**Hall Ticket No. :** **Question Paper Code :AAE11T01**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## INTRODUCTION TO AIRCRAFT INDUSTRY

**(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**

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**Unit - 1**

1. a) Explain the human space exploration with respect to Appollo space shuttle. 8M
   b) What are the lift support systems available in space flight? 7M

2. a) Explain the historical developments of helicopter flight. 7M
   b) With a neat sketch explain the functions of major components of fixed wing aircraft. 8M

**Unit – 2**

3. a) Draw a neat sketch of a basic airplane and identify the different components of the same. Also clearly indicate the aircraft axis system. 8M
   b) What is meant by high lift device? Explain different high lift devices. 7M

4. a) What are the different control surfaces of an airplane? Write a short note on each. 8M
   b) Explain the concept of lift. What does lift depends on? 7M

**Unit - 3**

5. a) Identify different aircraft systems. Explain any one of them. 7M
   b) Write a summary on the steering and braking system. 8M

6. a) Write a summary on avionics. 7M
   b) Identify the different navigation systems and explain each of them briefly. 8M

**Unit – 4**

7. a) Mention the different forces acting in airplane and support with a neat sketch. 7M
   b) Following data refers to two different airfoils 8M

| Airfoils | Lift 'L' | Velocity 'V' | Density | Span |
|---|---|---|---|---|
| **Airfoil I** | 250N | 10m/s | 1 kg/$m^3$ | 5$m^2$ |
| **Airfoil II** | 80N | 20m/s | 1.25 kg/$m^3$ | 0.2$m^2$ |

   Which of the airfoil is getting higher?

8. a) What are the different sources of drag? What do you understand by profile drag and induced drag? 7M
   b) Give the airfoil section geometry and nomenclature and mention types of airfoils. 8M

**Unit - 5**

9. a) What is stalling? Explain briefly – stability of an aircraft depends on deflection – justify your answer. 8M
   b) Describe the effects of high lift devices on lift co-efficient. 7M

10. a) Derive the maximum and minimum speeds of aircraft in horizontal flight. 8M
    b) Explain the power curves of aircraft with neat sketches and graphs. 7M

Question Paper Code :ABS11T09

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## MATHEMATICS-III

**(Common to Electronics and Communication Engineering and Electrical and Electronics 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**

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**Unit - 1**

1. a) Prove that $\beta(m,n)=\frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$, where m>0, n>0 — 8M

   b) Evaluate $\int_0^1 x^4 \log\left(\frac{1}{x}\right)^3 dx$ — 7M

2. a) Show that $xJ_n'(x)=nJ_n(x)-xJ_{n+1}(x)$ — 7M

   b) Prove that $\int_{-1}^{1} P_n(x)dx=0$ if n ≠ 0 — 8M

**Unit – 2**

3. a) Show that the function $f(z)=\sqrt{|xy|}$ is not analytic at the origin, although Cauchy – Riemann equations are satisfied at that point — 8M

   b) Prove that $u=x^2-y^2$, $v=\frac{-y}{x^2+y^2}$ both satisfy Laplace's equation but $u+iv$ is not regular (analytic) function of z — 7M

4. a) Show that both the real and imaginary parts of an analytic function are harmonic. — 10M

   b) Find all the principal values of $\left(1+i\sqrt{3}\right)^{\left(1+i\sqrt{3}\right)}$ — 5M

**Unit - 3**

5. a) Evaluate $\int_0^{2+i} z^2 dz$ along the imaginary axis from 0 to i and then horizontally to 2+i — 7M

   b) Find Taylor's expansion for the function $f(z)=\frac{e^z}{z(z+1)}$ about z=2 — 8M

6. a) Using Cauchy's integral formula show that $\int_C \frac{\cos \pi z^2}{(z-1)(z-2)} dz = 4\pi i$ where C is the circle |z|=4 — 7M

   b) Obtain the Taylor's expansion for $\sin\left(\frac{1}{z-1}\right)$ which is valid in 1<|z|<∞ — 8M

**Unit - 4**

7. a) Evaluate $\int_{-\infty}^{\infty} \frac{x^2-x+2}{x^4+10x^2+9}\,dx$ 7M

   b) Evaluate $\int_0^{\infty} \frac{\sin x}{x(x^2+a^2)}dx$ 8M

8. a) State and prove Residue theorem 7M

   b) Prove that $\int_0^{\infty} \frac{\cos x}{\sqrt{x}}dx=\sqrt{\frac{\pi}{2}}$ 8M

**Unit – 5**

9. a) Shown that the relation $w=\frac{5-4z}{4z-2}$ transform the circle $|z|=1$ into a circle of radius unity in the w-plane 8M

   b) Find the bilinear transformation which maps the points $(-i,\ 0,\ i)$ into the points $(-i,\ i,\ 1)$ respectively 7M

10. a) Define Multiple, Complete and Planar Graphs with examples and neat diagrams 8M

    b) Find the minimal spanning tree of the graph G given below, using Krushkal's Algorithm 7M

Question Paper Code :ABS11T10

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## MATHEMATICS FOR AEROSPACE ENGINEERS

**(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**

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**Unit - 1**

1. a) Show that $\beta(p,q)=\int_0^1 \frac{x^{p-1}+x^{q-1}}{(1+x)^{p+q}}\,dx$ 7M

   b) Show that $\int_0^1 \frac{1}{\sqrt{-\log x}}dx=\sqrt{\pi}$ 8M

2. a) Show that $\int J_3(x)\,dx=-J_2(x)-\frac{2}{x}J_1(x)$ 7M

   b) Show that $(2n+1)P_n(x)=P_{n+1}'(x)-P_{n-1}'(x)$ 8M

**Unit - 2**

3. a) Find the orthogonal trajectories of the family of curves $x^3y-xy^3=c$ =constant 7M

   b) Find the real and imaginary part of ln (cos(x+iy)) 8M

4. a) Show that $w=\log z$ is analytic everywhere except at origin and find $\frac{dw}{dz}$ 7M

   b) Find the principle value of $(1+i)^i$ 8M

**Unit - 3**

5. a) Evaluate $\int_0^{\infty}\frac{\cos x}{\sqrt{x}}dx=\sqrt{\frac{\pi}{2}}$ along the curve $y=x^2$ 7M

   b) Evaluate where C is $|z|=4$ 8M

6. a) Find $f(2)$ and $f(3)$ if $f(a)=\int_C \frac{2z^2-z-2}{z-a}dz$, where C is the circle $|Z|=2.5$ using Cauchy's integral formula. 7M

   b) Express $f(z)=\frac{z}{(z-1)(z-3)}$ in a series of positive and negative powers of $(z-1)$. 8M

**Unit – 4**

7. a) Find the residue of $\frac{z^2-2z}{(z+1)^2(z^2+1)}$ at each pole. 8M

   b) Show that $\int_0^{2\pi} \frac{d\theta}{4\cos^2\theta+\sin^2\theta}=\pi$ 7M

8. a) Evaluate $\int_C \frac{\cos \pi z^2}{(z-1)(z-2)}dz$ where C is $|z|=\frac{3}{2}$ using Residue theorem 7M

   b) Evaluate $\int_0^{\infty} \frac{dx}{(x^2+9)(x^2+4)^2}$ using Residue theorem 8M

**Unit – 5**

9. a) Show that the transformation $w=\frac{2z+3}{z-4}$ changes the circle $x^2+y^2-4x=0$ into the straight line $4u+3=0$. 8M

   b) Find the bilinear transformation which maps the points $(2,\ i,\ -2)$ into the points $(1,\ i,\ -1)$. 7M

10. a) Find the components of the first fundamental tensor in spherical coordinates. 8M

    b) If $(ds)^2=(dr)^2+r^2(d\theta)^2+r^2\sin^2\theta(d\phi)^2$, find the values of $[22,\ 1]$ and $[13,\ 3]$. 7M

**Hall Ticket No. :** **Question Paper Code :ACE11T01**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## BUILDING MATERIALS AND CONSTRUCTION

**(Civil 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**

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**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | What are the precautions to be taken in the process of blasting? Explain briefly. | 8M |
| | b) | Write the properties of good building stones | 7M |
| 2. | a) | Explain various tests conducted on burnt bricks. | 7M |
| | b) | Explain the characteristics of a good tile? | 8M |

**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | List and explain any four tests conducted on cement | 10M |
| | b) | Write the objectives of seasoning of timber | 5M |
| 4. | | Write a short notes on the following Galvanized Iron, Fibre – reinforced plastics, steel, Plasticizers, defects in timber. | 15M |

**Unit – 3**

| | | | |
|---|---|---|---|
| 5. | a) | List the various types of Rubble and Ashlar Masonary. Also explain any one type of rubble and Ashlar Masonary each with neat sketches. | 7M |
| | b) | With the help of neat sketches, explain English bond and Flemish bond for 1 ½ brick thick wall. | 8M |
| 6. | | With neat sketches, explain.<br>i) Spread footing<br>ii) Combine strap<br>iii) Mat footing | 15M |

**Unit – 4**

| | | | |
|---|---|---|---|
| 7. | a) | What are the requirements of good stairs? | 8M |
| | b) | Mention different types of arches with neat sketches. | 7M |
| 8. | a) | Write different types of roof trusses, Explain queen post truss with a neat sketch. | 7M |
| | b) | Draw the elevation and section of wooden framed double lead panalleled door by rooming all its parts | 8M |

**Unit – 5**

| | | | |
|---|---|---|---|
| 9. | a) | What are the various causes of dampness in buildings | 7M |
| | b) | Draw typical sketches of form work for a beam slab floor | 8M |
| 10. | a) | Explain the procedure of painting on new wood work. | 7M |
| | b) | Explain the various constituents of a varnish | 8M |

**Question Paper Code :ACE11T02**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B.Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## SURVEYING-I

**(Civil 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**

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**Unit - 1**

1. a) Describe the classification of surveying 5M
   b) Explain different kinds of chains used for linear measurements 5M
   c) Describe how you would range a survey line between two points which are not intervisible 5M
2. a) Distinguish clearly between cumulative and compensating errors 4M
   b) Describe briefly the functions of various accessories of a plane table 6M
   c) Briefly discuss the requirements of good field notes 5M

**Unit - 2**

3. a) Explain the different systems of designation of bearings and define the terms 8M
      i. True bearing
      ii. Magnetic bearing
   b) What are the adjustments usually necessary in prismatic compass. 7M
4. a) The following bearings were observed while traverse with a compass. Identify which stations were affected by local attraction and determine the corrected bearings 8M

| Line | FB | BB |
|---|---|---|
| AB | $45^0 45'$ | $226^0 10'$ |
| BC | $96^0 55'$ | $277^0 5'$ |
| CD | $29^0 45'$ | $209^0 10'$ |
| DE | $324^0 48'$ | $144^0 48'$ |

   b) Differentiate the prismatic compass and surveyors compass. 7M

**Unit - 3**

5. a) Compare the rise and fall method of reducing leveling with the height of collimation method. 7M
   b) Describe the indirect method of contouring by squares and by intersections. 8M
6. The following staff readings were observed successively with a level, the instrument having been moved after third, Smith and Ergth readings: 2.228; 1.606; 0.988; 2.090; 2.864; 1.262; 0.602; 1.982; 1.044; 2.684 metres. Enter the above readings in a page of a level book and calculate the R.L of points if the first reading was taken with a staff held on a bench mark of 432.384m. 15M

**Unit – 4**

7. a) Discuss in brief the various methods of measurements of area by offsets from the base line. State the relative merits and demerits of each method. 7M

   b) The following perpendicular offsets were taken from a chain line to an irregular boundary. 8M

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| Chainage(m) | : | 0.0 | 10.0 | 25.0 | 42.0 | 60.0 | 75.0 |
| Offset(m) | : | 15.5 | 26.2 | 31.8 | 25.6 | 29.0 | 31.5 |

   Calculate the area between the chain line, the boundary and the end offsets.

8. a) Enumerate different methods of determination of volume of earth work. Discuss their merits and demerits. 6M

   b) A railway embankment is 12 m wide. The ground is level in a direction transverse to the centre line. Calculate the volume contained in a 100 m length by trapezoidal rule and prismoidal rule, if the side slope is 1.5: 1. The centre heights at 20m interval are 3.7 m, 2.6 m, 4.0 m, 3.4 m, 2.8 m,3.0 m and 2.2 m. 9M

**Unit - 5**

9. a) How would you measure with a theodalite 7M
   Horizontal angle by repetition
   Vertical angle.

   b) What do you understand by 8M
   Consecutive coordinates
   Independent coordinates in traverse survey and explain briefly.

10. The table below gives the lengths and bearings of the lines of a traverse ABCDE, the length and bearing of EA having been omitted. Calculate the length and bearing of the line EA 15M

| Line | Length (m) | Bearing |
|---|---|---|
| AB | 204 | $87^0 30'$ |
| BC | 226 | $20^0 20'$ |
| CD | 187 | $280^0 0'$ |
| DE | 192 | $210^0 3'$ |
| EA | ? | ? |

**Hall Ticket No. :** **Question Paper Code :ACE11T03**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## STRENGTH OF MATERIALS-I

**(Civil 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**

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**Unit - 1**

1. a) Define 'Factor or safety', 'Poisson's ratio' and 'strain energy'. 6M
   b) A steel rope lowers a load of 15KN at a rate of 1m/sec. When the length of the rope unwound is 10m, it suddenly gets jammed. Estimate the, instantaneous stress induced in it due to the sudden stoppage and the maximum instantaneous elongation if the diameter of the rope is 30mm. Take the value of E as $2.05 \times 10^5 N/mm^2$ and $g=9.81 m/sec^2$. 9M

2. a) Derive the expression for obtaining the elongation due to an axial load 'P' of a trapezoidal section of uniform thickness. 7M
   b) A system of rails are laid such that there is no stress in them at $24^0C$. If the rails are 32m long, determine: 8M
      i. The stress in the rails at $80^0C$, when there is no allowance for expansion
      ii. The stress in the rails at $80^0C$, when there is an expansion allowance of 8mm per rail
      iii. The expansion allowance for no stress in the rails at $80^0C$
      iv. The maximum temperature for no stress in the rails when expansion allowance is 8mm.

      Take, coefficient of linear expansion $\alpha=11 \times 10^{-6}/^0C$ and E=205GPa.

**Unit - 2**

3. a) Give examples for statistically determinate and stable beams. 6M
   b) Construct shear force and bending moment diagrams for a cantilever beam carrying a load whose intensity varies from zero at the free end to w/unit run at the fixed end. 9M
4. a) State the relation between shear force and bending moment and illustrate with an example. 6M
   b) Construct shear force and bending moment diagrams for a propped cantilever beam of span 6m subjected to udl 24KN/m over the entire span and whose prop reaction is 54KN. 9M

**Unit - 3**

5. a) Derive the expressions for 'Horizontal' and 'Hoop' stresses in the case of a 'Thin cylinder'. Subjected to an internal fluid pressure 'p'. 6M
      Note: Take d and t as the diameter and thickness of the cylinder.
   b) A seamless spherical shell is of 0.8m internal diameter and 4 mm thickness. It is filled with fluid under pressure, until its volume increases by 50 cubic centimeters. Determine the Fluid pressure, taking $E=2 \times 10^5 N/mm^2$ and Poisson's ratio of the material of the shell as 0.3. 9M

6. A compound cylinder, formed by shrinking one tube on to the other is subjected to an internal pressure of 50 $N/mm^2$. Before the fluid is admitted the internal and external diameter of the compound cylinder are 100mm and 180mm and the diameter at the junction is 150mm. If, after shrinking on, the radial pressure at the common surface is $8N/mm^2$. Calculate the final stresses, set up by the section. 15M

**Unit – 4**

7. a) State and assumption made in the derivation of Bernoulli's equation for pure bending and also derive the equation. 7M
   b) Determine the section modulus for a square cross section of length a with one of the diagonal horizontal. 8M
8. a) Develop the shear stress distribution for a Triangular cross section of a beam subjected to transverse loads. 9M
   b) Determine the position and magnitude of maximum shear stress (assume any section). 6M

**Unit – 5**

9. a) Determine the deflection at the centre of the simply supported beam of span l carrying a udl w/per unit run over the entire span. 6M
   b) A simply supported beam of span 10m carries concentrated loads of 40kN, 20kN and 60kN at a distance of 2m, 5m and 9m from the left support. Determine the position and amount of maximum deflection using Macaulay's method. Assume moment of inertia of the section is 695 x $10^6$ $mm^4$ Young's modulus of elasticity E = $200kN/mm^2$. 9M
10. a) State and explain Mohr's theorems. 6M
    b) A cantilever beam of span l carrying a udl w/unit run over the half of the span from fixed end. Determine the deflection at the free end of the cantilever beam using moment area theorem. Assume El of the beam is constant throughout. 9M

**Hall Ticket No. :** **Question Paper Code :ACE11T04**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## CONCRETE TECHNOLOGY

**(Civil 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**

**Note: IS10262 concrete mixed design code should be provided in this exam.**

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**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | Briefly explain the significance of chemical composition of Portland cement. | 8M |
| | b) | Bring out the differences between dry and wet processes of cement manufacturing. | 7M |
| 2. | a) | Briefly explain the importance of mechanical properties of CA in making concrete. | 8M |
| | b) | Explain the setting action of cement and role of Bouge compounds formed during the setting. | 7M |

**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | What is workability of concrete? Explain briefly slump test carried out to obtain he workability of concrete. | 8M |
| | b) | Why concrete is to be cured? List the methods of curing and explain any one method of curing briefly. | 7M |
| 4. | a) | With a neat sketch explain the Abram's law of w/c ratio and enumerate the importance Abram's law in the mix proportioning of concrete. | 8M |
| | b) | How do you address the following in making good concrete<br>i. Vibration<br>ii. Segregation<br>iii. Honey comb<br>iv. Bleeding | 7M |

**Unit - 3**

| | | | |
|---|---|---|---|
| 5. | a) | Explain how the compressive strength of concrete is determined. | 7M |
| | b) | What is creep of concrete? What are the factors what influence the creep and what are the effects of creep? | 8M |
| 6. | a) | Write a note on non-destructive testing methods. | 7M |
| | b) | Explain the terms with respect to concrete<br>i. Modulus of elasticity<br>ii. Poisson's ratio<br>iii. Shrinkage<br>iv. Dynamic modulus | 8M |

**Unit – 4**

7. a) What do you mean by free water / cement ratio? Explain. 7M
   b) Comment on the relation between maximum aggregate size and section of a concrete member. 8M
8. Design a concrete mix, intended for a reinforced concrete foot bridge from the following data. Characterizing compressive strength required in the field at 28 days is = 20Mpa 15M
   Cement to be used = Ordinary Portland cement
   7 day strength = 33Mpa
   Workability = 0.9 compacting factor
   Maximum size of the aggregate = 20mm
   Type of exposure = mild
   Specific gravity = 2.6 for both C.A & F.A

**Unit – 5**

9. a) Explain any three types of very high strength concrete. 7M
   b) List out the factors affecting the properties of Fibre Reinforced Concrete. 8M
10. Write a short note on the following 15M
    a) Polymer concrete
    b) High performance concrete
    c) Self compacting concrete

**Hall Ticket No. :** **Question Paper Code :ACS11T02**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## DATA STRUCTURES THROUGH C

**(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**

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**Unit - 1**

1. Define the term recursion. Write a program in C to find factorial of N using recursion technique. 15M

2. Discuss the problem of tower of Hanoi and a recursive C program for tower of Hanoi. 15M

**Unit – 2**

3. Explain with example the quick sort. Compare it with bubble sort in terms of time complexity and space complexity. 15M

4. Write a program for Heap sort and explain with an example. 15M

**Unit – 3**

5. Write a C program to evaluate a post fix expression. 15M

6. What is a priority queue? Explain the implementation details of priority queues. 15M

**Unit – 4**

7. a) What is linked list? Explain with neat diagrams how an element is added and removed from the front end of the list. 10M
   b) Write a C function to insert the element 'x' at the end of the list 'List'. 5M

8. Given an ordered linked list whose first node is denoted by 'start' and node is represented by 'key' as information and 'link' as link field. Write a C program to implement deleting number of nodes (consecutive) whose 'key' values are greater than or equal to '$K_{min}$' and less than '$K_{max}$'. Explain the program with good comments. 15M

**Unit - 5**

9. a) Draw a binary tree for the following expression 3+4 * (6-7) / 5 +3. Traverse above constructed tree using pre order and post order. 7M
   b) What do you mean by a threaded binary tree? Discuss the impact of such a representation on tree traversal procedure. 8M

10. a) In order and Pre-order traversals of a tree is given as:ssss 4M
Inorder: D H B EA F C I G J
Preorder: A B D H E C F G I J
Find the topology of the tree.

b) Let G be a graph whose vertices are the integers 1 through 8, and let the adjacent vertices of each vertex be given by the table below: 11M

| Vertex | Adjacent Vertices |
|---|---|
| 1 | 2,3,4 |
| 2 | 1,3,4 |
| 3 | 1,2,4 |
| 4 | 1,2,3,6 |
| 5 | 6,7,8 |
| 6 | 4,5,7 |
| 7 | 5,6,8 |
| 8 | 5,7 |

Assume that, in a traversal of G, the adjacent vertices of a given vertex are returned in the same order as they are listed in the above table.

i. Draw G
ii. Order the vertices as they are visited in a DFS traversal starting as vertex 1.
iii. Order the vertices as they are visited in a BFS traversal starting at vertex 1.

**Question Paper Code :ACS11T03**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## DISCRETE MATHEMATICAL STRUCTURES

**(Common to Computer Science and Engineering, Information Technology)**

**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**

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**Unit - 1**

1. a) Prove that the proposition: $(P \rightarrow Q) \rightarrow (P \wedge Q)$ is a contingency. 7M

   b) Use Demorgan's laws to write the negation of each statement: 8M
   - i. I want a car and a worth cycle.
   - ii. My cat stays outside or it makes a mess.
   - iii. I've faller and I can't get up.
   - iv. You study or you don't get a good grade

2. Prove using rules of inference or disprove

   a) Duke is a Labrador retriever 5M
   All Labrador retriever like to swin
   Therefore Duke likes to swin

   b) No Engineering student is bad in studies. 5M
   Anil is not bad in studies
   Anil is an engineering students.

   c) If it is hot day or raining today then it is no fun to snow ski today. 5M
   It is no fun to snow ski today.
   Therefore it is hot today.
   UNIVERSE = days.

**Unit – 2**

3. a) Let R be a relation on the positive integers N defined by R = {(x, y); x + 3y = 12}. Write R as a set of ordered pairs. 3M

   b) Define compatibility relation. Give examples 6M

   c) Let X = {2, 3, 6, 12, 24, 36} and the relation $\leq$ be such that x $\leq$ y if x divides y. Draw the Hasse diagram of (x, $\leq$). 6M

4. a) Define 10M
   (i) Onto function
   (ii) one-to-one function
   (iii) one-to-one onto function

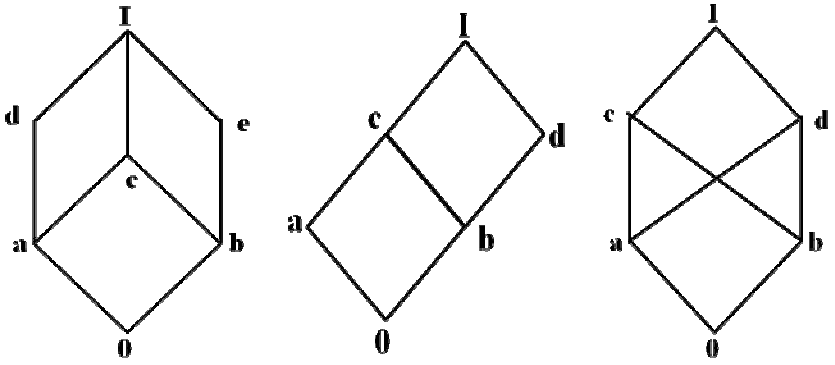
   b) Define a primitive recursive function. Show that $f(x, y) = x^y$ is a primitive recursive function. 5M

**Unit – 3**

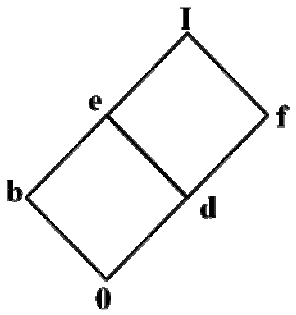
5. a) Let I be the set of integers, Consider the algebraic system <I, +, x>. List the important properties of the operations of addition and multiplication. 9M

   b) Define 6M
   (i) Group
   (ii) abelian group
   (iii) group homomorphism

6. a) Which of the partially ordered sets are lattices? 6M




   b) Consider the bounded lattice L in the following figure 9M




   (i) Find the complements ( if they exist) of e and f.
   (ii) Express I in an irredundant joints irreducible decomposition in a many ways as possible.
   (iii) Is L distributive?

**Unit – 4**

7. a) In how many ways can we distribute 12 identical pencils to 5 children so that every child gets at least 1 pencil? 7M

   b) State and prove Binomial theorem. 8M

8. a) In how many different orders can 3 men and 3 women be seated in a row of 6 seats if 6M
   Any one may sit in any of the seats
   Men and women are seated alternatively

   b) How many positive integers ‘n’ can we form using the digits 3,4,4,5,5,6,7 if we want to exceed 5,000,000? 9M

**Unit – 5**

9. a) Fine the coefficient of $X^{10}$ in $(1 + x + x^2 + \ldots\ldots)^2$. 8M

   b) Solve $a_n - 6a_{n-1} + 12a_{n-2} - 8a_{n-3} = 0$ by generating functions. 7M

10. Solve the following recurrence relations using characteristics roots 15M

    a) $a_n - 3a_{n-1} - 4a_{n-2} = 0 \quad for \quad n \geq 2 \quad and \quad a_0 = a_1\ 1$

    b) $a_n - 4a_{n-1} + 4a_{n-2} = 0 \quad for \quad n \geq 2 \quad and \quad a_0 = \frac{5}{2}.\ a_1 = 8$

**Hall Ticket No. :** **Question Paper Code :ACS11T04**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## OBJECT ORIENTED PROGRAMMING THROUGH JAVA

**(Common to Computer Science and Engineering and Information Technology)**

**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 - 1**

1. a) Briefly explain the three Object Oriented Programming principles. 6M
   b) Write a program to give the example of control statements. 9M
      i. if statements
      ii. switch statements
      iii. for loop

2. a) Write a Java program to display default value of all primitive data types of Java. 6M
   b) Write a java program to print all real solutions to the quadratic equation $ax^2+bx+c=0$. Read a, b, c values and use the formula $(-b\pm sqrt(b^2-4ac))/2a$. 9M

**Unit – 2**

3. a) Define the term inheritance and explain different types of inheritance. 7M
   b) Write a program to create a class named Shape. In this class we have three sub classes Circle, Triangle and Square each class has two member functions named draw() and erase(). Create these using polymorphism concepts. 8M

4. a) What is an interface? Explain how to define and implement an interface. 7M
   b) Create a class called Outer with a method called display(), again create another class inside the Outer class named Inner with a method called display() and call the two methods in the main class. 8M

**Unit – 3**

5. a) Briefly discuss different java's Unchecked Runtime Exception Subclasses defined in java.lang. 8M
   b) Write a program to create two threads. In this class we have one constructor used to start the thread and run it. Check whether these two threads are run or not. 7M

6. a) Explain different inter thread communication mechanisms provided by Java. 6M
   b) Write a program to illustrate sub class exception precedence over base class. 9M

**Unit – 4**

7. a) Briefly explain any four commonly used EventListener Interfaces. 8M
   b) Write a sample program in setting paint mode using XOR mode. 7M

8. a) Write an applet program that shows how to obtain the names of the available font families. 7M
   b) What is an AWT Event class? Explain about any two java AWT Event classes. 8M

**Unit - 5**

| | | | |
|---|---|---|---|
| 9. | a) | Write a simple swing application that displays a short message. | 8M |
| | b) | Write a program that has menu bar and also a quit option and if the user clicks the quit option the applet should quit. | 7M |
| 10. | a) | Write a sample program demonstrating the JScrollPane. | 8M |
| | b) | Write a program to illustrate the use of Java Native Interface (JNI) and discuss the drawbacks of native methods. | 7M |

**Hall Ticket No. :** **Question Paper Code :AEC11T01**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## ELECTRONIC DEVICES

**(Common to Electrical and Electronics Engineering 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**

---

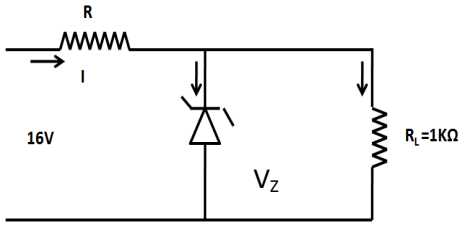
**Unit - 1**

1. An electron starts at rest on one plate of a plane parallel plate capacitor whose plates are 5cm apart. The applied voltage is zero at the instant the electron is released, and it increased linearly from zero to 10V in 0.1μ sec. 15M
   a) If the opposite plate is positive, what speed will the electron attain in 50n sec?
   b) Where will it be at the end of this time?
   c) With what speed will the electron strike the positive plate?

2. a) Discuss the concept of diffusion current in semiconductors. 7M
   b) Describe about Hall-effect. 8M

**Unit - 2**

3. a) i. Write the semi-conductor diode current equation and define all the parameters used. 4M
   ii. Determine the forward current for a Ge diode at room temperature, when the voltage across it is 0.3V. Compare with the current when the temperature rises $50^0$C. Leave the answer in terms of $I_0$. 4M
   b) i. What is the difference between Zener breakdown and avalanche breakdown. 3M
   ii. Draw the VI characteristics of the Zener diode. Find R in the shunt regulator shown below. Given $V_Z$= 10V and $I_Z$=20mA. 4M




4. a) Consider an open circuited PN junction. Sketch the curves as a function of distance across the junction of space charge, electric field and potential and explain the shapes. 8M
   b) Derive the expression for the space charge capacitance $C_T$ in a diode. 7M

**Unit – 3**

5. a) Draw the circuit diagram of a full wave rectifier using 8M
   i. Centre tapped transformer
   ii. Bridge rectifier
   Derive expressions for ripple factor, transformer utilization factor and rectification efficiency in both cases.
   iii. Calculate the output d.c voltage and efficiency for a bridge rectifier whose $R_L$=100 ohms, diode forward resistance is 10 ohms and a.c input voltage is

300 sin 314t.

b) i. Sketch the volt ampere characteristics of a tunnel diode indicating the different regions and explain. 4M

ii. Explain how to obtain maximum power output from a photo voltaic cell. 3M

6. a) For a half wave rectifier circuit a 10% ripple factor is desired. Calculate the 8M

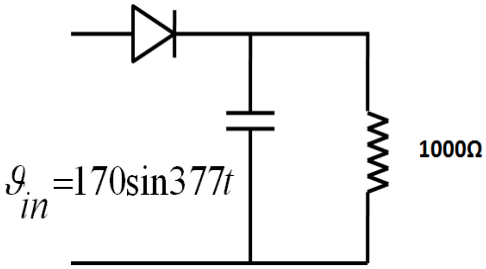
i. Value of the C needed for 10% ripple factor

ii. Average dc voltage

iii. Effective value of the ac ripple voltage

iv. Peak current through the diode

v. Conduction time for the diode




b) Draw the emitter characteristics of a UJT. Draw the equivalent circuit of the UJT. Define "intrinsic stand – off ratio". Explain clearly the working of a JUT relaxation oscillator. 7M

**Unit – 4**

7. a) Explain how transistor will act as an amplifier. 5M

b) Discuss in detail about early effect and its consequences. 5M

c) Derive an expression for collector current in common emitter configuration. 5M

8. a) With neat structure explain the principle of operation of enhancement MOSFET. 8M

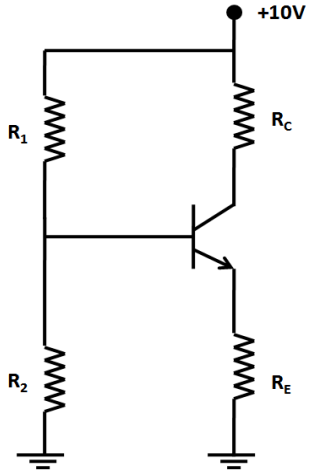
b) Explain how FET acts as Voltage Variable Resistor. 7M

**Unit – 5**

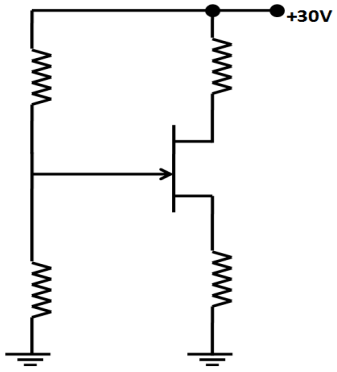
9. a) In the voltage divider biasing circuit of a transistor 8M

If $R_C$=3.6KΩ, $R_E$=1 KΩ, $R_1$=10 KΩ, $R_2$=2.2 KΩ

Find the collector to emitter voltage. Assume $V_{BE}$=0.7V, β=50.




b) Draw the dc load line and the Q point for the figure shown below. 7M



10. a) i. Draw the emitter to base biasing circuit for a transistor. 2M

ii. What are the three sources of instability of collector current in a transistor and hence define the three stability factors S, S', S". 6M

b) An FET amplifier in the common-source configuration uses a load resistance of 300KΩ. The ac drain resistance of the device is 100KΩ and the transconductance is 0.5mA $V^{-1}$. Find the voltage gain of the amplifier. 7M

**Hall Ticket No. :** **Question Paper Code :AEC11T02**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## SIGNALS AND SYSTEMS

**(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**

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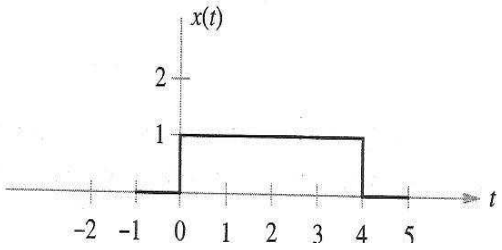
**Unit - 1**

1. a) A continuous time domain signal is shown in below. Sketch and label each of the following signal — 7M
   i) x(t-2)
   ii) x(2t)
   iii) x(t/2)
   iv) x(-t)




   b) Consider the periodic waveform x(t) = 4 + 2 cos(3t) + 3 sin(4t) — 8M
   i) What is the value of T
   ii) What is the total average power
   iii) Find the complex fourier coefficients

2. a) Calculate the trigonometric Fourier coefficients of periodic signal described by — 7M

$$x(t)=\begin{cases} A \ , \ 0<t<\dfrac{T}{2} \\ -A \ , \ \dfrac{T}{2}<t<T \end{cases}$$

   b) If a real value of continuous time periodic signal x(t) has Fourier series X(k), prove that X*(k) =X(-k) and also prove the time differentiation property. — 8M

**Unit – 2**

3. a) For the signals given below, find the Fourier transform of x(t). Also explain which of them will demonstrate conjugate symmetry — 7M
   i) $x(t) = e^{-t-1}u(t)$
   ii) $x(t) = e^{-t-j\pi t}u(t)$
   b) State and prove the following properties of Fourier transforms — 8M
   i) Scaling
   ii) Frequency differentiation

4. a) Using the appropriate properties, find the Fourier transforms of the following signals 7M

i) $x(t) = \sin \pi t e^{-2t} u(t)$

ii) $x(t) = \frac{d}{dt}\left[ te^{-2t} \sin(t) u(t) \right]$

b) Find the Fourier transform of a rectangular pulse given as follows 8M

$$x(t) = \begin{cases} 1 & |t| \le a \\ 0 & |t| > a \end{cases}$$

Also plot their magnitude and phase spectrums

**Unit - 3**

5. a) Determine the output y(t) of a LTI system with impulse response 10M

$h(t) = t \quad for\ |t| \le 2 \quad and \quad input\ x(t) = 2 \quad for\ |t| \le 1$

$= 0 \quad for\ |t| > 2 \qquad\qquad = 0 \quad for\ |t| > 1$

b) Determine whether the following system which is described as $y(t) = x\left(\frac{t}{2}\right)$ 5M

i) Linear
ii) Time Invariant
iii) Memory
iv) Causal
v) Stable

6. a) Find the total response of the system y(n+2) + 4y(n+1) + y(n) = $2^n$u(n) 7M
given y(-1) = 0 & y(-2) = 1

b) Compute the convolution of the two sequences 8M
$x_1(n)$ = (1 2 3) & $x_2(n)$ = (1 2 3 4) where $x_1(0)$ = 1 and $x_2(0)$ = 3

**Unit – 4**

7. a) State and prove convolution property of Laplace transform 7M

b) Find the inverse Laplace transform of $x(s) = \frac{s^2 + 2s + 5}{(s+3)(s+5)^2} \quad R_e(s) > -3$ 8M

8. a) The output y(t) of a continuous – time LTI system is found to be $2e^{-3t}$ u(t) when the input x(t) is u(t) 10M
i) Find the impulse response h(t) of the system
ii) Find the output y(t) when the time input x(t) = $e^{-t}$ u(t)

b) Find the Laplace transform and the associated RoC for each of the following signals: 5M

i) $x(t) = e^{-2t}\left[u(t) - u(t-5)\right]$

ii) $u(t) = \sum_{K=0}^{\infty} \delta(t - KT)$

**Unit – 5**

9. a) Explain the signal reconstruction process to recover the message from the sampled signal 7M

b) Find the inverse Z – transform of $X(z)=\frac{z(z^2-4z+5)}{(z-3)(z-1)(z-2)}$ for the following cases 8M

$i)\ 2<|z|<3$

$ii)|z|<1$

10. a) A signal x(t) = cos(5πt) + 0.5 cos(10πt) is ideally sampled. The interval between the samples is $T_s$ sec. 7M

Find the maximum allowable value for $T_s$

ii) If the sampling signal $S_\delta(t)=\sum_{k=-\infty}^{\infty}\delta(t-0.1\ k)$, the sampled signal consists of a train of impulses, each with a different strength, i.e $X_\delta(t)$ = $\sum_{=-\infty}^{\infty}(-0.1)$. find the value of $I_k$

iii) To reconstruct the signal, $X_\delta(t)$ is passed through a rectangular lowpass filter. Find the minimum filter bandwidth required to reconstruct the signal without distortion

b) State and prove the convolution property in Z-domain 8M

**Hall Ticket No. :** **Question Paper Code :AEC11T03**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations - 2013

**(Regulations: VCE-R11)**

## PROBABILITY THEORY AND STOCHASTIC PROCESSES

**(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**

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**Unit - 1**

1. a) State and prove Baye's theorem. 6M
   b) Find the characteristic function of the random variable X having density function $f(x) = e^{-|x|}, \quad -\infty < x < \infty$. 4M
   c) Given the Gaussian random variable with pdf 5M
   $f_X(x) = e^{\frac{-x^2}{2\sigma^2}} / \sqrt{2\pi}.\sigma$ and let $Y=x^2$, find pdf of y.
2. a) State four properties of conditional density function. 4M
   b) The probability density of a random variable X is 6M
   $$f(x) = \begin{cases} x & for\ 0 < x \le 1 \\ 2-x & for\ 1 < x < 2 \\ 0 & for\ x > 2 \end{cases}$$
   Compute the CDF of X.
   c) Find the Movement Generating Function of a uniform distribution and hence find its mean. 5M

**Unit – 2**

3. a) Obtain the mean value of a sum of N weighted random variables. Also define joint moments about the origin. 7M
   b) Given $f_{xy}(x,y) = cx(x-y), 0 < x < 2, -x < y < x$ and 0 elsewhere 8M
      i. Evaluate c
      ii. Find $f_x(x)$
      iii. $f_{y/x}(y/x)$
      iv. $f_y(y)$
4. a) State any four properties of joint density function. 4M
   b) If X and Y each follow an exponential distribution with parameter 1 and are independent then find pdf of U=X-Y. 8M
   c) If X and Y are independent Random Variables having density functions 3M
   $$f_1(x) = \begin{cases} 2e^{-2x}, & x > 0 \\ 0, & x < 0 \end{cases} \text{ and } f_2(y) = \begin{cases} 3e^{-3y}, & y \ge 0 \\ 0, & y < 0 \end{cases}$$
   Find the density function of their sum U=X+Y.

**Unit - 3**

5. a) The autocorrelation function for a stationary process x(t) is given by 5M

$R_{xx}(\tau) = 9 + 2e^{-|\tau|}$ Find the mean value of $y = \int_{t=0}^{2} x(t)dt$ and variance of x(t).

b) Consider a random process x(t)=Ucos t+Vsin t, where U and V are independent random variables each of which assumes values -2 and 1 with probabilities 1/3 and 2/3 respectively. Show that x(t) is WSS and not SSS. 10M

6. a) A random process is defined as x(t)=A cos wt + B sin wt, where A and B are random variables with E[A]=E[B]=0, E[$A^2$]=E[$B^2$] and E[AB]=0. Then show that the process x(t) is mean Ergodic. 7M

b) Consider a random process $x(t) = A\cos(w_0 t + \theta)$, where A and $w_0$ are real constants and $\theta$ is a random variable uniformly distributed on the internal (0, π/2). Find the average power $P_{xx}$ in X(t). 8M

**Unit – 4**

7. a) Derive the relation between cross power spectrum and cross correlation function of random processes. 8M

b) Given the power spectral density of a continuous process as $S_{xx}(w) = \left(w^2 + 9\right) / \left(w^4 + 5w^2 + 9\right)$. Find the autocorrelation function and mean square value of the process. 7M

8. a) Given that a process X(t) has the auto correlation $R_{xx}(t) = Ae^{-\alpha|t|}.\cos(w_0 t)$ where A>0, α>0 and $w_0$ are real constants find the power spectrum of X(t). 8M

b) State any two uses of spectral density. If X(t) is a real WSS process then prove that the spectral density function $S_{xx}(w)$ and the autocorrelation function $R_{xx}(t)$ form a Fourier transform pair. 7M

**Unit – 5**

9. a) Obtain an expression to find noise band width of the system. 6M

b) Show that a narrow-band noise process can be expressed as in-phase and quadric components of it. 6M

c) Define average noise figure and derive a mathematical expression for it. 3M

10. Develop a mathematical model of narrow band noise and explain its related properties. 15M

**Hall Ticket No. :** **Question Paper Code :AEC11T04**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## DIGITAL LOGIC DESIGN

**(Common to Computer Science and Engineering, Information Technology, Electrical and Electronics Engineering 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**

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**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | Convert the following numbers<br>i) $(11011.101)_2$ to decimal<br>ii) $(163.875)_{10}$ to binary<br>iii) $(110101.101010)_2$ to octal<br>iv) $(4057.06)_8$ to decimal | 7M |
| | b) | Design a system which accepts four inputs a,b,c and d and outputs a '1' whenever the least significant input or the most significant input goes high. Write the truth table. | 8M |
| 2. | a) | Each of the following numbers is correct in at least one number system. Determine the possible bases of the numbers for each of the operation.<br>i) 3250-72532 = -69282<br>ii) 41/3 = 13<br>iii) 302/20 = 12.1<br>iv) 1234+5432 = 6666 | 7M |
| | b) | Realize the X-OR function using only (i) NAND logic and (ii) NOR logic | 8M |

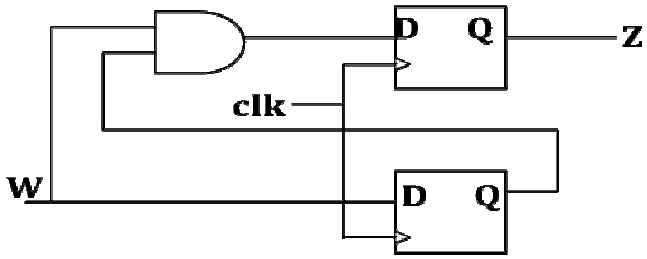
**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | Identify all the prime implicants and essential prime implicants of the following functions using karnaugh map. F(A,B,C,D) = ∑(0,1,2,5,6,7,8,9,10,13,14,15) | 9M |
| | b) | Construct a 4 to 16 line decoder using 2 to 4 line decoders | 6M |
| 4. | a) | Find all the prime implicants of the function F(A,B,C,D) =∑(4,7,9,11,12,13,14,15) using Quine-McCluskey algorithm | 9M |
| | b) | Configure a 16 to 1 multiplexer using 4 to 1 multiplexer which is having an active high enable | 6M |

**Unit - 3**

| | | | |
|---|---|---|---|
| 5. | a) | Construct JK flip flop and T flip flop using D flip flop. Give truth table | 7M |
| | b) | Draw a 4 bit Johnson counter using D flip flop. Write the truth table if the input in reset to zero state. Also write the minimum decoding logic used. | 8M |

6. a) Design Mod 13 ripple counter using JK flip flops. Draw the timing diagram 7M
   b) Construct transition table, state table and state diagram for the circuit shown. Determine the sequence obtained if input w varies as 10110110 8M

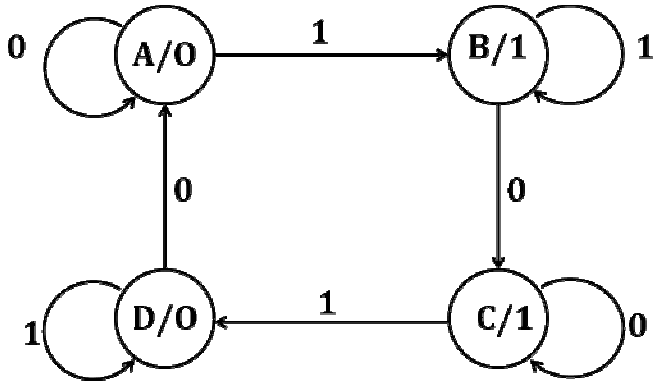



**Unit – 4**

7. a) Draw the logic diagram of a RAM memory cell and explain 8M
   b) Implement the following functions using a PLA. 7M
   $f_1(x\,y\,z) = \Sigma m(0,1,3,4)$ *and* $f_2(x,y,z) = \Sigma m(1,2,3,4,5)$
8. a) A RAM chip has a capacity of 1 k x 4 bits. Construct at 4k x 4 RAM and 1 k x 8 RAM 7M
   b) Given a 11 bit data word 10101101011, generate a 15 bit. Hamming code. Explain how you would determine if any error. 8M

**Unit – 5**

9. a) Draw the ASM chart for a Mod 8 up-down counter 7M
   b) Design a Hazard fine circuit for the expression $f = x_1\,x_2 + \overline{x_1}\,x_3$ 8M
10. a) Explain the difference between state diagram and ASM chart with explain. 7M
   b) Given state diagram, determine the flow table, state assignment table, next state and output expression. 8M



**Hall Ticket No. :** **Question Paper Code :AEC11T05**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## ELECTRONIC DEVICES AND CIRCUITS

**(Common to Computer Science and Engineering and Information Technology )**

**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**

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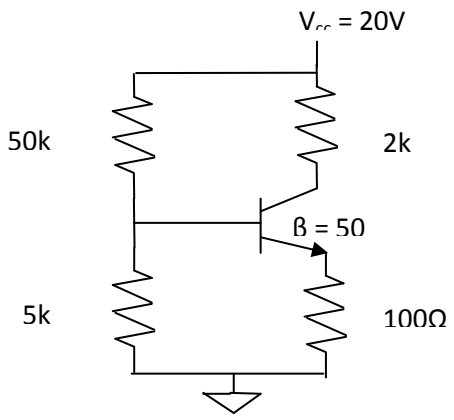
**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | Draw diode equivalent circuits and explain | 6M |
| | b) | Explain the effect of temperature on PN junction diode characteristics | 5M |
| | c) | Define diffusion and transition capacitances | 4M |
| 2. | a) | Explain tunnel diode operation with the help of energy band diagrams | 5M |
| | b) | A230V 60Hz voltage is applied to the primary of step down center tapped transformer used in a FWR having a load of 900Ω. If the diode resistance and secondary coil resistance together has a resistance of 100Ω. Determine<br>i) DC Voltage across the load<br>ii) DC current flowing through the load<br>iii) DC power delivered to the load<br>iv) PIV across each diode<br>v) Ripple Voltage and frequency | 10M |

**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | Describe the functioning of BJT in common base configuration. Draw input and output characteristics | 7M |
| | b) | The reverse saturation current in transistor is 8μA. If the transistor common base current gain is 0.979, Calculate the collector and emitter current for 40μA base current | 8M |
| 4. | a) | Discuss about bias compensation methods | 7M |
| | b) | Derive expression for stability factor of voltage divider bias circuit. Find out the stability factor for the circuit given below. | 8M |



**Unit – 3**

5. a) Draw the hybrid model for a CB transistor and write the equations for input voltage and output current. 7M

   b) A transistor amplifier is connected in CE configuration and the h parameters are given by 8M
   $h_{ie}$ = 1K$\Omega$ , $h_{fe}$ = 50, $h_{re}$ = 2 x $10^{-4}$, $h_{oe}$ = 25 x $10^{-6}$ A/V. compute $A_I$, $A_V$, $Z_I$, $Z_O$ if $R_L$ = $R_S$ = 2.2K$\Omega$ .

6. a) Compare CB, CE and CC configurations with respect to 7M
   i) Current gain
   ii) Voltage gain
   iii) Input resistance and
   iv) Output resistance

   b) Draw the circuit of a CE transistor configuration and give its h – parameter model. Using the model obtained the expressions for 8M
   i) Ai
   ii) Av
   iii) Zi
   iv) Zo

**Unit – 4**

7. a) When the help of a neat diagram explain the operation of n channel depletion type MOSFET. 7M

   b) For JFET if Idss=50mA, Vgs(off) = -5v and gmo=4ms or mA/V. Determine the transconductance for Vgs = -4V and also find $I_D$ at this point. 8M

8. a) Define pinch off voltage in a JFET. Explain how to use JFET as a switch 7M

   b) Draw a neat diagram for common source JFET amplifier with bypassed Rs. Derive expressions for Zi, Zo and Av. 8M

**Unit – 5**

9. a) List the advantages of negative feedback 5M

   b) What are the four categories of feedback amplifier? Mention the output signal, feedback signal, transfer ratio and feedback factor for each of the four categories. 10M

10. a) State and briefly explain Barkhausen Criterion for oscillation. 5M

    b) The following data are available for the Copitts oscillator 8M
    $C_1$=1nF, $C_2$ =99nF, L = 1.5mH, Cc = 10 $\mu$ F, $h_{fe}$ = 110
    i) Calculate the frequency of oscillation
    ii) Check to make sure that the condition for oscillation is satisfied

    c) List any two advantages of Crystal oscillator 2M

**Hall Ticket No. :** **Question Paper Code :AEE11T03**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## NETWORK ANALYSIS

**(Electrical and Electronics 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**

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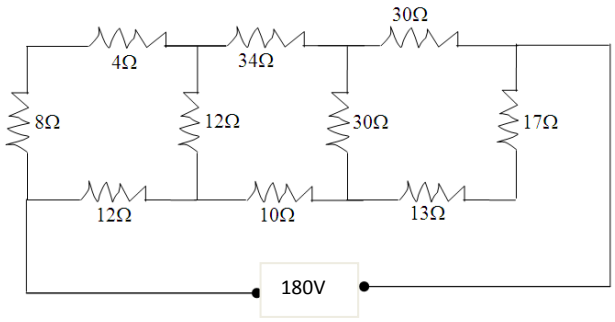
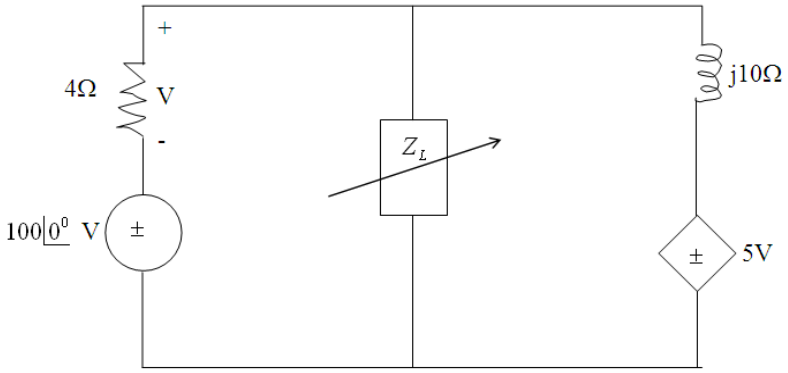
**Unit - 1**

1. a) State and explain Thevenin's theorem 7M
   b) Find the current in the 10 Ω resister using Thevenin's theorem in the circuit shown in figure. 8M

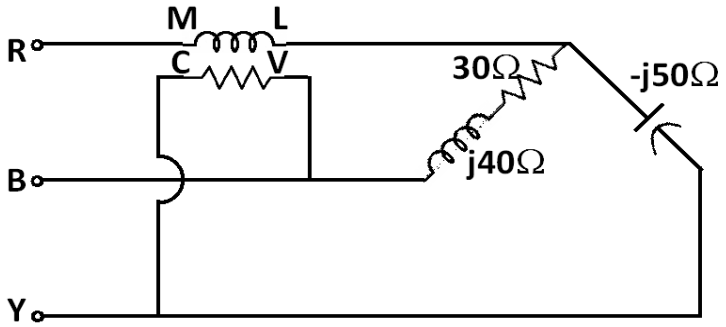



2. a) State and explain Maximum Power Transfer theorem for an A.C. exited circuit 7M
   b) Determine the values of $Z_L$ for maximum power in the circuit shown in 8M




**Unit – 2**

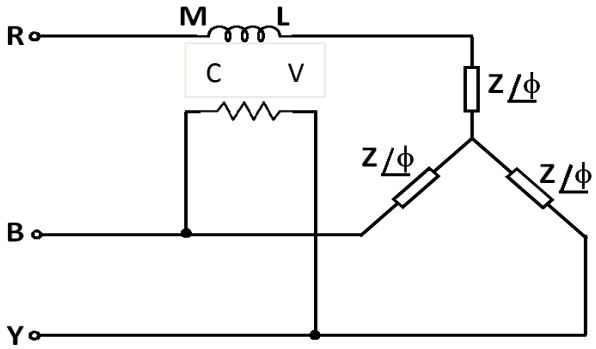
3. a) Find the reading of the wattmeter in the circuit shown in figure. Assume a symmetrical 400V supply with RYB phase sequence 7M




b) Three impedances 20 Ω, j20 Ω, and -j20 Ω are connected in star across a 3 phase , 400 V supply. Determine 8M
i) Line currents
ii) Power supplied from source phase sequence RYB.

4. a) Three coils each having resistance and inductance of 8Ω and 0.02 H, respectively, are connected in star across a 3 phase , 230V, 50 Hz supply. Calculate the Line current, power factor, power , reactive volt amperes and total volt amperes(VA). 7M

b) What will be reading of the wattmeter if it is connected to a 3 phase supply as shown in figure and also find the expression for reactive power. 8M




**Unit - 3**

5. a) Derive an expression for a transient current in R-L series circuit, excited with a D.C. voltage of V volts, connected through a switch S 7M

b) A coil of resistance 20Ω and inductance 0.5 H is switched on to a direct current 200 V supply. Calculate the rate of change of the current 8M
i) at the instant of closing the switch and
ii) when t = L / R. Find also the steady state value of the current

6. Derive an expression for a.c. transient current in case of RLC series circuit excited with an a.c. voltage of V cos(wt + θ) with usual notations. 15M

**Unit – 4**

7. a) Explain with mathematical support how an image impedance of a T-netwok can easily be obtained by measuring the open circuit impedance and short circuit impedance. 8M

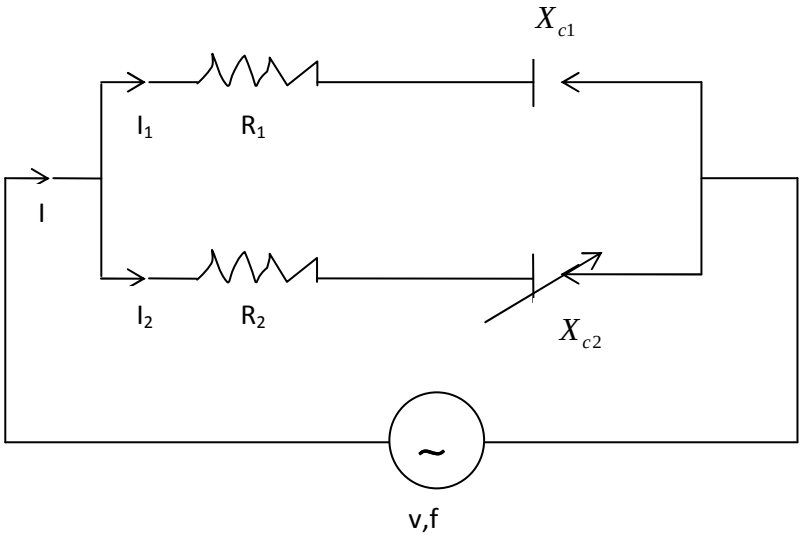
b) A high pass filter has a cut of frequency of 8 KHz and nominal impedance of 600 Ω. Calculate the values of inductance and capacitance used in the filter 7M

8. a) Explain a T- type attenuator 7M

b) Design a T- type attenuator to give an attenuation of 60 dB and to work in a line of 500 Ω impedance. 8M

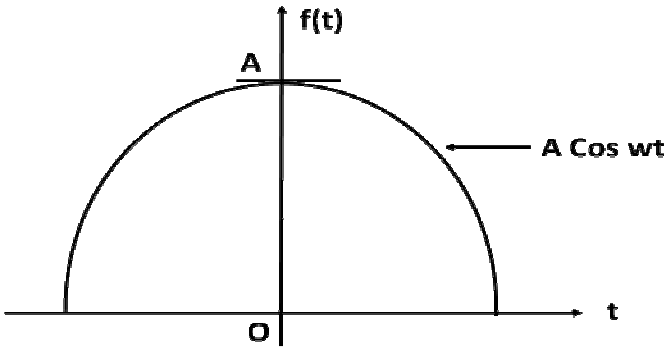
**Unit – 5**

9. a) Draw the locus of $I_2$ and I for the parallel circuit shown in figure. 7M




b) In a R-C series circuit with R fixed and $X_c$ variable, draw the locus of the current and explain. 8M

10. a) Find the Fourier transform of the pulse shown in fig 10 (a) 8M




b) State and prove the following properties of Fourier Series: 7M
i) Time shift property
ii) Scaling property

**Hall Ticket No. :** **Question Paper Code :AEE11T04**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## DC MACHINES

**(Electrical and Electronics 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**

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**Unit - 1**

1. a) Explain the concept of Energy balance in electromechanical conversion system. 7M
   b) The self and mutual inductances of the two exciting coils of a multiple excited translatory system are 8M

$$L_{11} = L_{22} = 4/1+2x,\ L_{21} = L_{12} = 2/1+2x$$

Calculate the time average force and coil currents at x=0.5 m, when the coils are connected in parallel across a voltage source of 120 cos314t.

2. a) Derive the relation for magnetic stored energy in terms of reluctance in a singly excited systems. 7M
   b) Two parallel plates of each of area $2m^2$ are separated by a distance "g". The electric field intensity between plates is $5X10^6$/m, a value equal to break down strength of the air. Find the force between two plates using both energy and co-energy methods. 8M

**Unit – 2**

3. a) Explain armature reaction in a DC generator and what are the methods to reduce its effects? 7M
   b) A 4 pole wave wound DC generator has 880 conductors and supplies a load current of 120A. The brushes are displaced by 3 mechanical degrees from the geometrical axis. Calculate 8M
      i. Demagnetizing amp-turns/pole
      ii. Cross magnetizing amp-turns/pole
4. a) Explain the process of commutation in a DC generator. What are the methods to improve commutation. 8M
   b) An 8-pole lap-wound DC generator has 120 armature slots. The useful flux per pole is 40mWb and the number of conductors per slot is 4, calculate the speed of the generator to give 230V on open circuit. If the voltage drops to 220V on full load and if each conductor can carry 240A, find the power output of generator. 7M

Unit - 3

5. a) Explain the manner in which the terminal voltage of a DC shunt generator will vary when the load resistance is reduced steadily from infinite to zero. The speed is maintained constant and field excitation remains unaltered. 8M
   b) Two shunt generators when running in parallel with no-load voltage of 120 volts. Generator-I is rated at 250 Kwatts and its full load voltage is 115volts. Generator-II is rated at 200 KW at 112 volts. If the load supplied is 3600Amps, calculate the bus bar voltage and output of each generator. 7M

6. a) What is the need to operate DC generators in parallel? Explain the process of 8M

paralleling two DC compound generators.

b) A 100 KW, 250 volt DC shunt generator has 4-pole, lap connected armature with 280 conductors. The generator is rewound to form two armature circuits with wave connected armature for the same number of conductors. Calculate the new rating of machine for voltage, output current and power if the speed and flux/pole remain as before neglecting shunt field current. 7M

Unit – 4

7. a) Explain all the possible methods of speed control of DC shunt and series motors. 8M

b) A 220 volt shunt motor develops a total torque of 100 N-m and takes 31 Amps at 600 rpm. The armature,shunt field and series field resistances are 0.3ohm, 220ohm and 0.03ohm respectively. If the speed is to be increased from 800 rpm,determine the percentage reduction in field flux and additional resistance to be inserted in the field winding. Torque developed by the motor at 800rpm is 70 N-m. 7M

8. a) What is the need for a starter for a DC motor? Mention the various protective devices and their role in DC shunt motor starter. 8M

b) A 240 volt,40 Amp,1000 rpm DC shunt motor has an armature resistance of 0.5 ohm. If the load torque is reduced by 75% of its full load value and a resistance of 2.5 ohm is inserted in series with armature circuit, find the motor speed. Armature reaction has weakened the field flux by 4 % at full load and 3 % at 75 % of full load. 7M

**Unit – 5**

9. a) Explain the method of testing two similar DC shunt machines with a neat circuit. 7M

b) Calculate the efficiency of a 500 volt Shunt motor when it draws a current of 700 Amps from supply. Voltage drop in the armature winding is 15 volts, armature current 510 Amps, field current 9 Amps at normal voltage at standstill. When motor running at normal speed, the armature current is 22.5 Amps, applied voltage is 550 volts; the brush contact drop is 2 volts and 1 % of the rated output of 400 Kwatts for stray load losses. 8M

10. a) What are the various losses in DC machines and what proportion they occupy in full load losses. Obtain the condition for maximum efficiency and maximum power output. 8M

b) Field's test on two mechanically coupled identical DC series machines gave the following test results. 7M

Motor : Armature voltage =220 volts ; Armature current = 35 Amps.
Voltage drop across field winding = 10 volts

Generator: Armature voltage =160 volts ; Armature current = 25 Amps.
Voltage drop across field winding = 10 volts

Armature resistance of each machine is 0.4 ohms. Calculate the efficiency of each machine.

**Hall Ticket No. :** **Question Paper Code :AEE11T05**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## ELEMENTS OF ELECTRICAL ENGINEERING

**(Common to Computer Science and Engineering and Information Technology)**

**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**

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**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | State and explain Thevinin's theorem | 7M |
| | b) | Three equal star connected inductive coils take 9 kw at a power factor of 0.8 lag when connected to 960V, 3 phase supply. Find per phase load resistance and inductance. | 8M |
| 2. | a) | Deduce the relationship between line current and phase current in a 3 phase delta connected balanced load with the help of a phasor diagram. | 7M |
| | b) | State and explain maximum power transfer theorem. | 8M |

**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | Explain how the speed of a DC Shunt motor is controlled? | 8M |
| | b) | A shunt generator has an induced voltage on open circuit of 127 Volts. When the machine is on load the terminal voltage is 120 Volts. Find the load current if the field circuit resistance be 15Ω and armature resistance be 0.02Ω. Ignore armature reaction. | 7M |
| 4. | a) | Derive the expression for EMF generated in a DC Generator. | 10M |
| | b) | The armature of a 4-pole shunt motor has a lap winding accommodated in 60 slots, each containing 20 conductors. If the useful flux per pole be 23mwb, calculate the total torque developed when the armature current is 50 A? | 5M |

**Unit - 3**

| | | | |
|---|---|---|---|
| 5. | a) | How is efficiency and regulation of a transformer calculated. Explain | 7M |
| | b) | Find the efficiency of 150 KVA transformer at 25%, 33% and 100% at unity power factor, if the copper loss is 1600 watt at full load and the iron loss is 1400 watt. | 8M |
| 6. | a) | Explain with circuit diagram how Open Circuit test is conducted on a transformer and what are the parameters obtained through this test. | 7M |
| | b) | A 40 KVA transformer with a ratio of 2000/250 V has a primary resistance of 1.15 Ω and a secondary resistance of 0.0155 Ω. Calculate (a) the total resistance in terms of the secondary winding, (b) the total resistance drop on full load, and (c) the total copper loss on full-load. | 8M |

**Unit – 4**

| | | | |
|---|---|---|---|
| 7. | a) | Explain the construction and working principle of a capacitor start induction motor and draw the torque – speed characteristic | 8M |
| | b) | In a 3 phase induction motor show that $P_2:P_m:P_c=1:1-s:s$ | 7M |
| 8. | a) | With a neat diagram describe an auto transformer starter | 8M |
| | b) | Draw the torque – speed characteristics of 3 phase induction motor. How does the characteristics modify if resistance in the rotor circuit is increased | 7M |

**Unit – 5**

| | | | |
|---|---|---|---|
| 9. | a) | Explain how the regulation of an alternator is determined? | 8M |
| | b) | Find the number of armature conductors per phase in a star-connected 3-phase, 50Hz, | 7M |

10-pole alternator with 90 slots. The winding is to be star connected to give a line voltage of 11000 Volts. The flux per pole is 0.16 webers.

10. a) Explain different methods of starting synchronous motor. 8M

b) The effective resistance of a 2200 V, 50 Hz, 440 KVA single phase alternator is 0.5 ohms. On short circuit a field current of 40 A gives the full-load current of 200 A. The emf on open circuit with the same field excitation is 1160 Volts. 7M

**Hall Ticket No. :** **Question Paper Code :AEE11T06**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## PRINCIPLES OF ELECTRICAL 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**

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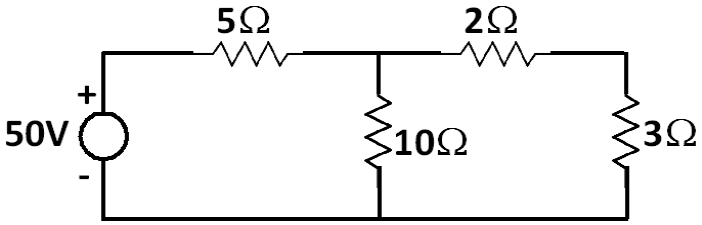
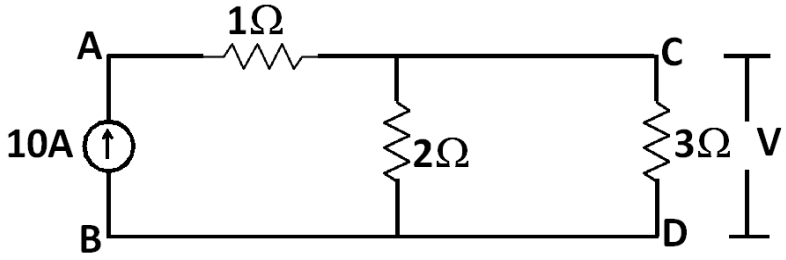
**Unit - 1**

1. a) State and Explain Superposition Theorem 7M
   b) Use Thevenins Theorem to find the current in 3Ω resistor in fig 1(b) 8M

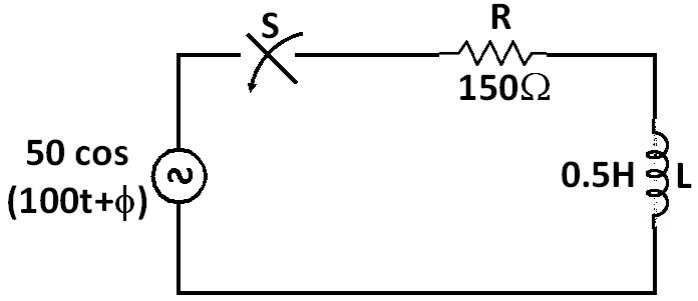



2. a) State and Explain Norton's Theorem 8M
   b) Verify the Reciprocity theorem for the network shown in fig 2(b) 7M

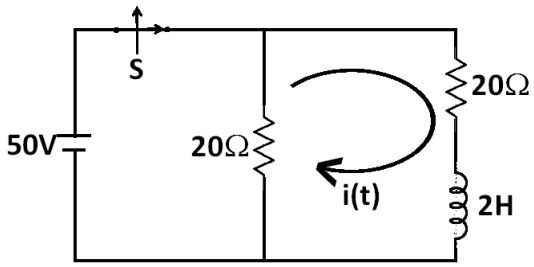



**Unit – 2**

3. a) Derive the expressions for DC transient 8M
   i) Response of an R-C circuit in series
   ii) Voltage across the resistor and capacitor and corresponding curves in voltage versus Time Constant graph
   b) The circuit shown in fig 3(b) consists of series RL elements with R=150Ω and L=0.5H. 7M
   The switch is closed when t=0, determine the resultant current when Voltage V=50cos (100t+Φ) is applied to the circuit at $\Phi=30^0$.



4. a) Derive the expression for ac transient response of RL series circuit? 6M
   b) For the current shown in fig 4(b), find the current equation when the switch is opened at t=0 9M




**Unit – 3**

5. a) Derive an expression for emf induced in a DC generator 7M
   b) A 4 pole 220V, lap connected DC shunt motor has 36 slots, each slot containing 16 conductors. It draws 40A from the supply. The field resistance and armature resistance are 110Ω and 0.1Ω respectively. The motor develops and output power of 6 KW. The flux per pole is 40mwb. Calculate 8M
   i) Speed ii) Torque developed by the armature
   iii) shaft torque iv) Rotational loses and
   v) lost torque

6. a) Define Armature reaction? Briefly explain demagneting effect and cross magnetizing effect in a DC machines 7M
   b) The armature resistance of 25HP, 250V series motor is 0.2 Ω and series field resistance is 0.05 ohm. When it takes 80 amps, speed is 600 rpm. Find the speed when the current is 50 amp (1HP=746W). 8M

**Unit – 4**

7. a) Derive the EMF equation of a single phase transformer? 8M
   b) A single phase transformer with a ratio of 440/110V takes a no-load current of 5A at 0.2 p.f. lagging. If secondary supplies a current of 120 A at a p.f. of 0.8 lagging, estimate the current taken by the primary 7M
8. a) Derive the condition for maximum efficiency of a single phase transformer? 7M
   b) From the following data of a 500 KVA, 3300/400V, 50Hz single phase transformer, calculate the full load regulation and efficiency at a p.f. of 0.8 (lag). 8M
   S.C Test: 1250W, 100V – secondary S.C with full load current in it.
   O.C Test: 1000W - with normal primary voltage

**Unit – 5**

9. a) Explain the principle of operation of a three phase induction motor? 8M
   b) Rotor emf of a three phase, 6 pole, 400V, 50Hz induction motor alternates at 3Hz. Compute the speed and percentage slip of the motor. Find the rotor copper loss per phase if full load input to the rotor is 111.9 KW. 7M
10. a) Explain the method of starting of a three phase induction motor with star/delta starter?. 8M
    b) A three phase induction motor is wound for 4 poles and is supplied from 50Hz system Calculate 7M
    i) The synchronous speed
    ii) The rotor speed when slip is 4% and
    iii) Rotor frequency when rotor runs at 600rpm

**Hall Ticket No. :** **Question Paper Code :AHS11T02**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations - 2013

**(Regulations: VCE-R11)**

## MANAGERIAL ECONOMICS AND FINANCIAL ANALYSIS

**(Common for Computer Science and Engineering, Information Technology, Electrical and Electronics Engineering, 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**

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**Unit – 1**

1. Demand moves in opposite direction as result change in price. Explain the concept invocating demand function and law of demand. Why demand curve slope downwards? 15M

2. Demand forecasting is essential for a firm to enable it to produce the required quantities at right time. In the light of the above statement explain any four methods of demand forecasting used by modern organizations. 15M

**Unit – 2**

3. Various combinations of two inputs yield the same output at a given time. Explain Using the concept of Iso-Quants or equal product curves. What are the characteristics of Iso-Quants? 15M

4. The following data is obtained from the records of M/S ABC&Co, 15M

| | **Period 1** | **Period 2** |
|---|---|---|
| | **Rs.** | **Rs.** |
| Sales | 6, 50,000 | 8, 50,000 |
| Profit | 1,00,000 | 1,75,000 |

Calculate

i. P/V Ratio
ii. Break even sales
iii. Sales required to earn a profit of Rs. 2,00,000
iv. Profit when sales are Rs. 10.00.000
v. Margin of Safety for Period 2

**Unit - 3**

5. Explain the equilibrium of a firm by using Total Cost and Total Revenue curves or Break Even Point. 15M

6. Explain the determination price and output under Perfect Competition. 15M

**Unit – 4**

7. A firm whose cost of capital is 10% is considering two mutually exclusive projects X and Y, the details are given below. 15M

| | Project X Rs. | Project Y Rs. |
|---|---|---|
| **Investment** | 70,000 | 70,000 |
| **Cash inflows** | | |
| **1 year** | 10,000 | 50,000 |
| **2 year** | 20,000 | 40,000 |
| **3 year** | 30,000 | 20,000 |
| **4 year** | 45,000 | 10,000 |
| **5 year** | 60,000 | 10,000 |

Compute Net present Value for both the projects at 10% discount rate. Which one will you choose under NPV method?
(The PV factors @ 10% are 1year – 0.909, 2 year – 0.826, 3 year-0.751, 4 year – 0.683, 5 year – 0.621.)

8. A project requires an initial investment of Rs.4,00,000 and the cash inflow are given below. 15M

| Year | Cash inflow Rs. |
|---|---|
| 1 | 80,000 |
| 2 | 1,00,000 |
| 3 | 1,20,000 |
| 4 | 1,50,000 |
| 5 | 90,000 |

Calculate
   i. Pay back period
   ii. Net present Value if the cost of capital is 10% taking the PV factors given in Q.No.7 above.

**Unit – 5**

9. How profitability and solvency ratios used for performance evaluation of a corporate entity. 15M

10. From the following data compute EPS and P/E ratios 15M

   i. Net profit before tax Rs. 400000
   ii. Tax @ 40 % of net profit
   iii. 5% preference shares of Rs. 100 each Rs. 100000
   iv. Equity shares Rs. 400000 face value Rs. 10
   v. Market price per share Rs. 150.

**Hall Ticket No. :** **Question Paper Code :AME11T02**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## MACHANICS OF SOLIDS

**(Common to 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**

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Unit - 1

1. a) With a neat sketch explain the stress-stain diagram for ductile materials by indicating the salient points. 7M

   b) A steel bolt of 20mm diameter is passed through a brass tube having internal diameter of 20mm and external diameter of 30mm. Both the brass tube and the steel bolt are kept at a temperature of $10^0$C and at this condition, the nut and the bolt are tightened on to the tube so that stress in the tube is 12MN/m$^2$. What will be loads and the stress in the bolt and tube if both are heated to a temperature of $120^0$C? Take coefficient of thermal expansion of brass = $20.39*10^{-6}$ per $^0$C and the coefficient of expansion of steel =$12*10^{-6}$ per $^0$C. Young's modulus for brass and steel are 80GN/m$^2$ and 200 GN/m$^2$ respectively. (Consider the bolt as if it is solid throughout). 8M

2. a) Define volumetric strain and derive volumetric strain for a cube, cylinder and sphere. 7M

   b) Derive the relation between Young's modulus E, rigidity modulus C and bulk modulus K. 5M

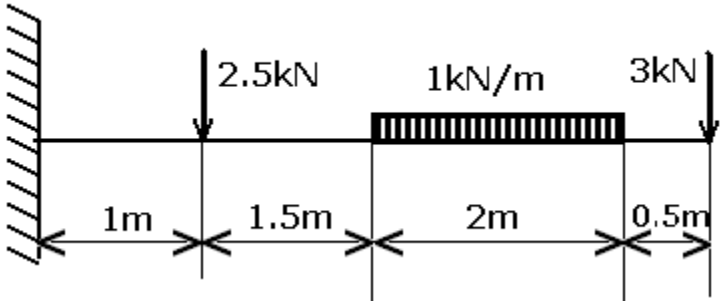
   c) Define Poisson's ratio and strain energy. Write the expression for strain energy. 3M

**Unit – 2**

3. a) Determine and draw the shear force and bending moments of a cantilever of length l carrying a concentrated load W at a free end. 7M

   b) Determine and draw the shear force and bending moments of a cantilever of length "l" carrying a UDL 'w' per unit run over the whole length and concentrated load "W" at the free end. 8M

4. Draw shear force and bending moment diagrams for the cantilever beam shown in the figure below. 15M



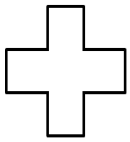
**Unit - 3**

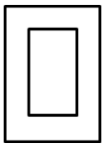
5. a) Derive Euler-Bernoulli equation for bending of beams and indicate the assumption involved. 8M

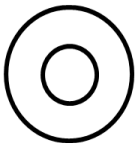
   b) An uniformly distributed load of 40kN/m is acting along the transverse direction of a simply supported beam of length 1m with rectangular cross section. If the breadth is 20cm and allowable max stress is 200Mpa determine the depth of the beam. 7M

6. a) Find shear stress at neutral axis in a cantilever beam having point load F at free end for the different cross section given below. 9M
   Circle with radius R
   Rectangle with breadth B, depth D

   b) Sketch the shear stress distribution diagram for shown cross sections below of cantilever beam, with a point load at the free end. 6M

   i. 

   ii. 

   iii. 

**Unit – 4**

7. Explain the method of resolution in determination of reaction forces with an example. Give the limitations. 15M

8. A beam section is 10m long and is simply supported at the ends. It carries concentrated load of 100kN and 60kN at distances of 2m and 5m respectively from the left end. Calculate the deflection under each load. Find also the maximum deflection. Take I = 18 x $10^8$ $mm^4$ and E = 200 GPa. 15M

**Unit – 5**

9. a) Derive expression for longitudinal and hoop stress for thin seamless cylinder subjected to internal pressure. 10M

   b) A seam less pipe 800 mm diameter contains a fluid under pressure of 2N/$mm^2$, find the maximum thickness of the pipe. 5M

10. a) A thin cylinder of internal diameter 60mm and wall thickness 2 mm is subjected to an internal pressure of 1.25N/$mm^2$. The cylinder is also subjected to a torque of 60Nm. The axis of the torque coinciding with that of cylinder. Find the principal stresses and the maximum shear stress at a point on the surface of the cylinder.

    b) What are hoop and circumferential stresses?

**Hall Ticket No. :** **Question Paper Code :AME11T03**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## MACHANICS OF FLUIDS

**(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**

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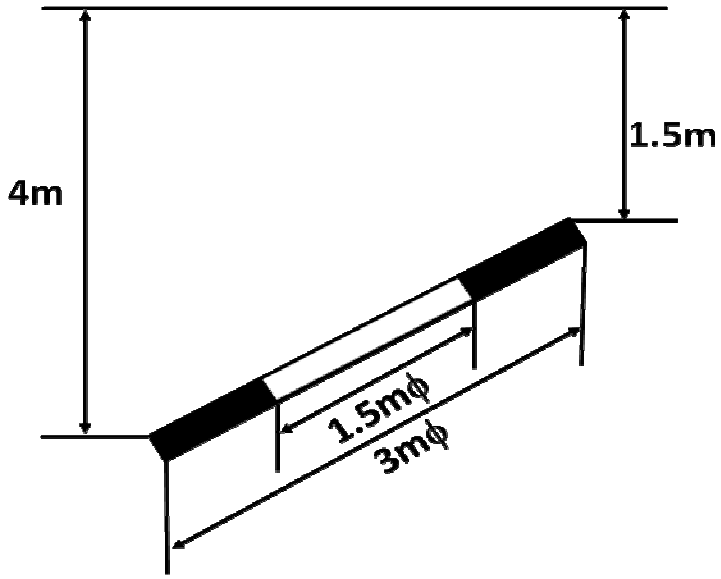
**Unit - 1**

1. a) Explain the following terms: 7M
   i) Viscosity of Fluid
   ii) Relative Denisty of Fluid
   b) Classify the fluids A and B for which following values of deformation rate and shear stress are obtained experimentally 8M

| **Shear stress N/m$^2$** | 0 | 100 | 200 | 300 | 400 |
|---|---|---|---|---|---|
| **Deformation Rate S$^{-1}$** | | | | | |
| **Fluid A du/dy** | 0 | 0.3 | 0.6 | 0.9 | 1.2 |
| **Fluid B du/dy** | 0 | 54.8 | 77.5 | 94.9 | 109.5 |

2. a) What is Barometer? What is measured using Barometer? Which fluid is preferred to use in Barometer? Why give reasons? 7M
   b) A thin circular plate of 3m diameter having a hole of 1.5m diameter is immersed in water in such a way, that its greatest and least depth below the free surface is 4m and 1.5m respectively. Determine the total pressure on upper face of the plate and position of C.P. 8M




Unit – 2

3. a) Derive a 3D expression continuity equation for Cartesian coordinate system. 7M
   b) Oil of specific gravity 0.9 and viscosity 1 poise is pumped through a 5cm diameter pipe 8M

at the rate of 280 litre/min. Show that the flow is streamline and hence estimate the power required to pump oil up through a pipe line 75m long which rises 7.5m over this length.

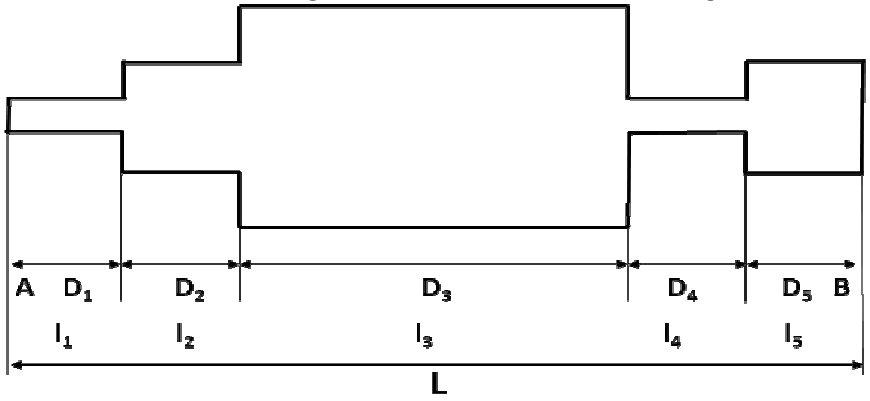
4. a) A cylindrical vessel with vertical axis contains a liquid with free surface. If the liquid rotates as a forced vortex, derive a relation between height of the liquid surface and radius at any point. 7M

   b) If the vessel is 90cm in diameter and 60cm height with an open top and if initially three quarter full of liquid. Calculate the speed at which (i) liquid commences to spill (ii) liquid surface reaches the bottom of the vessel, what volume of liquid will be spilt in the later case. 8M

Unit - 3

5. a) Discuss the relative merits and demerits of Venturimeter with respect to orifice meter. 7M

   b) Derive an expression for equivalent length and equivalent diameter connecting 5 pipes in series with different lengths and diameters as shown in fig. 8M




6. a) A 0.3 m diameter main is required for a town water supply. As pipes over 250mm diameter are not readily available, it was decided to lay two parallel mains of the same diameter. Find the diameter of the parallel pipes which will have the combined discharge equal to the single pipe. Adopt the same friction co-efficient. 7M

   b) A venturimeter is used in a 300 mm diameter pipe to measure the follow. The contraction co-efficient is 0.98. Calculate the rate of flow of water when the pressure difference between inlet and throat is 3m of water. The throat diameter is half of the diameter of pipe. 8M

Unit – 4

7. a) A box shaped truck body 2.5m wide, 3 m high and 7 m long is traveling at 20 m/s in 20°C air. Calculate the contributions to the total drag of truck from sides and top of the truck body. Assume that a sheet metal seam near the leading edge of each panel causes the boundary layer to be turbulent for the full length of the panel. Also find the wall shear stress and boundary layer thickness along the top panel and the maximum value of the wall shear stress and boundary layer thickness on this panel. 8M

   b) An air ship 10 m diameter and 90 m long travels through still air at 30 m/s. By treating the cylindrical surface of the air ship as a flat plate rolled up and exposed to one side. Calculate the power absorbed as skin friction. Take density = 1.20 kg/$m^3$ and dynamic viscosity = 1.8 x $10^{-5}$ N-s/$m^2$. Assume boundary layer as turbulent. 7M

8. a) A smooth flat plate 1.5m long, 30 cm wide is placed in a stream of air at 8 m/s. Calculate (i) thickness of boundary layer and displacement thickness at the edge of the plate (ii) skin friction drag force and average value of $C_f$. assume laminar flow and third degree velocity profile $\frac{u}{u_\infty}=\frac{3y}{2\delta}-1/2(\frac{y}{\delta})^3$ in boundary layer. Density of air = 1.23 7M

kg/$m^3$, kinematic viscosity = $15x10^{-6}$ $m^2$/s.

b) Air at 40°C flow past a flat plate of length 8m at a velocity of 10 m/s, the plate width is 1.5m. Assuming that air flows over only on one side of the plate, calculate the force required to hold the plate stationary accounting for laminar flow near the leading edge, given at 40°C, kinematic viscosity = 17 x $10^{-6}$ $m^2$/s, density : 1.13 kg/$m^3$. 8M

**Unit – 5**

9. a) Define stagnation enthalpy and stagnation temperature, do these quantities define stagnation state. Argon is stored in a reservoir at 300 K, determine stagnation enthalpy and velocity of sound in it. γ = 1.658 and the molecular weight of argon is 39.94. 7M

b) Define Mach angle, explain with suitable sketches propagation of sound waves in a subsonic, sonic and supersonic flows. 8M

10. a) Compare the final values of the pressure in a duct generated by sudden closure of the exit valve with (i) hydrogen, γ = 1.4, R = 4125 J/kgK (ii) air γ = 1.4, R = 287 J/kgK (iii) Freon γ = 1.2, R = 135 J/kgK. The initial flow conditions in each case are pressure 10 bar, temperature 400K and velocity 100 m/s. 7M

b) Air ($C_p$ = 1.05 kJ/kgK, γ = 1.38) at a pressure 3 bar and temperature 500K flows with a velocity 200 m/s in a 30 cm diameter duct. Calculate (i) mass flow rate (ii) stagnation temperature (iii) Mach number (iv) stagnation pressure. 8M

**Hall Ticket No. :** **Question Paper Code :AME11T04**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations January - 2013

**(Regulations: VCE-R11)**

## THEROMDYNAMICS

**(Common to 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**
**Note: Steam tables are to be provided**

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**Unit - 1**

1. a) Differentiate between the following 7M
   i) Macroscopic and Microscopic approach.
   ii) Path and point functions.
   iii) Reversible and irreversible process.
   b) The equation $R_t = R_o[1+\alpha t]$ is used for a resistance thermometer in which $R_t$ and $R_o$ are the resistance values at $t^oC$ and $0^0C$ respectively. The thermometer is calibrated by immersing in boiling water ($100^oC$) and boiling sulphur ($445^oC$) and the indicated resistance values are $14.7\Omega$ and $29.2\Omega$ respectively. Determine fluid temperature when resistance thermometer reads 25 $\Omega$. 8M

2. a) A person picks up a package, walks with it for a distance and then places it on a table. Discuss the concept of work for these actions. 7M
   b) Explain whether the heat and work are positive, negative or zero in the following systems which are specified by underline. 8M
   i) Current flows through a <u>resistor</u> immersed in water.
   ii) Rise of mercury column in a <u>thermometer</u>.
   iii) <u>One kg of air</u> flows adiabatically from the atmosphere into an evacuated bottle.
   iv) <u>1kg of gas</u> contained in an insulated cylinder expands moving the piston outwards.

**Unit – 2**

3. a) Show that the efficiency of a reversible heat engine is always higher then any other engine when operating between same temperature limits. 7M
   b) The thermal efficiency of three real heat engines which are in series is same. A source at 1175 K supplies 2250 kJ of heat to the first engine and the third heat engine 280 kg of heat to a sink at 145 K. Determine work output from each engine. 8M

4. a) Explain the reason, why a heat engine has to exchange heat with two thermal reservoirs to produce net work in a thermodynamic cycle 5M
   b) State and explain entropy principle 5M
   c) One kg of superheated steam at 0.2 MPa and $200^oC$ contained in a piston cylinder machine is kept at ambient conditions of 300 K till the steam is condensed to saturated liquid at constant pressure. Calculate change in entropy of the universe. 5M

**Unit - 3**

5. a) Explain (Pressure – Temperature) P – T diagram for a pure substance and triple point. 7M
   b) 1000 kg of a steam at a pressure of 16 bar and 0.9 dry is generated by a boiler per 8M

hour. The steam passes through a superheater via boiler stop valve where its temperature is raised to $380^0$C. If the temperature of feed water is $30^0$C, determine: (i) The total heat supplied to feed water per hour to produce wet steam (ii) The total heat absorbed per hour in the superheater Take specific heat for superheated steam as 2.2 KJ/kg K.

6. a) Explain the process of steam generation at constant pressure with the help of T – S diagram 7M
   b) One kg of $CO_2$ has a volume of 1 $m^3$ at $100^0$C compute the pressure by (i) Vander Waals equation (ii) perfect gas equation. 8M

**Unit – 4**

7. a) State Avogadro's hypothesis 7M
   b) 2.5 kg of $N_2$ at 15 bar and $40^0$C is contained a rigid vessel. Adequate quantity of $O_2$ is added to increase the pressure to 20 bar while the temperature remains constant at $40^0$C. Calculate the mass of $O_2$ added. 8M

8. a) Derive an expression for the enthalpy of an ideal gas. 7M
   b) An mixture of hydrogen ($H_2$) and oxygen ($O_2$) is to be made so that the ratio of $H_2$ to $O_2$ is 2 : 1 by volume. If the pressure and temperature are 1 bar and $25^0$C respectively, calculate: (i) The mass of $O_2$ required (ii) The volume of the container. 8M

**Unit – 5**

9. a) Derive an expression for air standard efficiency of dual combustion cycle 7M
   b) An engine operating on the ideal diesel cycle has compression ratio 15:1. Heat is added during constant pressure processes upto 8% of the stroke. If the engine inhales 0.05 $m^3$/s at 101 kpa and $27^0$C. Determine
   i) The maximum pressure and temperature in the cycle
   ii) Thermal efficiency and power developed 8M

10. a) An engine working on otto cycle in which salient points are 1, 2, 3 and 4 has upper and lower temperature limits $T_3$ and $T_1$. If the maximum work per kg of air is to be done,
   i) Show that the intermediate temperature is given by $T_2 = T_4 = \sqrt{T_1 T_3}$
   ii) If the engine works on Otto cycle between temperature limits 1500 K and 300 K, find the maximum power developed by the engine assuming the circulation of air per minute as 0.3 kg. 7M
   b) The stroke and cylinder diameter of a CI engine are 245 mm and 160mm respectively. If the clearance volume is 0.0005$m^3$ and fuel injection takes place at constant pressure for 5% of the stroke, determine efficiency of the engine. 8M

**Hall Ticket No. :** **Question Paper Code :AME11T05**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B. Tech III Semester Regular Examinations - 2013

**(Regulations: VCE-R11)**

## METALLURGY & MATERIAL SCIENCE

**(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**

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**Unit - 1**

| | | | |
|---|---|---|---|
| 1. | a) | Define the following terms<br>i. Unit cell<br>ii. Atomic packing factor<br>iii. Co-ordination number | 6M |
| | b) | Determine the atomic packing factor for a BCC unit cell. | 5M |
| | c) | Sketch the following crystal imperfections<br>i. Vacancy<br>ii. Interstitialcy | 4M |
| 2. | a) | What is a phase diagram? List the three types of phase diagrams. With a neat sketch illustrate a binary phase diagram. | 10M |
| | b) | Write a brief note on lever rule. | 5M |

**Unit – 2**

| | | | |
|---|---|---|---|
| 3. | a) | Draw neatly iron carbon-carbon equilibrium diagram and mention the three variant reactions involved in the phase diagram. | 10M |
| | b) | With the help of Isomorphous system phase diagram explain the lever rule. | 5M |
| 4. | a) | Write a short note on allotropy. | 5M |
| | b) | Two metals A and B have their melting points at $900^0$C and $800^0$C respectively. The alloy pair forms a eutectic at $600^0$C of composition of 60% B and 40% A. A and B have unlimited mutual liquid solubilities. Their solid solubilities are as follows:<br>10% B in A at $600^0$C and 5% B in A at $0^0$C<br>10% A in B at $600^0$C and 5% A in B at $0^0$C<br>Assume the liquids, solidus and solvus lines to be straight. No solid state reactions or any intermediate phase changes occur in the series.<br>i. Draw the phase diagram for the series and label all salient temperature, compositions and regions.<br>ii. Find the liquid and solid phase percentages in an alloy of 80% A and 20% B at $650^0$C. | 10M |

**Unit – 3**

| | | | |
|---|---|---|---|
| 5. | a) | What is the classification of steels? Explain the effect of alloying element on the steels. | 7M |
| | b) | What are the engineering applications of grey cast iron? And also explain he composition, microstructure and properties of grey cast iron. | 8M |
| 6. | a) | What is T-T-T diagram? How it is different from phase diagram? Explain. | 6M |
| | b) | Write short notes on the following with their objectives.<br>i. Normalizing<br>ii. Tempering<br>iii. Hardening | 9M |

**Unit – 4**

| | | | |
|---|---|---|---|
| 7. | a) | Mention the need for using non ferrous alloys. Write a brief note on copper and copper alloys. | 8M |
| | b) | Write explanatory notes on any two aluminum alloys. | 7M |
| 8. | a) | Define ceramics. Briefly mention the properties which make the material to be used in engineering applications. | 8M |
| | b) | Define the properties, characteristics and applications of glass material. | 7M |

**Unit – 5**

| | | | |
|---|---|---|---|
| 9. | a) | Define a composite material. How are they classified? Explain. | 8M |
| | b) | Briefly discuss the applications of composite materials. | 7M |
| 10. | a) | Sketch an explain hand layup method for processing FRP's. | 8M |
| | b) | With a neat sketch explain he stir casting route of processing MMC's. | 7M |

**Question Paper Code :AME11T06**

# VARDHAMAN COLLEGE OF ENGINEERING

**(AUTONOMOUS)**

Four Year B.Tech III Semester Regular Examinations December - 2012

**(Regulations: VCE-R11)**

## MACHINE DRAWING

**( 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**

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Unit - 1

1. Draw the schematic representation of threaded parts 15M
   a) V- threads (internal & external)
   b) Trapezoidal treads
2. Draw top and sectional front views of double riveted butt joint with double cover plates of equal width and zig-zag riveting. The thickness of the plates is 14mm. Show at least three rivets in one row and two rivets in the adjoining row. Indicate all the dimensions. Use snap head rivets 15M
3. Draw the half sectional front view of a FLANGED COUPLING – PROTECTED TYPE and also draw the end view looking from the nut end. The details of the drawing to be expressed in terms of diameter 'd' of the shaft. 15M

Unit - 2

4. The details of tailstock are shown in the figure. Draw the following views of the assembled tailstock. 45M
   a) Front view in section
   b) Top view