R-11

ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)

B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Engineering Physics
(Common to All Branches)

Max. Marks: 70   Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. a)	Distinguish between interference and diffraction phenomena of light.	3M
b)	Describe Fraunhofer diffraction due to single slit along with its intensity distribution.	8M
c)	In a plane transmission grating the angle of diffraction for the second order principal maximum for the wavelength 5000 A^0 is 30^0. Calculate the number of lines in one centimeter of the grating.	3M
2. a)	State and Explain Bragg's law of X-ray diffraction.	4M
b)	Derive the expression for inter plannar separation between successive (hkl) planes.	7M
c)	Sketch the crystal planes in unit cubic crystals of Miller indices (001), ($\bar{2}$11) & (120)	3M
3. a)	Explain the possible sources contributing the electrical resistance of a conductor.	4M
b)	Derive Schrodinger's time independent wave equation for a one dimensional motion of a particle.	7M
c)	Find the uncertainity in the momentum of an electron restricted to a region of linear dimension equal to 0.1 nm. Given h=6.626x 10^{-34} J-s.	3M
4. a)	State and explain the law of mass action for a semiconductor	4M
b)	Derive Einstein's relation relating the mobility and the diffusion coefficients of the charge carriers in a semiconductor.	6M
c)	Distinguish between direct and indirect band gap semiconductors.	4M
5. a)	Define Electronic, Ionic and Orientation polarizations.	3M
b)	Explain the origin of orbital magnetic moment of an atom with the help of necessary expressions.	7M
c)	Mention the properties of ferroelectrics.	4M
6. a)	Explain Messiner effect in superconductors.	4M
b)	Describe the construction and working of He-Ne laser with suitable Energy level diagram.	7M
c)	Mention important applications of superconductors.	4M
7 a)	Derive the expressions for Acceptance angle and Numerical aperture of an optical fiber.	8M
b)	Describe the construction and reconstruction process of hologram.	6M
8 a)	Describe the synthesis of nanomaterials by sol-gel method.	7M
b)	Explain various types of carbon nanotubes and mention its applications.	7M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
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B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Programming in C and Data Structures
(Common to CSE & IT)

Max. Marks: 70   Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. a)   What is operating system? What are the responsibilities of an operating system?

   b)   Mention the steps involved in software development method.

2. a)   Write a brief description about control statements in c.

   b)   Write a program to reverse a number using for statement.

3. a)   Write a program to find the product ofall the elements in an array.

   b)   What is recursion? What are the advantages and disadvantages?

4. a)   Explain the concepts of pointer to pointer with example.

   b)   Write a c program to read and print an array of elements using pointers

5. a)   Explain structure within structure using an example.

   b)   Write a program in c that interchanges the contents of two files.

6. a)   Explain the various operations on a stack.

   b)   Write a program to evaluate postfix expression.

7. a)   Write a program to insert an element at a specified position.

   b)   Write a short note on circular linked list.

8.   Compare linear and binary search .write a program to perform linear search.

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)

B.Tech. I Year Supplementary Examinations Jan/Feb 2014

C Programming and Introduction to Data Structures
(Common to CIVIL, EEE , ME & ECE)

Max. Marks: 70

Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1.	a)	Describe computer hardware and computer software.	4M
	b)	Explain the software development method in detail.	10M
2.	a)	What are expressions? Give examples.	4M
	b)	Distinguish between Break and Continue with examples.	4M
	c)	Write a C program to check whether a given number is a prime or not.	6M
3.	a)	Write a C program to find the trace of a matrix.	7M
	b)	Explain the differences between call by value and call by address with examples.	7M
4.	a)	Explain various dynamic memory allocation functions with examples.	6M
	b)	Write a program to sort the set of strings in an alphabetical order?	8M
5.	a)	Compare structures and unions.	6M
	b)	Write a C program to print maximum marks in each subject along with the name of the student by using structures. Take 3 subjects and 3 student's records.	8M
6.		Write a program in C that reverses the contents of a file and copies it into a new file.	14M
7.	a)	What is a Queue? Explain the various operations performed on Queues with suitable algorithms.	8M
	b)	Explain infix and prefix notations of representing expressions.	6M
8.	a)	Write a program to sort the elements whose worst and average case are O(n log n).	10M
	b)	Explain linear search with an example.	4M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)

B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Electronic Devices and circuits
(Common to EEE & ECE)

Max. Marks: 70

Time: 03 Hours

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Answer *any five* **questions**
All Questions carry equal marks (14 Marks each)

1. a) Explain the effect of temperature on V-I characteristics. 7M

   b) Derive an expression for the Fermi level in an intrinsic semiconductor. 7M

2. a) Explain the concept of diode capacitance. Derive expression for transition capacitance? 7M

   b) Find the value of D.C. resistance and A.C resistance of a Germanium junction diode at 25^0 C with reverse saturation current, I_0 = 25μA and at an applied voltage of 0.2V across the diode? 7M

3. a) Draw the circuit diagram of full-wave rectifier with capacitor filter. Explain its operation with necessary diagrams. 7M

   b) A HWR circuit supplies 10mA DC current to a 25Ω load. Find the DC output voltage, PIV rating of a diode and the r.m.s. voltage for the transformer supplying the rectifier. 7M

4. a) Explain about the D.C. load line analysis of a transistor with neat diagrams. 7M

   b) With neat sketches and necessary waveforms, explain the input and output characteristics of a BJT in CE configuration. 7M

5. a) What is the need for biasing.Drive an expression for the Stability factor of voltage divider bias network? 10M

   b) Explain the concept of thermal runaway. 4M

6. a) Briefly explain about the constructional details of junction FET. 7M

   b) With neat waveforms, explain the transfer and output characteristics of a MOSFET. 7M

7. a) Give the significance of h-parameters. Draw the hybrid equivalent model of CE-amplifier. 7M

   b) State and explain Miller's theorem and dual of miller's theorem. 7M

8. a) Explain the working principle of UJT with its characteristics? 7M

   b) Explain the constructional details and characteristics of varactor diode. 7M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
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B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Engineering Chemistry
(Common to All Branches)

Max. Marks: 70   Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. a) Explain the ion-exchange method of softening water. Write reactions involved. Discuss the advantages of this method   7M

   b) How is hardness of water determined by using EDTA?   7M

2. a) What is the principle underlying conductometric titration? Discuss the titration curve obtained for a mixture of HCl and CH_3COOH with NaOH. What are the advantages of conductometric titrations?   7M

   b) What is fuel cell? Describe hydrogen oxygen fuel cell.   7M

3. Write short notes on the following

   a) Concentration cell corrosion   3M

   b) Cathodic protection   5M

   c) Electroplating   3M

   d) Corrosion inhibitors   3M

4. a) What are plastics?. Distinguish between thermoplastics and thermosetting plastics.   7M

   b) How are the following manufactured? Give their uses.

      (i) Nylons

      (ii) Buna-S   7M

5. What are propellants and how are they classified? Give examples. Give the principle of propulsion   (2+6+6)M

6. a) What is phase rule and explain the terms involved in it with suitable examples   7M

   b) Discuss the phase diagram of one-component, water system   7M

7. a) Define calorific value of a fuel. Explain the determination of calorific value of fuel using Bomb calorimeter.   7M

   b) A sample of coal was found on analysis to have the following composition by weight C-72.2%, H-3.27%, O-18.5%, S-2.4% and the ramaining being ash. Calculate the theoretical quantity of air required for the combustion of 1 kg of coal.   7M

8. a) What is the composition of portland cement? Write a note on setting and hardening of cement.   7M

   b) What is refractory?. What are the essential conditions of a good refractory?.   7M

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B.Tech. I Year Supplementary Examinations, January 2014
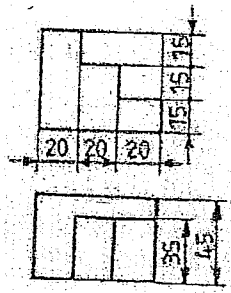*Engineering Drawing*
(*Common to EEE, ECE, CSE & IT*)

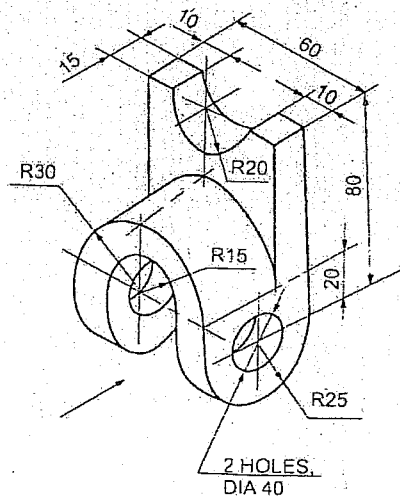Time: 3 hours   Max Marks: 70

Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)
Assume suitable data if necessary
All dimensions are in mm
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1.   Construct a conic having eccentricity=1, taking the distance of the fixed point from the directrix equal to 60 and draw a tangent and normal to the curve at a point 50 from the fixed straight line. Name the curve.

2.   Draw epi-cycloid of a circle of 60 diameter, which rolls out side on another circle of 160 diameter, for one revolution. Draw a tangent and normal to the curve at any point on the curve.

3.   a)   A line PK of 75 long, has its end P, 20 above H.P. and 15 infront of V.P.; The line is inclined at 30^0 to H.P. and 60^0 to V.P. Draw its projections.

     b)   The top view of a line, which is 80 long, measures 55. The line is in V.P; its one end being 25 above H.P. Draw its projections.

4.   Draw the projections of a rhombus having diagonals 120 and 55 long, the smaller diagonal being parallel to both the principal planes, while the other is inclined to H.P at 30^0

5.   a)   A pentagonal pyramid of base 25 side and axis 60 long, is resting on an edge of the base on H.P. Draw the projections of the pyramid, when its axis is perpendicular to V.P and the base is 20 from V.P.

     b)   Draw the projections of a cone base 30 diameter and axis 50 long, resting on H.P on a point of its base circle with the axis making an angle of 45^0 with H.P and parallel to V.P

6.   Draw the isometric projection of a pentagonal pyramid, with side of base 25 and axis 60 long. The pyramid is resting on its base on H.P, with an edge of the base (towards the V.P) parallel to V.P.

7.   Draw the isometric projection of the model of steps shown below.

8.   Draw the front, top and left side views of the machine block shown below:

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B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Engineering Graphics
(Common to Civil and Mechanical Engineering)

Max. Marks: 70   Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. A circle of 40mm diameter rolls on a horizontal line. Draw the curve traced out by a point R on the circumference for one half revolution of the circle. For the remaining half revolution the circle rolls on the vertical line. The point R is vertically above the centre of the circle in the starting position.   14M

2. A line AB measuring 12cm long has its VT 8cm above XY line and the HT 10cm in front of XY line. The projections of the HT and VT on the XY line are 11cm apart. If the point A is 1cm above HP, draw the projections of AB and find its true inclinations.   14M

3. A thin triangular sheet has its corners P,Q and R above HP by 27mm, 45mm and 15mm and in front of VP by 18mm, 11mm and 36mm respectively. The projectors through P and Q are 72mm apart and those through Q and R are 36mm apart. If the projector through R is exactly in between those of P and Q, find the size of the triangle by auxiliary projection method.   14M

4. Draw the projections of a cone, base 30mm diameter and axis 50mm long, resting on HP on a point of its base circle with the axis making an angle of 45° with HP and 30° with VP.   14M

5. A hexagonal prism of side of base 24mm and axis 64mm is on HP on one of its ends with a base edge parallel to VP. A square hole of side 26mm is drilled such that the axis of the hole is perpendicular to VP and bisects the axis of the prism with all the faces equally inclined to HP. Draw the development of the lateral surface of the prism showing the true shape of the hole formed on it.   14M

6. A sphere of radius 2cm is kept on the top face of a square prism of side of base 4cm and height 2cm. The latter is placed on the top face of a cylinder of 6.5cm diameter and 2.5cm height. All the three solids have the common axis. Draw the isometric projection of the combination of solids.   14M

7. A cone of base 60mm diameter and axis 70mm long, stands vertically with its base on HP. It is penetrated by a horizontal cylinder of radius 13mm. The axis of the cylinder is parallel to VP, 20mm above the base and 5mm in front of the axis of the cone. Draw the projections of the solids showing the curves of intersection.   14M

8. A square pyramid of base edge 40mm and altitude 50mm rests with its base on the ground plane such that all the edges of the base are equally inclined to the PP. One of the corners of the base is touching the PP. The station point is 60mm in front of the PP, 80mm above the ground plane and lies in a central plane which passes through the axis of the pyramid. Draw the perspective projection.   14M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(AUTONOMOUS)
B.Tech. I Year Supplementary Examinations, January 2014
Engineering Mechanics
(Common to ME & CE)

Time: 3 hours   Max Marks: 70
Answer any FIVE Questions from the following
All questions carry equal marks (14 Marks each)
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1. a) Define moment of force and moment of a force and moment of a couple.   6M

   b) Two smooth cylinders are placed in a channel as shown in Figure-1. The weight of
       small cylinder is 10 kN and that of larger cylinder is 30 kN. Determine the reaction at
       the contact points A, B, C and D. Assume larger cylinder diameter is three times the
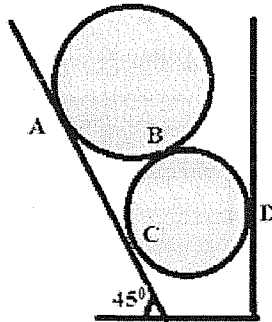   smaller cylinder and take smaller cylinder diameter is 1m.

Figure-1   8M

2.   Determine the reaction at the support for the beam as shown in Figure-2.

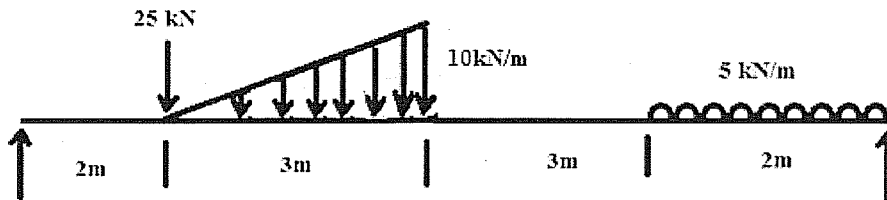**Figure-2**   14M

3. a) Define friction, angle of friction, angle of repose and cone of friction.   4M

   b) A system of blocks shown in Figure-3, if the weight of the block B is 150 N,
       Determine the range of the weight of the block A for which motion is impending.
       Take the coefficient of friction for all contact surface to be 0.25. Assume the pulley at
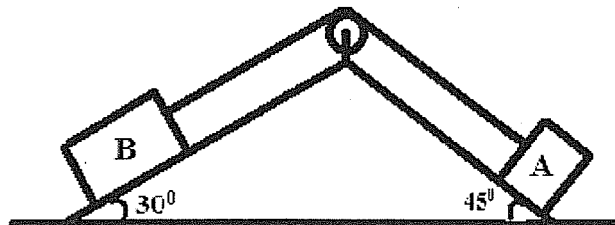   the top to be frictionless.

Figure -3   10M

4. a) Differentiate between centroid and centre of gravity   6M

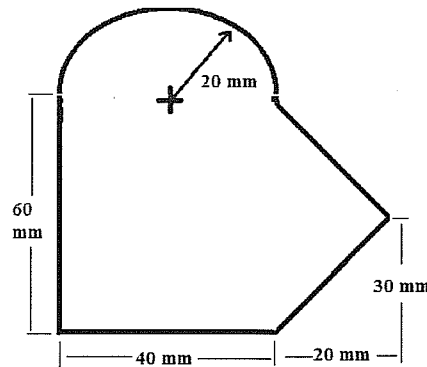   b) Find the centroid of the lamina is shown in Figure-4.

Figure-4   8M

5. a) State and explain the parallel axis theorem   6M

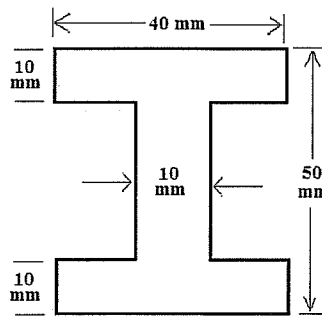   b) Determine the moment of inertia of the I section shown in Figure-5 about its centroidal axis.

Figure-5   8M

6. A ball is thrown from the ground with a velocity of 20 m/sec. at an angle of 30^0 to the horizontal. Determine

         (i) The velocity of the ball at t=0.5 sec and t=1.5 sec

         (ii) Total time of flight of the ball

         (iii)Maximum height reached

         (iv)Range of the ball and

         (v) Maximum range   14M

7. a) A block is projected up on an inclined plane with an initial velocity of 10 m/sec. The inclined plane is at the angle of 30^0 with the horizontal. If coefficients of static and kinetic friction between the contact surfaces are respectively 0.25 and 0.2, determine how far up the plane will the block move before coming to rest.   6M

   b) A jet of water issued from a nozzle strikes normally a smooth flat fixed plate. The water after striking the plate leaves parallel to the plate. Derive an expression for the force exerted by the jet of water on the plate.   8M

8. a) A particle executing simple harmonic motion has a time period of 4 seconds. If the velocity of the particle at a distance of 100 mm from the extreme right position is 200 mm/sec, determine the amplitude, maximum velocity and maximum acceleration.   6M

   b) A circular metallic disc of 150 mm diameter and 1.5 kg mass is suspended such as to oscillate in a horizontal plane by a metallic wire passing through its centre and whose other end is clamped. The wire is 1m long and 2mm in diameter. If the shear modulus of the wire is 0.75×10^5 N/mm^2, determine the period of oscillation of the disc.   8M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)
B.Tech. I Year Supplementary Examinations Jan/Feb 2014

English
(Common to All Branches)

Max. Marks: 70   Time: 3.00Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. The narrator finally says "Miss Krishna, it seems, had an unexpected sense of humour!" What was her experience with Miss Krishna and why did she give this statement?

2. What was the result of the villagers not sharing their fears about the patch of grass with the writer, Rudyard Kipling before he set out to hunt the wild boar? Why did they not share?

3. Objectives can be achieved with resourcefulness even in the lack of resources. How did Visvesvaraya prove it?

4. How does Pitroda want to modernize India?

5. How did Cuddalore face the intense havoc of tsunami in 2004 and how was the normalcy restored?

6. Enumerate the significant incidents in Teresa's life?

7. a) Rinma Pvt. Ltd., Hyderabad manufactures washing powder and detergent cakes. For the last five years, there has been a gradual decline in profits owing to various causes. The Managing Director has asked the marketing manager to investigate the causes, make suitable recommendations, and submit a report. Assuming yourself to be the Marketing Manager, prepare a report.

   b) Write a letter to the Commissioner of the local Municipality about the menace of street dogs and the need to take measures to sterilize them.

8. a) **Correct the following sentences and rewrite them:**
      i) I look forward to see you again.
      ii) The computer is very easy to use it.
      iii) Where shall we go to have a lunch?
      iv) Your child's future is depend on your decision.
      v) The news of his death spreaded like wildfire.

   b) **Give one word substitutes for the following:**
      i) That which cannot be believed.
      ii) Hand writing that cannot be read.
      iii) A person who knows many languages.
      iv) Detailed plan of journey.
      v) An expression that has more than one meaning.

   c) **Use the following idioms in your own sentences:**
      i) to throw cold water on
      ii) to rain cats and dogs
      iii) Herculean task
      iv) a red letter day

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)
B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Mathematical Methods
(Common to CSE & IT)

Max. Marks: 70   Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. a) Reduce the matrix $A = \begin{bmatrix} 2 & 1 & 3 & 4 \\ 0 & 3 & 4 & 1 \\ 2 & 3 & 7 & 5 \\ 2 & 5 & 11 & 6 \end{bmatrix}$ to normal form and hence find its rank   7M

   b) Discuss for what values of λ, μ the simultaneous equations $x + y + z = 6$, $x + 2y + 3z = 10$, $x + 2y + \lambda z = \mu$ have (i) no solution (ii) a unique solution (iii) an infinite number of solutions.   7M

2. a) Find the Eigen values and Eigen vectors of the matrix $\begin{bmatrix} 5 & -2 & 0 \\ -2 & 6 & 2 \\ 0 & 2 & 7 \end{bmatrix}$ 7M

   b) State Cayley-Hamilton theorem and use it to find the inverse of the matrix $A = \begin{bmatrix} 1 & 2 & 3 \\ 2 & -1 & 4 \\ 3 & 1 & -1 \end{bmatrix}$ 7M

3.   Reduce the quadratic form $3x_1^2 + 3x_2^2 + 3x_3^2 + 2x_1x_2 + 2x_1x_3 - 2x_2x_3$ into sum of squares form, by an orthogonal transformation and give the matrix of transformation   14M

4. a) Find a real root of $x + \log_{10} x - 2 = 0$ using Newton Raphson method   7M

   b) Find f(2.5) using Newton's forward formula from the following table

x	0	1	2	3	4	5	6
y	0	1	16	81	256	625	1296

7M

5. a) Fit a second degree polynomial to the following data by the method of least squares:

x	0	1	2	3	4
y	1	1.8	1.3	2.5	6.3

7M

   b) Fit $y = a(b^x)$ by the method of least squares to the data given below

x	0	1	2	3	4	5	6	7
y	10	21	35	59	92	200	400	610

7M

6. a) From the following table of values of x and y, obtain $\dfrac{dy}{dx}$ and $\dfrac{d^2y}{dx^2}$ for x=1.5

x	1.5	2.0	2.5	3.0	3.5	4.0
y	3.375	7.0	13.625	24.0	38.875	59.0

7M

b) Evaluate $\displaystyle\int_0^1 \dfrac{1}{1+x}\,dx$ by Simpson's 1/3 rule

7M

7. a) Use Runge – Kutta method to evaluate y(0.1) and y(0.2) given that $y' = x + y$, y(0)=1. 7M

b) Given $y' = x + \sin y$, y(0)=1 compute y(0.2) and y(0.4) with h=0.2 using Euler's modified method

7M

8. a) Find the Fourier series of the periodic function defined as $f(x) = \begin{cases} -\pi, & -\pi < x < 0 \\ x, & 0 < x < \pi \end{cases}$

Hence deduce that $\dfrac{1}{1^2} + \dfrac{1}{3^2} + \dfrac{1}{5^2} + \ldots = \dfrac{\pi^2}{8}$

7M

b) Find the half-range cosine series for $f(x) = x(2-x)$, in $0 \le x \le 2$ and hence find sum of the series $\dfrac{1}{1^2} - \dfrac{1}{2^2} + \dfrac{1}{3^2} - \dfrac{1}{4^2} + \ldots$

7M

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ANNAMACHARYA INSTITUTE OF TECHNOLOGY & SCIENCES :: RAJAMPET
(Autonomous)

B.Tech. I Year Supplementary Examinations Jan/Feb 2014

Mathematics-I
(Common to All Branches)

Max. Marks: 70

Time: 03 Hours

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Answer *any five* questions
All Questions carry equal marks (14 Marks each)

1. a) Solve $\dfrac{dy}{dx} + \dfrac{y}{x \log x} = \dfrac{\operatorname{Sin} 2x}{\log x}$ 5M

   b) The number N of bacteria in a culture grew at a rate proportional to N. The value of N was initially 100 and increased to 332 in one hour. What was the value of N after $1\frac{1}{2}$ hours?   5M

   c) Find the orthogonal trajectories of families of semi-cubical parabolas $ay^2 = x^3$, where 'a' is parameter   4M

2. a) Solve $(D^3 - 1)y = e^x + \operatorname{Sin} 3x + 2$ 7M

   b) Solve $(D^2 - 4D + 13)y = e^{2x} \operatorname{Cos} 3x$ 7M

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

   b) Find the minimum value of $x^2 + y^2 + z^2$, when x+y+z = 3a   7M

4. a) Trace the curve $y^2 = (x - 2)(x - 4)^2$ 7M

   b) Find the length of the arc of the parabola $x^2 = 4ay$ from the vertex to one extremity of the latus rectum   7M

5. a) Evaluate the integral $\int_0^1 \int_0^{\sqrt{1-x^2}} y^2 \, dy \, dx$ by changing the order of integration   7M

   b) Evaluate $\int_0^1 \int_1^2 \int_2^3 x^2 y^2 z^2 \, dx dy dz$ 7M

6. a) Find L[t sin at]   4M

   b) Find $L\left[\dfrac{e^{-at} - e^{-bt}}{t}\right]$ 5M

   c) Find $L^{-1}[\tan^{-1}(s + 1)]$ 5M

7. Solve the differential equation using Laplace transform
   $$\frac{d^2x}{dt^2} + 3\frac{dx}{dt} + 2x = e^{-t}, x(0) = 0, x^1(0) = 1$$ 14M

8. a) Find div $\overline{f}$, when $\overline{f}$ = grad $(x^3 + y^3 + z^3 - 3xyz)$ 7M

   b) Evaluate by Green's theorem $\oint_c (x^2 - \operatorname{Cosh} y) \, dx + (y + \operatorname{Sin} x) \, dy$, where 'c' is the rectangle with vertices (0,0), (π,0), (π,1), (0,1)   7M

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