. a) Explain step growth polymerization giving two different polymeric reactions as examples
   b) What is meant by compounding? Give any three compounding agents along with their functions to improve the properties of natural rubber.
   c) Distinguish between thermoplastic and thermosetting resins.

4. a) Explain the conduction mechanism in intrinsic and extrinsic semiconductors.
   b) Calculate the number of charge carriers and the conductivity of the doped materials if one atom of P is doped for every 10^6 atoms of silicon by assuming a cubic structure for silicon.

5. a) What is coagulation? Discuss the role of electrolyte in causing coagulation of colloidal solutions
   b) Describe briefly on ion exchange absorption
   c) Write any two applications of nano materials

6. a) How to analyse the coal by ultimate analysis method ? Write its significance?
   b) Give reasons for the following
   i) GCV is always higher than NCV ii) unleaded petrol is better for IC engines
   c) What is synthetic petrol? Describe the Bergius method of obtaining synthetic petrol.

7. a) What is condensed system? Why in such a case the phase rule equation is F= c-p+1?
   b) Construct the phase diagram for water system
   c) Correlate various mechanical emperies of alloys with their crystal structure.

8. a) Explain mesessner effect in superconductors with the applications of superconductors.
   b) Explain the mechanism of setting and hardening of cement.

Code No.: **10303/20303**

MR11 & MR12

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I B.TECH SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Engineering Drawing**

Branch: **Common to EEE, ECE, CSE & IT**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

1. a) Construct a diagonal scale, to measure kilometre, 1/8 of a km and 1/40 of km, in which 1 km is represented by 4 cm. Mark on this scale, a distance of 3.575 km. **(7)**
   b) Construct a parabola with the distance of the focus from the directrix is 50. **(8)**

2. A line AB of 80 mm long has its one end A 15 mm from both H.P and V.P. The other end B is 40 mm above H.P and 50 mm in front of V.P. Draw the projections of the line and determine the inclinations of the line with H.P and V.P.

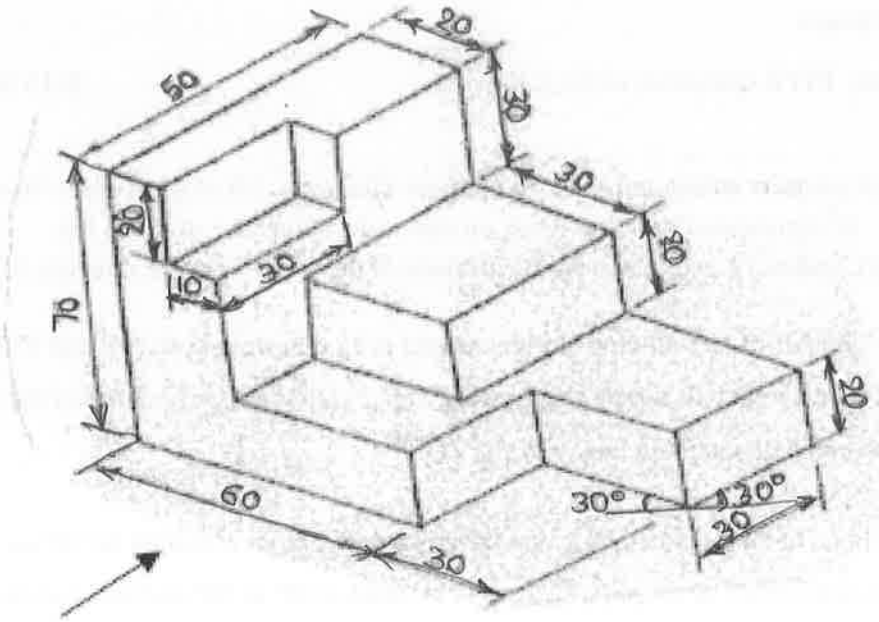
3. A cone of base diameter 45mm and axis length 65mm is resting on HP on a point on the circumference of the base. Its base is inclined at 50° to HP and axis parallel to VP. Draw its projections.

4. A cylinder of base diameter 40mm and 70mm height resting on the ground with its axis making an angle of 50° with the HP. Its axis is parallel to VP. Draw the projections.

5. A vertical cone having 80 mm base diameter and 100 mm long axis is penetrated by a horizontal cylinder with 45 mm diameter, the axis of which is 30 mm above the base of the cone, parallel to the VP and 5 mm away from the axis of the cone. Draw the three views showing the curves of intersection.

6. A hexagonal prism of base 25mm side and axis 75mm long is lying on the ground on one of its rectangular faces. A cylinder of 40mm diameter and axis 50mm height is located centrally and vertically on top of the prism. Draw the isometric view.

7. Draw the front, top and both side views of the isometric projection given in figure. All dimensions are in mm.



8. Draw the perspective of a square pyramid of base 30 mm and axis 50 mm long. When it is resting on the ground on its base, with the longer edge parallel to and 30 mm behind P.P. The central plane is 30 mm left of the apex and the station point is 50 mm in front of P.P and 30 mm above the G.P.

Code No.: **10302/20302**

MR11 & MR12

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I B.TECH SUPPLEMENTARY EXAMINATIONS, JUNE-2018

Subject: **Engineering Graphics**

Branch: **CE**

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

Answer any **FIVE** Questions of the following **5x15 Marks= 75 Marks**

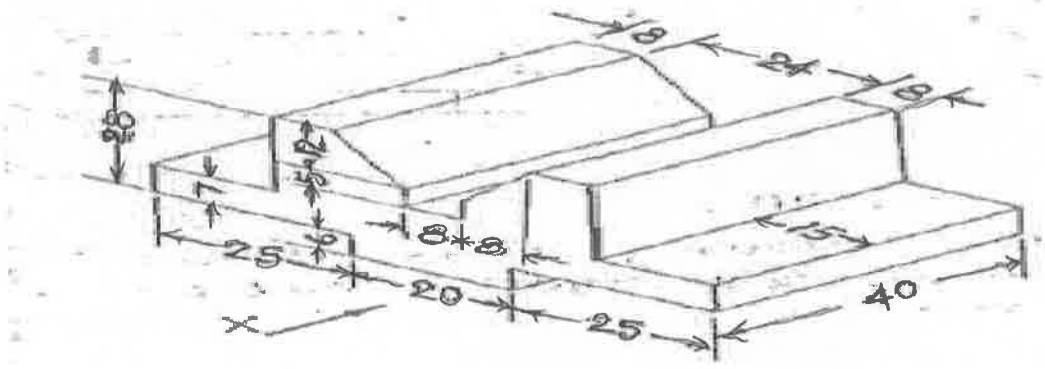
1. a) Draw a scale of 1:50 showing meters and decimeters, and to measure up to 8 meters. (7M)
   b) Draw a path of the end of string when it is wounded on a circle of 40 cm diameter without slipping. The length of the string is 150cm long. Name the curve (8M)

2. A line AB inclined at 40° to the V.P., has its ends 50mm and 20mm above the H.P., the length of its front view is 65mm and its V.T is 10mm above the H.P. Determine the true length of AB, its inclination with the H.P. and its H.T. (15M)

3. A thin circular plate of 70mm diameter is resting on its circumference such that its plane is inclined 60° to the HP and 30° to the V.P. Draw the projections of the plate. (15M)

4. A hexagonal prism of side of base 30mm and axis 65mm long, is resting on one of its rectangular faces on H.P. with the axis making an angle of 30° to the VP. It is cut by a section plane, perpendicular to V.P., inclined at 45° to the HP and passing through the midpoint of the axis. Draw the sectional top view and true shape of the section. (15M)

5. A cylinder of 60mm diameter having its axis vertical is penetrated by another cylinder of 40mm diameter. The axis of the penetrating cylinder is parallel to the V.P. and bisects the axis of the vertical cylinder, making an angle of 60° with it. Draw the projections showing the curves of intersection. (15M)
6. A square pyramid, with base side 85mm and height 125mm, is resting on a cube of side 100mm, the axis of the solids coincide along a line. The two sides of the base of the pyramid are parallel to the edges of the cube. Draw the Isometric projection. (15M)
7. Draw the orthographic projections for the pictorial view shown in figure. (15M)



8. A rectangular pyramid of sides of 30x20 mm and height 35 mm rests with its base on ground such that one of the longer base edge is parallel to picture plane and 30 mm behind it. The station point is 50 mm in front of the picture plane, 30mm to the left of the axis of the pyramid and 50 mm above the ground. Draw the perspective view of the pyramid. (15M)