VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
ENVIRONMENTAL SCIENCE
(Common to Computer Science and Engineering, Information Technology, Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit-I

1 a) Environmental Studies deals with different aspects using a holistic approach. Therefore explain its multidisciplinary nature.   7M
   b) Explain the problems related to usage of chemical pesticides and fertilizers in the modern Agriculture.   8M
2 a) We are far behind the target of achieving 33% forest area. Discuss various causes, consequences of deforestation in India. Explain JFM activity and give its functions.   6M
   b) Over usage of ground water for various purposes resulted in rapid depletion at various regions. Explain the effects of over utilization of ground water resources.   9M

Unit-II

3 a) Explain the concepts on   6M
      i)   Food Chains
      ii) Food Webs and
      iii) Ecological Pyramids
   b) Biodiversity can be grouped into three levels based their nature and taxonomical status. Briefly explain the levels and values of Biodiversity with suitable examples.   9M
4 a) Our India is a "Mega diversity Nation". Support the statement highlighting the biodiversity greatness of INDIA.   7M
   b) Biodiversity is to be conserved. Explain conservation methods of Biodiversity.   8M

Unit-III

5 a) Briefly describe the sources, effects and control of noise pollution.   8M
   b) List the various ways, in which an individual can contribute towards pollution prevention in society.   7M
6 a) What is meant by sustainable development? What are the measures to obtain sustainability?   8M
   b) State the ill effects due to depletion of Ozone layer and presence of green house gases in the atmosphere.   7M

Unit-IV

7 a) How would Carbon Credits and Carbon foot printing help to protect our Environment?   8M
   b) Explain the concept of green building.   7M
8 a) What is the role of Information Technology in protecting the environment and human health?   8M
   b) Explain the benefits and status of ISO 14000 series of Environmental Management Standards.   7M

Unit-V

9 a) Give an account of Environmental Protection Act - 1986   10M
   b) Methods to propagating Environmental awareness are many. Explain them.   5M
10 a) Write the objectives, principles, key elements and importance of environmental impact Assessment.   8M
   b) NGO's play a vital role in creating environmental awareness among the people regarding environmental issues. Explain their objectives and features.   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
MATHEMATICS - I
(Common for All Branches)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

(5 X 15 = 75 marks)

Unit – I

1 a) Solve $\dfrac{dy}{dx} + (y-1)\cos x = e^{-\sin x}\cos^2 x$.   7M

   b) Show that the system of rectangular hyperbolas $x^2 - y^2 = a^2$ and $xy = c^2$ are mutually orthogonal trajectories.   8M

2 a) Solve: $\dfrac{dy}{dx} + yx = y^2\ e^{x^2/2}\sin x$ 7M

   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 ½ hours.   8M

Unit – II

3 a) Solve: $\dfrac{d^2y}{dx^2} - 6\dfrac{dy}{dx} + 13y = 8e^{3x}\sin 2x$ 7M

   b) Solve: $\dfrac{d^2y}{dx^2} + y = x\cos x$ by the method of variation of parameters   8M

4 A resistance of 100 ohms, an inductance of 0.5 Henry is connected in series with a battery of 20 volts. Find the current in the circuit as a function of time   15M

Unit – III

5 a) Prove that $\dfrac{\pi}{3} - \dfrac{1}{5\sqrt{3}} > \cos^{-1}\dfrac{3}{5} > \dfrac{\pi}{3} - \dfrac{1}{8}$ using Lagrange's mean value theorem.   7M

   b) Prove that u=xy+yz+zx, v=x²+y²+z², w=x+y+z are functionally dependent and find the relation between them.   8M

6 a) A rectangular box open at the top is to have a volume of 32 cubic fee t. Find the dimensions of the box requiring least material for its construction.   7M

   b) Find the radius of curvature at any point on the curve
       x=a(cost + tsint), y=a(sint – tcost).   8M

Unit – IV

7 a) Use definition for determining Laplace transform of cos (at). Hence find Laplace transform of e²ᵗ cos² t   7M

   b) Obtain the inverse Laplace transform of $\log\left(1+\dfrac{1}{s^2}\right)$ 8M

8 Solve: y''' + 2y'' - y' - 2y = 0 given y(0) = y'(0) = 0 and y''(0) = 6 using Laplace transforms   15M

Unit – V

9 a) Find a unit normal to the surface $x^2y + 2xy = 4$ at the point (2, -2, 3)   8M

b) Determine the constant a so that the vector V = (x + 3y)i + (y − 2z)j + (x + az)k is solenoidal   7M

10 Verify Green's theorem in the plane $\int_c (3x^2 - 8y^2)dx + (4y - 6xy)dy$ where C is the region bounded by $y = \sqrt{x}$ and $y = x^2$ 15M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations, February - 2012
(Regulations: VCE-R11)
COMPUTER PROGRAMMING
(Common to Computer Science and Engineering, Information Technology, Electrical and Electronics Engineering, Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I
1	a)	Write about different types of programming languages.	7M
	b)	What is an Algorithm? Write an algorithm to find the roots of a quadratic equation considering all cases.	8M
2	a)	What is meant by operator precedence? What are the relative precedences of the Arithmetic operators?	7M
	b)	Explain in detail about Bitwise operators in C with examples.	8M

Unit – II
3	a)	Distinguish between while and do .. while loops.	4M
	b)	What is an array? What are its characteristics?	4M
	c)	Write a program to print bytes reserved for various types of data and space required for storing them in memory using arrays.	7M
4	a)	What are the uses of functions and explain how a function works?	7M
	b)	Depending upon the arguments present, explain the types of the functions with suitable example.	8M

Unit – III
5	a)	Explain in detail about String handling functions in C.	8M
	b)	Write a C program to copy one String into another String without using *String Handling functions.*	7M
6	a)	What is a pointer? How pointers are declared and initialized.	5M
	b)	Write a function program in C to swap two values using pointers.	6M
	c)	Explain the difference between 'call by reference' and 'call by value'.	4M

Unit – IV
7	a)	What is Structure? How does a Structure differ from an Array?	7M
	b)	Write a C program using structure to read today's date and print tomorrows date.	8M

8	a)	What is meant by the following terms
		   i. Union
		   ii. Array of structure
		   iii. Nested structures
			10M

	b)	Define a structure called student that will describe the following i)Name ii)Branch iii)Section iv)Roll no. using this structure, write a program to read the date from 60 students and print branch wise list .	5M

Unit – V
9	a)	What are the steps used for performing the file operations. Explain them.	7M
	b)	Explain the following: 1)fprinf() 2)getc() 3)fgets() 4)fputc()	8M
10	a)	What are the different modes used for file operations. Explain them in detail.	7M
	b)	Write a program to write the data to text file and read it.	8M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
ENGINEERING DRAWING
(Common to Civil Engineering, Mechanical Engineering, Aeronautical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1 a) Construct a diagonal scale, to measure km, 1/8 of a km and 1/40 of a km, in which 1 km is represented by 4 cm. Mark on the scale, a distance of 3.575 km.   6M

   b) Trace the path of a point moving in such a way that the ratio of its distance from a fixed point to its distance from a fixed line is 3/2. The distance of fixed point from the fixed line is 50mm. Take at least five points on either side. Also draw a tangent and normal to the curve at a point 30mm from the fixed line.   9M

2 a) Construct a diagonal scale of R.F =1/4000 to show metres and long enough to measure up to 500mt. Mark on it a distance of 374mt.   6M

   b) Draw an involute of a circle of 40mm diameter. Also draw a normal and tangent to it at a point 95mm from the centre of circle.   9M

Unit – II

3 A line AB 85mm long has end A 25mm away from both the reference planes and is in the first quadrant. The line is inclined at 50^0 to H.P and 30^0 V.P. Draw its projections and mark the traces of the line.   15M

4 The mid point of a straight line AB 90mm long is 60mm above H.P and 50mm in front of V.P. It is inclined at 30^0 to H.P and 45^0 to V.P. Draw its projections.   15M

Unit – III

5 A regular pentagonal plane of side 30mm, has one of its corner on the V.P and its surface is inclined at 60^0 to the V.P and the edge opposite to the corner on the V.P. makes an angle of 45^0 with the H.P. Draw the projections of the Plane.   15M

6 A square pyramid base 40mm side and axis 90mm long has a triangular face on the ground and the vertical plane containing the axis makes an angle of 45^0 with the VP. Draw its projections.   15M

Unit – IV

7 A pentagonal pyramid of side of base 25mm and axis 50mm long, rests on a triangular faces on the H.P, with its axis parallel to V.P. It is cut by a horizontal section plane bisecting the axis. Draw the projections of the retained solid.   15M

8 A hexagonal pyramid of side of base 30mm and axis 65mm long, is resting on its base on the H.P with an edge of the base parallel to the V.P. It is cut by a section plane, perpendicular to the V.P. inclined at 45^0 to the H.P and intersecting the axis at a point 25mm above the base. Draw the front view and sectional top view. Also draw the true shape of the section.   15M

Unit – V

9   A cone of base diameter 50mm and axis length 70mm rests with its base on H.P. A section   15M
    plane perpendicular to V.P. and inclined at 35^0 to H.P bisects the axis of the cone. Draw the
    development of the truncated cone.

10 A hexagonal pyramid of side 30mm and axis length 60mm resting on H.P. on its base with of   15M
    the base sides are perpendicular to V.P. the pyramid is cut by a section plane inclined at 30^0
    to H.P. and perpendicular to V.P. and bisecting the axis. Draw the development of the
    remaining portion of the pyramid.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
ENGINEERING PHYSICS
(Common to Electrical and Electronics Engineering, Civil Engineering, Mechanical Engineering and Aeronautical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1	a)	Explain the forces between the two interacting atoms when they are brought nearer to form a molecule	6M
	b)	Derive the expression for the equilibrium spacing of two atoms for which the potential energy is minimum and hence obtain the dissociation energy	9M
2	a)	Show that FCC is the most closely packed of the three cubic structures by working out thier packing factors	10M
	b)	Describe the structure of Nacl crystal	5M

Unit – II

3	a)	State and explain Bragg's law	4M
	b)	Describe Laue Method for the Crystal structure determinations	8M
	c)	Sketch the following planes in a cubic unit cell i. (101) ii. (002) iii. (T10)	3M
4	a)	Explain the concept of surface to volume ratio which influences the properties of nanomaterials	4M
	b)	Describe the pulsed laser deposition method for the synthesis of nanomaterials	7M
	c)	Mention the applications of nanomaterials	4M

Unit – III

5	a)	Derive one dimensional, time independent Schrodinger's wave equation for a particle	10M
	b)	What is the Physical significance of wave function?	5M
6	a)	Describe qualitatively the Kronig – Penney model for the motion of an electron in a periodic potential field and explain the formation of energy bands	10M
	b)	Explain the concept of effective mass of an electron	5M

Unit – IV

7	a)	Explain dielectric polarization process of a dielectric in the presence of electric field	4M
	b)	Derive clausius – Mossotti equation for a polarized dielectric	7M
	c)	What is Ferroelectricity? Mention its characteristics properties	4M
8	a)	Explain the origin of magnetic moment in an atom	4M
	b)	What is Hysteresis curve? Explain the important features of soft and hard magnetic materials based on it	8M
	c)	State and explain Meissner effect in superconductors	4M

Unit – V

9	a)	Explain spontaneous and stimulated emission of radiation	5M
	b)	Describe the construction and working of He Ne laser	7M
	c)	Mention the important applications of Lasers	3M
10	a)	Explain the basic principle of propagations of light signal through the optical fiber	4M
	b)	Derive the expression for numerical aperture (NA) of an optical fiber	7M
	c)	Describe the factors which gives raise to attenuations of signal in an optical fiber	4M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B.Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
BASIC ELECTRICAL ENGINEERING
(Common to Electrical and Electronics Engineering, Electronics and Communication Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1   a)   State Kirchoff's Laws as applied to electrical circuits   5M
     b)   Discuss source transformation   5M
     c)   For the circuit shown in Fig1(c) calculate the value of current in each branch and the   5M
           value of unknown resistance R.

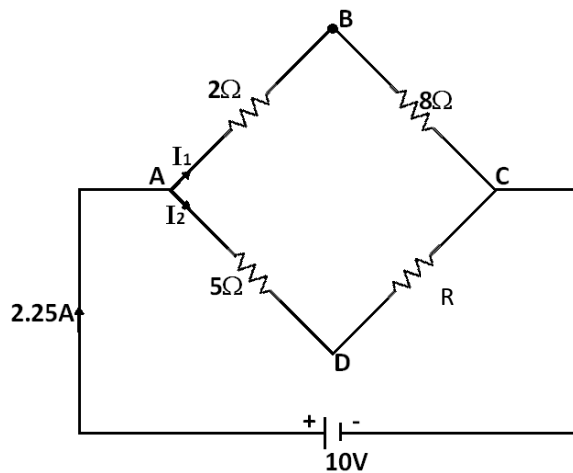

Fig1(c)

2   a)   Write voltage – current relationship for passive elements   5M
     b)   In the circuit shown in Fig2(b), find the current drawn by the circuit, if it is connected   10M
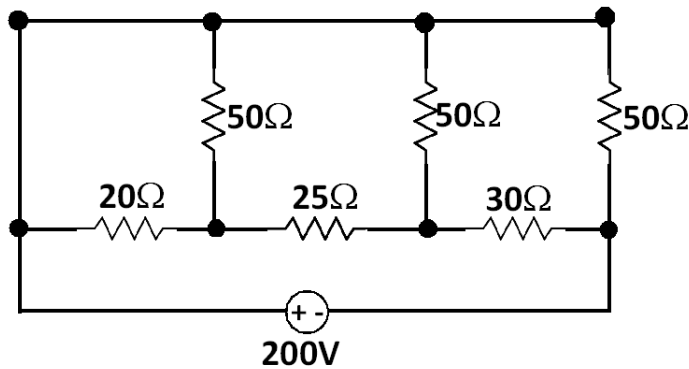   across a 200V DC supply

Fig2(b)

Unit – II

3 a) Using Nodal Analysis, find the power delivered by the 4A current source shown in   9M
        fig 3(a)
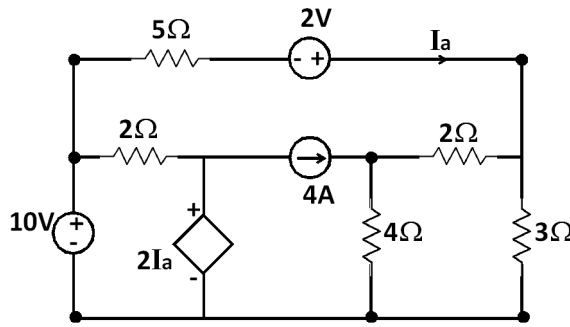

Fig 3(a)

   b) Explain Super Mesh Technique in finding solution of a Network. Illustrate with example   6M

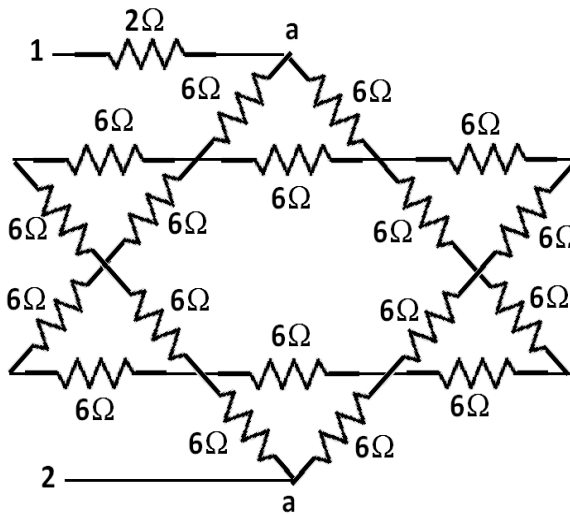4 a) Find the equivalent resistance between terminals 1 and 2 of the network in fig 4(a).   8M

fig 4(a)

   b) Using mesh analysis, determine the power delivered by voltage source and the current   7M
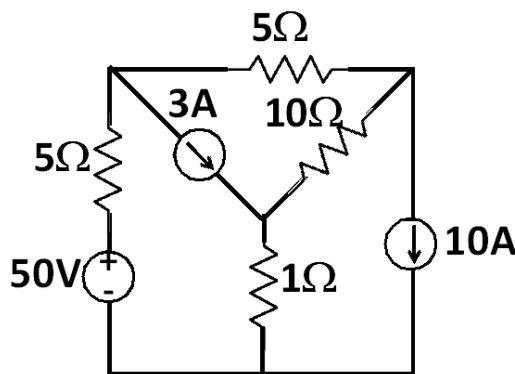   in 10Ω resistor in the circuit of fig 4(b).

fig 4(b)

Unit – III

5 a) Define power factor? Mention its physical significance.   5M
   b) A Sinusoidal current wave is given by i = 50 sin (100 πt) Determine   10M
       i. The greatest rate of change current **ii.** The average value **iii.** Root mean square value

6 a) Draw the Phasor diagrams for Resistance, Inductance and Capacitance   5M
   b) A Capacitive reactance of 4 ohms is connected in series with a resistance of 5Ω. The   10M
       series circuit is connected across a 200 V, 50 Hz supply. Find
       i. The capacitance   **ii.** Impedance
       iii. Current   **iv.** Voltage drop across the resistance
       v. Reactance drop   **vi.** Power factor

Unit – IV

7 a) State and explain Faraday's law of electromagnetic induction   5M
   b) In the circuit shown in Fig 7(b), write the equations for V_1 and V_2. If L_1 =4H, L_2 = 9H and   10M
       coefficient of coupling is 0.5, find V_1 and V_2 at time t = 0, when i_1 = 5 cos (50t – 30^0)A
       and i_2 = 2cos (50t – 30^0)A.
       Also calculate the total energy stored in the system

Fig 7(b)

8 a) Derive from the fundamentals expression for coefficient of coupling   5M
   b) A solenoid X consisting of 800 turns of wire wound, on a former of length 90cm and   10M
       diameter 3cm is placed co-axially with in another adenoid y of same length and number
       of turns, but of diameter 6cm. Find approximately the mutual inductance and coupling
       coefficient of the arrangement.

Unit – V

9 a) Define   5M
       i. Graph   **ii.** Tree   **iii.** Twigs   **iv.** Links
   b) For the network shown in Fig 9(b) Determine the cut-set matrix   10M

Fig 9(b)

10 a) Explain   10M
       i. Relation between y and z parameters   **ii.** h – parameters to z – parameters
   b) Find ABCD parameters of the network shown in Fig 10(b)   5M

Fig 10(b)

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
TECHNICAL ENGLISH
(Common to Computer Science and Engineering, Information Technology and Electronics and Communication Engineering)

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

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1 a) Raman was a voracious reader and pored eagerly over all the books in his father's collection among which were original writings of great scientists. How did this habit prove fruitful in his later life?   10M

   b) Do as directed: 5M
       i.   Write the antonym for the word: fabulous
       ii.   Write the Synonym for the word: speculate
       iii. Write one word substitute: belief that there is God.
       iv.   Use this Idiom in your sentence: to spill the beans
       v.   Correct the sentence: Is there some tea in the flask?

2 a) Give an account of Mother Teresa and her service to the humanity   10M
   b) Do as directed: 5M
       i.   Write the antonym for the word: destitute
       ii.   Write the Synonym for the word: incredible
       iii. Write one word substitute: belief that there is God in all things.
       iv.   Use this Idiom phrasal verb in your sentence: break out
       v.   Correct the sentence: Harsha saw a lots of swans at the lake

Unit – II

3 a) A connoisseur is an expert in knowledge or training especially in the fine arts. Examine Miss Krishna's Character as a connoisseur   10M

   b) Do as directed: 5M
       i.   Write the antonym for the word: Dynamic
       ii.   Write the synonym for the word: Abandon
       iii. Choose the appropriate verb: Srikanth had read a book now / Srikanth reads a book now / Srikanth is reading a book now
       iv.   Choose the appropriate demonstrative: This room is dinning and that ones there are the chairs
       v.   Choose the appropriate Quantifier: Is there some coffee in the flask

4 a) Pitroda avers, "It is not about software exports or internet access, but a whole way of doing things"-substantiate the statement in regard to his contribution to Indian Telecom   10M

   b) Do as directed: 5M
       i.   Use the appropriate quantifier: Raman saw a lots of cranes at the lake
       ii.   Rewrite using the appropriate demonstrative: Do you want to put this banana or that orange.
       iii. Choose the appropriate verb: He walk / walks every day
       iv.   Write the antonym for the word: Civilize
       v.   Write the Synonym for the word: Meticulous

Unit – III

5 a) Narrate the mystery of the bubbling well road.   10M
   b) Do as directed: 5M
       i.   Write the antonym for the word: indigenous

ii.   Write the Synonym for the word: brand
iii.   Write one word substitute: A place where money is coined
iv.   Use this Idiom Phrasal verb in your sentence: fall out
v.   Correct the sentence: The building does not have much windows

6   a) Give an account of Martin Luther King's dream   10M
     b) Do as directed: 5M
         i.   Write the antonym for the word: agony
         ii.   Write the Synonym for the word: inspire
         iii. Write one word substitute: One who is present everywhere
         iv.   Use this Idiom Phrase verb your sentence: do up
         v.   Correct the sentence: You will find a few shops in the desert

Unit – IV

7   a) As the purchase Manager of Satyam Computers, 9 Naidu Road, Hyderabad – 500007,   8M
         you had ordered two dozen personal computers from Hindustan Computers Limited
         (HCL), 140 M.G. Road, Bangalore-500001. When the consignment arrived, you found
         some of the pieces in the damaged condition. Write a complaint letter to the sales
         Manager of the company asking for repair, replacement or compensation
     b) The General Manager of comfort Home Appliances Ltd., Kolkata, is worried about the   7M
         Wastage of stationery in almost all sections of the company. Draft a memo to be
         signed by him and sent to all sectional Heads, asking them to identify the reasons
         behind such wastage and also advice the employees under their control restrain from
         such wastage.
8   a) You are Ravichand of Sita Book store, Guntur, which sells books on English Literature. 8M
         You want to write a letter to the sales Manager of English Literature Publications in
         Hyderabad asking for their catalogue and enquiring about the possibility of being their
         distributor. Write the letter.
     b) You are Dr. M. V. L. Manasa of Vijayawada. The modem you bought two weeks ago   7M
         from Deepika Electronics in Hyderabad is giving you problems. Write an e-mail to the
         manager of the company making a complaint about the defective modem and asking
         for it to be replaced at the earliest.

Unit – V

9   As a student representative submit a report to the principal of your college on youth   15M
     festival attended. The report should cover time and place of the incident, the outcome,
     suggestions for better implementation.
10   Assume that you are the publicity officer of the tourist department of a state government 15M
     which has recently developed a new tourist centre near Delhi. This centre has an aquarium,
     an artificial lake, and a Japanese style hanging garden. There is a tourist bungalow which
     has air conditioned rooms, a bar and a swimming pool. Draft a report to be sent to the first
     secretaries of the foreign diplomatic missions in Delhi for promoting tourist traffic to this
     centre.

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
ENGINEERING CHEMISTRY
(Common to Electrical and Electronics Engineering, Civil Engineering, Mechanical Engineering and Aeronautical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit-I

1 a) What is galvanic cell? Set up galvanic Cell and write electrode reactions involved in it.   8M
   b) Describe a method of determining the equivalent conductance at infinite dilution of a weak electrolyte by using Kohlrau sch's law.   7M

2 a) Calculate the molar conductance of dilute acetic acid at infinite dilution at 298 K using the given data.   7M

   $\wedge_\infty(HCl) = 42.62 \times 10^{-3}$ Sm^2 / mol, $\wedge_\infty(CH_3COONa) = 9.1 \times 10^{-3}$ Sm^2 / mol and $\wedge_\infty(NaCl) = 12.65 \times 10^{-3}$ Sm^2 / mol

   b) Explain the following briefly   8M
       i.   Applications of batteries
       ii.   Advantages of fuel cells
       iii. Lead – acid cell
       iv.   Nickel – Cadmium cell

Unit-II

3 a) What is caustic embrittlement and how it is minimized.   5M
   b) How total hardness is estimated by complex metric method?   5M
   c) Name the different units of hardness and explain their inter conversion.   5M

4 a) Describe the zeolite process for softening of water.   7M
   b) Write a note on the fallowing   8M
       i.   Reverse osmosis
       ii.   Electro dialysis

Unit-III

5 a) What is plastic? Differentiate thermoplastics from thermosetting resins with suitable examples.   7M
   b) What is an adsorption isotherm? Derive an expression for Langmuir adsorption isotherm. Discuss its limitations.   8M

6 Prepare the following synthetic polymers and write their properties and engineering applications.   15M
   (i) Nylon (ii) Teflon (iii) Polyvinyl chloride (iv) Buna-S and (v) Thiokol rubber

Unit-IV

7 a) Discuss proximate analysis of Coal   8M
   b) Discuss the relative merits and demerits of solid, liquid and gaseous fuels   7M

8 What do you understand by flue gas analysis? Discuss its significance and determination by Orsat's apparatus.   15M

Unit-V

9 a) Define phase rule. Explain the terms involved in it with examples   7M
   b) What are electrical Insulators. Discuss their characteristics and engineering applications.   8M

10 a) Discuss the applications of phase rule to Lead – Silver system   8M
   b) What is a lubricant? Mention the functions of a lubricant   7M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
PROBABILITY, STATISTICS AND COMPUTATIONAL TECHNIQUE
(Common to Computer Science and Engineering, Information Technology, Civil Engineering, Aeronautical Engineering)

Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1. a) For the continuous random variable X whose probability density function $f(x) = k x^2 e^{-x}$ when $x \geq 0$, find   7M
   - i. K
   - ii. Mean
   - iii. Variance

   b) In a normal distribution, 7% of the items are under 35 and 89% are under 63. Determine mean and variance of the distribution.   8M

2. a) Out of 800 families with 5 children each, how many would you expect to have   7M
   - i. 3 boys
   - ii. 5 girls
   - iii. Either 2 or 3 boys
   - iv. At least one boy

   b) Suppose 2% of the items of a factory are defective. Find the probability that   8M
   - i. Defective items are 2
   - ii. At least 3 defective items

Unit – II

3. a) A random sample of size 50 was taken whose variance is 12.25 and mean is 20.2, construct 99% confidence interval.   7M

   b) A die is thrown 264 times with the following results. Show that the die is biased   8M

No. appeared on the die	1	2	3	4	5	6
Frequency	40	32	28	58	54	32

4. a) The means of two large samples of size 1000 and 2000 members are 67.5 inches and 68.0 inches respectively. Can the samples be regarded as drawn from the sample population of S.D 2.5 inches?   7M

   b) A group of 5 patients treated with medicine A weigh 42, 38, 48, 60 and 41 kgs. Second group of 7 patients from the same hospital treated with same medicine B weight 38, 42, 56, 64, 68, 69 and 62 kgs. Do you agree with the claim that medicine B increases the weight significantly.   8M

Unit – III

5   a)   Find a root of the equation $x^3 - 4x - 9 = 0$, using the bisection method upto four approximations   7M

    b)   Find the root of the equation $2x - \log_{10} x = 7$ by the method of false position correct to three decimals   8M

6   a)   Find the values of y when x = 218 from the following table by using Newton's forward interpolation   7M

x	100	150	200	250	300	350	400
y	10.63	13.03	15.04	16.81	18.42	19.90	21.27

    b)   By Newton's method, the real root the equation $xe^x - 2 = 0$ correct to three decimal places   8M

Unit – IV

7   a)   Fit a curve of the form $y = a + bx + cx^2$ for the following data   7M

x	10	15	20	25	30	35
y	3.5.3	32.4	29.2	26.1	23.2	20.5

    b)   Given that y = log x, and   8M

x	4.0	4.2	4.4	4.6	4.8	5.0	5.2
y	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $\int_{4}^{5.2} y\,dx$ by

     i.   Trapezoidal rule
    ii.   Simpson's 1/3 rule

8   a)   Fit a curve of the form $y = ae^{bx}$ to the following data   7M

x	77	100	185	239	285
y	2.4	3.4	7.0	11.1	19.6

    b)   Given that   8M

x:	4.0	4.2	4.4	4.6	4.8	5.0	5.2
log x:	1.3863	1.4351	1.4816	1.5261	1.5686	1.6094	1.6487

Evaluate $\int_{4}^{5.2} \log x\,dx$ by Simpson's 3/8 rule

Unit – V

9   a)   Using Taylor's series find y(0.1) given that $dy/dx = xy+1$, y(0) = 1   7M

    b)   Apply R – K fourth order method to find y when x = 0.2 given that $dy/dx = x+y$ and y(0)=1   8M

10   a)   Using Modified Euler's method, find y(0.1) given that $dy/dx = x + y^2$, y(0) = 1   7M

    b)   Determine y(0.8) by Milne's predictor – corrector method for $dy/dx = x - y^2$ when y(0)=0, y(0.2)=0.02, y(0.4)=0.0795, y(0.6)=0.1762   8M

VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B. Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
ENGINEERING MECHANICS
(Common to Civil Engineering, Mechanical Engineering and Aeronautical Engineering)

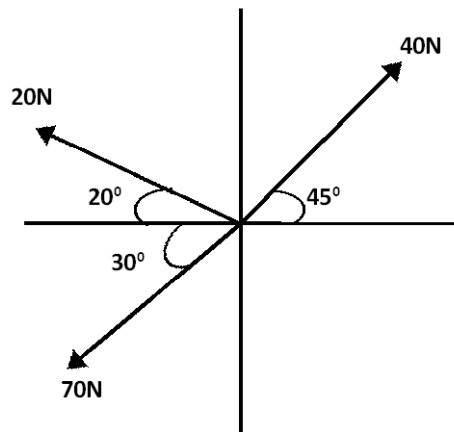Time: 3 hours   Max Marks: 75

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1   a)   Distinguish between   5M
         i.   Moment and Couple
         ii. Concurrent and non-current force systems

    b)   A system of Coplanar concurrent forces is shown in figure. Determine the resultant   10M

2   a)   Three coplanar forces acting at a point are stated to be in equilibrium. Show that the force   5M
         is proportional to the sine of the angle between the other two forces

    b)   A roller of radius r = 12m and weight Q = 500N is to be pulled over a curb of height h = 6m   10M
         by a horizontal force P applied to the end of a string wound around the circumference of
         the roller as shown in figure. Find the magnitude of P required to start the roller over the
   curb
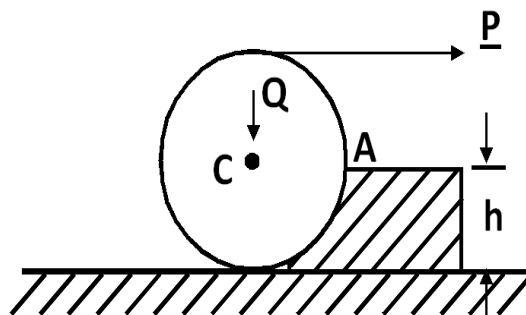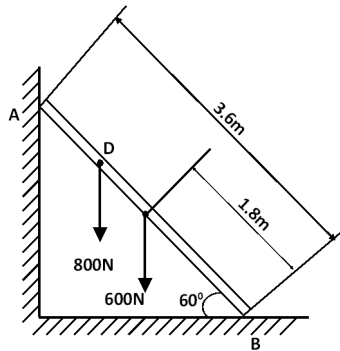
Unit – II

3 A block of weight W_1 = 1000N rests on a horizontal surface and supports on top of it another 15M
block of weight W_2 = 250N as shown in figure the block W_2 is attached to a vertical wall by the
inclined string AB. Find the magnitude of the horizontal force 'P', applied to the loser block as
shown that will be necessary to cause slipping to impend. The coefficient of static friction for all
contiguous surfaces is μ = 0.3
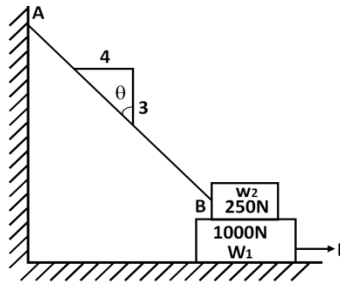
4 A ladder of length 4m and weighing 600N is inclined to the floor at an angle of 60^0 with the 15M
horizontal. The coefficient of friction between the ladder and the floor is 0.4 and with the wall
is 0.3. A man weighing 200N climbs on the ladder from the foot of the ladder. Find the length
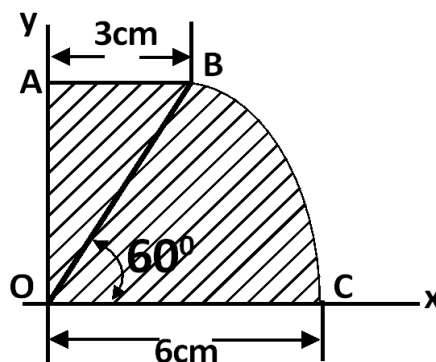along the ladder up to which he can climb before the ladder starts slipping.

Unit – III

5 a) State and prove that theorem of Pappu's and Guldinus representing surface area of an 7.5M
object.

b) Locate centroid for the shaded area shown in figure. 7.5M
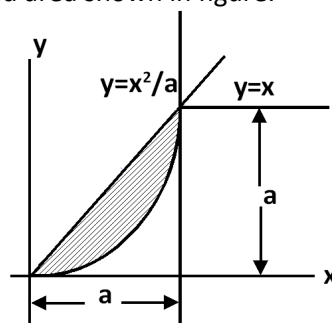

6 Locate the centroid for the given shaded area 15M

Unit – IV

7   Determine the moment of inertia of the plane area bounded between the lines y = 4x + 5, y   15M
     = 0, x = 0 and x = 3; about its horizontal centroidal axis

8   A right circular cylinder of 12cm diameter is joined with a hemisphere of the same diameter   15M
     face to face. Find the greatest height of the cylinder so that C.G. of the composite section
     coincides with the plane of joining the two sections.

Unit – V

9   A weight of 1000N resting over a smooth surface inclined at 30^0 with the horizontal, is   15M
     supported by an effort (P) resting on a smooth surface inclined at 45^0 with the horizontal as
     shown in figure. By using the principle of virtual work calculate the value of effort P.
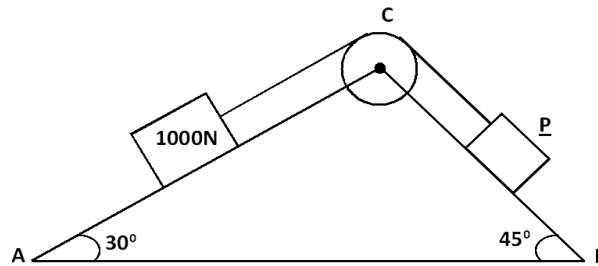
10   A weightless ladder AB supported as shown in figure carries a vertical load of 600N. Find the   15M
     force P required at A to keep the ladder in equilibrium using method of virtual work.
     Assume all contact surfaces to be smooth.
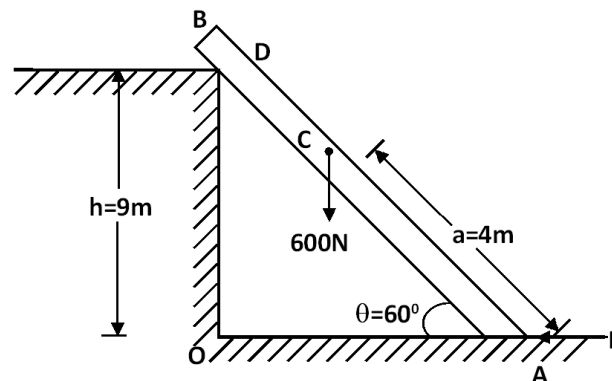
VARDHAMAN COLLEGE OF ENGINEERING
(AUTONOMOUS)
Four Year B.Tech I Semester Regular Examinations February - 2012
(Regulations: VCE-R11)
COMPUTATIONAL TECHNIQUES
(Mechanical Engineering)

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

Answer ONE question from each Unit
All Questions Carry Equal Marks
All parts of the question must be answered in one place only

Unit – I

1   a)   Find by Newton-Raphson method , the real root of the equation $3x = \cos x + 1$ correct to   7M
         four decimal places.
    b)   Solve, by Gauss – Seidel iteration method, the equations   8M
         $20x + y – 2z = 17$
         $3x + 20y – z = -18$
         $2x – 3y + 20z = 25$

2   a)   Find the iteration method, a real root of $2x – \log_{10} x = 7$, correct to four decimal places   7M
    b)   Solve by Gauss – Jacobi method of interaction the equations   8M
         $27x + 6y – z = 85$
         $6x + 15y + 2z = 72$
         $X + y + 54z = 110$

Unit – II

3   a)   The following is a table of values of polynomial of degree 5. It is known that f(3) is an   7M
         error correct the error.

x	0	1	2	3	4	5	6
f(x)	1	2	33	254	1025	3126	7777

    b)   Given the values   8M

x	14	17	31	35
f(x)	68.7	64	44	39.1

         Find the value of f(x) corresponding to x=27

4   a)   Find the nth difference of e^x 5M
    b)   Define the following operators   5M
             i.   E
             ii. ∇
             iii. δ
             iv. Δ
    c)   Find the missing term in the following data   5M

x	0	1	2	3	4
y	1	3	9	-	1

Unit – III

5   a)   Find the first, second derivatives of the function tabulated below, at the point x = 1.5   7M

x	1.5	2	2.5	3	3.5	4
y	3.375	7	13.625	24	38.875	59

8M

   b)   Evaluate $\int_0^1 \dfrac{dx}{1+x^2}$ using Simpson's 3/8 rule by dividing the range into 6 equal parts.

6   a)   Fit a Straight line to the following data   8M

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

   By the method of least squares.

   b)   Find the curve of best fit of the form y = ax^b to the following data   7M

x	1	2	3	4	5
y	0.5	2	4.5	8	12.5

Unit – IV

7   a)   Use Taylor's series method to find y at the points x_1 = 0.1 and x_2 = 0.2 given that   8M
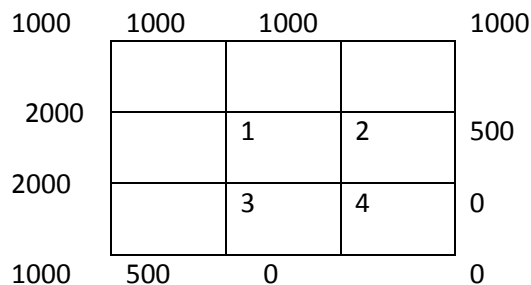   dy/dx = $x^2 + y^2$, y(0) = 1

   b)   Using the fourth – order Runge – Kutta method, solve the equation y^1 = x + y^2, y(0) = 1 at   7M
          the points x = 0.1 and x = 0.2 insteps of 0.1.

8   a)   Using Euler's method, solve for y = at x = 2 from dy/dx = $3x^2$ + 1, y(1) = 2 taking step size   7M
          h = 0.25

   b)   Using the Adams – Bash forth method, solve the equation $\dfrac{dy}{dx} = \dfrac{1}{2}\,xy$ at the point   8M

          x = 0.4 given that y(0) = 1, y(0.1) = 1.0025, y(0.2) = 1.0101, y(0.3) = 1.0228

Unit – V

9   Given the values of u(x, y) on the boundary of the square given in the figure, evaluate the   15M
    function u(x, y) satisfying Laplaces equation $\nabla^2 u = 0$ at the pivotal points of this figure

```
  1000    1000      1000           1000
        ┌───────┬───────┬───────┐
  2000  │       │       │       │
        │       │   1   │   2   │  500
  2000  │       │       │       │
        │       │   3   │   4   │  0
        └───────┴───────┴───────┘
  1000    500       0              0
```

10 Solve the equation (∂u/∂t) = (∂^{2}u/∂x^2)   15M
    Subject to the conditions u(x, 0) = sinπ x, 0 ≤ x ≤ 1, u(0, t) = u(1, t) = 0. Carry out
    computations for two levels, taking h = 1/3, k = 1/36