Code No: Z0121/R07

Set No. 1

I B.Tech Supplementary Examinations, November 2009
C PROGRAMMING AND DATA STRUCTURES
(Common to Civil Engineering, Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Aeronautical Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Why 'while statement' is called as repetition structure? Write a program to find whether number is Armstrong or not. [16]

2. (a) Write short notes on extern variable .
   (b) Write a program to show the working of external variables in different blocks. [6+10]

3. What are the various operations performed in pointers explain with an example? [16]

4. Define Structure and write the general format for declaring and accessing members. [16]

5. Write a program to demonstrate
   (a) getc() and putc ()
   (b) gets() and puts () [8+8]

6. Compare the advantage and disadvantage of bubble, insertion and selection sort. [16]

7. What do you mean by data structure ? Explain about linear data structure ? [16]

8. How many ancestors does a node at level n in a binary tree have ? Prove. [16]

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Code No: Z0121/R07

Set No. 2

I B.Tech Supplementary Examinations, November 2009
C PROGRAMMING AND DATA STRUCTURES
(Common to Civil Engineering, Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Aeronautical Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write a 'C' program to print Pascal Triangle using Binomial Theorem.
   (b) Write short notes on goto statement. [10+6]
2. (a) Compare function and recursive function .
   (b) Explain the concept of function. [8+8]
3. (a) Write short notes on Arrays.
   (b) Write a 'C' program to sort an array of elements using bubble sort. [6+10]
4. (a) Write notes on structure to function.
   (b) Write a program to store three records in one structure. [6+10]
5. (a) Write the syntax for opening a file with various modes and closing a file .
   (b) Explain about file handling functions . [8+8]
6. Explain the sorting mechanism which uses the concept of pivot element selection with a program . [16]
7. Define linked list. Mention the different types of linked lists and Explain the operations for any one. [16]
8. Explain tree traversals indetail . [16]

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Code No: Z0121/R07

Set No. 3

I B.Tech Supplementary Examinations, November 2009
C PROGRAMMING AND DATA STRUCTURES
(Common to Civil Engineering, Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Aeronautical Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Write a 'C' program which reads temperature in either Fahrenheit or Celsius and compute temperature in the opposite scale.
   Formulas are C = (F - 32) * 5/9 , F = 9 (C/5) + 32
   (b) Write a 'C' program to find greatest common division (GCD) of two given numbers. [6+10]

2. (a) Explain about call by value with an example .
   (b) Write a program to generate Fibonacci series using with argument and return type. [8+8]

3. Write a program to reverse the strings stored in array of pointers. [16]

4. (a) Define Union , write the syntax for union.
   (b) Write a program to find size of union and number of bytes reserved for it. [6+10]

5. Explain the operation of random access file , mention its advantage and disadvantage with example. [16]

6. Explain the algorithm for binary search on an ordered file with keys { 1,2,3,4,5,6,7,8,9,10 } and determine the number of key comparisons made while searching for the keys 2, 10 and 15. [16]

7. Define Abstract Data Type . Explain with an example . [16]

8. (a) What is a network?
   (b) What is a spanning tree?
   (c) Define minimal spanning tree .
   (d) What are the various traversals in a tree? [16]

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Code No: Z0121/R07

Set No. 4

I B.Tech Supplementary Examinations, November 2009
C PROGRAMMING AND DATA STRUCTURES
(Common to Civil Engineering, Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Chemical Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering, Aeronautical Engineering, Instrumentation & Control Engineering and Bio-Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Summarize 'C' operators precedence and associativity. [16]
2. What is a function ? What are the different types of functions? Explain function with no argument and no return type with an example. [16]
3. Write a program to find inverse of a matrix. [16]
4. (a) Explain the concept of nesting of structures and accessing structure members with a program.
   (b) What is the use of typedef in structure declaration? [8+8]
5. Write a program using indexed sequential file for student database to perform addition, deletion and searching of data's. [16]
6. Write a program for searching mechanism whose worst case time complexity is O(log n) . [16]
7. Explain the procedure for converting an infix expression to postfix with an example. [16]
8. Write an algorithm to create binary search tree using Depth First Tree . [16]

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Code No: Z0323/R07

Set No. 1

I B.Tech Supplementary Examinations, November 2009
ENGINEERING CHEMISTRY
(Common to Mechanical Engineering, Mechatronics, Production Engineering and Aeronautical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is meant by sterilization of water? Expalin how sterilization of water is carried out by using chlorine and ozone.
   (b) 0.28 g of $CaCO_3$ was dissolved in dil.HCl and the solution made up to one litre with distilled water. 100 mL of the above solution required 28 mL of EDTA solution for titration. 100 mL of the water sample required 33 mL of same EDTA solution for titration. After boiling 100 mL of this water, cooling, filtering and then titration required 10 mL of EDTA solution. Calculate the temporary and permanent hardness of water. [9+7]

2. Distinguish between:
   (a) Scales and Sludges
   (b) External and Internal treatment of water
   (c) Priming and Foaming
   (d) Zeolite and ion-exchange resins. [4+4+4+4]

3. (a) Write a brief account on
      i. pitting corrosion and
      ii. pipeline corrosion.
   (b) What is the principle of cathodic protection? Explain impressed current method of protection. Mention its merits and demerits. [8+8]

4. (a) Why chromium anodes are not used in chromium plating?
   (b) Distinguish between galvanizing and sheradizing.
   (c) Discuss the role of following factors on the nature of electrodeposit :
      i. Current Density
      ii. pH. [2+6+8]

5. Explain how the polymers are classified on the basis of their thermal behaviour and method of polymerization. Give one example for each class. [16]

6. (a) What is pyrometric cone equivalent? How it is determined for a refractory? What is its significance?
   (b) Write a short note on:
      i. porosity

ii. Thermal Conductivity
iii. Dimensional Stability.
iv. strength [8+8]

7. (a) Distinguish between extreme pressure lubrication & boundary lubrication.
   (b) Describe the functions of viscosity index improvers? Give examples.
   (c) In what situations semi-solid lubricants are preferred. [8+4+4]

8. (a) What is ultimate analysis of coal? How it is carried out to access the quality of coal? What is the significance of the contrituents determined.
   (b) Calculate the mass and volume of air needed for complete combustion of 1 Kg of carbon. [12+4]

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Code No: Z0323/R07

Set No. 2

I B.Tech Supplementary Examinations, November 2009
ENGINEERING CHEMISTRY
(Common to Mechanical Engineering, Mechatronics, Production Engineering and Aeronautical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is meant by sterilization of water? Expalin how sterilization of water is carried out by using chlorine and ozone.
   (b) 0.28 g of $CaCO_3$ was dissolved in dil.HCl and the solution made up to one litre with distilled water. 100 mL of the above solution required 28 mL of EDTA solution for titration. 100 mL of the water sample required 33 mL of same EDTA solution for titration. After boiling 100 mL of this water, cooling, filtering and then titration required 10 mL of EDTA solution. Calculate the temporary and permanent hardness of water. [9+7]

2. (a) What are ion-exchange resins? Discuss their application in water softening. How are spent resins regenerated?
   (b) Write a note on priming and foaming and their disadvantages. [10+6]

3. (a) Discuss stress corrosion metals. Explain in detail the conditions responsible for it.
   (b) Explain the theory of passivity with an example. [8+8]

4. (a) Discuss how the surface of a metal is prepared prior to the application of a protective coating.
   (b) Write the important applications of protective coating.
   (c) Why is moderate current density employed during electroplating? [10+4+2]

5. (a) How will you synthesis nylon 6,6 from 1,3 butadiene?
   (b) Describe the method of preparation of polyester and mention its properties and uses.
   (c) What is the repeating unit of
      i. Natural rubber
      ii. Teflon. [6+6+4]

6. (a) List out the characteristics of electrical insulators.
   (b) Mention the types of electrical insulators and explain any two examples in detail. [6+10]

7. (a) Give the functions of lubricants.
   (b) Describe the mechanism of extreme pressure lubrication.

(c) How a viscous lubricant is converted into grease? [6+6+4]

8. (a) What is the principle of calorimeter? How is the calorific value of a solid fuel determined with the help of the Bomb calorimeter?

(b) Compare straight run petrol and cracked petrol. [12+4]

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Code No: Z0323/R07

Set No. 3

I B.Tech Supplementary Examinations, November 2009
ENGINEERING CHEMISTRY
(Common to Mechanical Engineering, Mechatronics, Production Engineering and Aeronautical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Discuss the treatment of ground water to be used for domestic purposes.
   (b) A sample of water contains the following.
   $Mg(HCO_3)_2$ = 146 mg/L; $Ca(HCO_3)_2$ = 162 mg/L; $MgCl_2$ = 95 mg/L; $CaSO_4$ = 68 mg/L. Calculate the temporary and permanent hardness present in the water sample. [12+4]

2. (a) Water having following composition to be softened by lime soda process
   $Ca(HCO_3)_2$= 220 ppm, $Mg(HCO_3)_2$=56ppm, $MgCl_2$=130ppm, $MgSO_4$=84ppm, $CaSO_4$ =98ppm, Calculate the amount of lime and soda required to soften 10^6 litres of water.
   (b) Explain scale formation and sludge formation in boilers. What are their disadvantages? How are they removed? [8+8]

3. (a) What is galvanic series? How does it help to predict corrosion of metals and alloys? Give examples.
   (b) Compare the merits and demerits of sacrificial anode method and impressed current method of protection. [8+8]

4. (a) What are paints? Mention the ingredients of paint?
   (b) Write the requisites of a good paint?
   (c) What is pigment volume concentration? Explain its significance. [4+4+8]

5. (a) What is Buna-N rubber? How is it manufactured? Give its properties and uses.
   (b) Write four moulding constituents of plastics and their function with examples. [8+8]

6. (a) What is pyrometric cone equivalent? How it is determined for a refractory? What is its significance?
   (b) Write a short note on:
      i. porosity
      ii. Thermal Conductivity
      iii. Dimensional Stability.
      iv. strength [8+8]

7. (a) Define pour-point? What is the significance of determining the pour-point of a lubricant?
   (b) Bring out the relationship between viscosity index and molecular structure of an oil.
   (c) How is viscosity index of oil determined and improved? [6+6+4]

8. (a) Distinguish between the followings.
      i. Proximate analysis and ultimate analysis
      ii. Straight run gasoline and Cracked gasoline.
   (b) The percentage composition of a sample of anthracite coal was found by weight to be, carbon = 90, Oxygen = 3.0, Hydrogen = 3.3, Sulphur = 0.9, Nitrogen = 0.8 and Ash = 2.0. Calculate the minimum weight of air required for the complete combustion of 1 Kg of this fuel. If 50% excess of air is supplied, find the percentage composition of dry flue gas by weight. [6+10]

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Code No: Z0323/R07

Set No. 4

I B.Tech Supplementary Examinations, November 2009
ENGINEERING CHEMISTRY
(Common to Mechanical Engineering, Mechatronics, Production Engineering and Aeronautical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) What is potable water? Discuss the treatment of water for domestic purpose.
   (b) Calculate temporary hardness and total hardness of a sample of water containing $Mg(HCO_3)_2$ = 7.3 mg/L; $Ca(HCO_3)_2$ = 16.2 mg/L; $MgCl_2$ = 9.5 mg/L; $CaSO_4$ = 13.6 mg/L. [12+4]

2. Write short notes on :
   (a) Internal conditioning
   (b) Lime soda process. [8+8]

3. (a) What is meant by passivation? How passive oxide film is superior than natural oxide film for controlling corrosion?
   (b) Give suitable reasons:
      i. Zn gets corroded vigorously when connected with Cu than with Fe
      ii. Copper equipment should not possess a small steel bolt
      iii. Small anodic area results in intense local corrosion. [8+8]

4. (a) Explain why Chromium plating has nickel under coat?
   (b) Describe any two methods of Cathodic coating. [4+12]

5. (a) How is HDPE is prepared? Give its properties and uses?
   (b) Explain the injection moulding process with a neat diagram? Mention its advantages. [8+8]

6. (a) What is pyrometric cone equivalent? How it is determined for a refractory? What is its significance?
   (b) Write a short note on:
      i. porosity
      ii. Thermal Conductivity
      iii. Dimensional Stability.
      iv. strength [8+8]

7. (a) Define lubricant and lubrication.
   (b) Explain the mechanism of lubrication behind delicate machines like watches, and clock etc.

(c) What is meant by oiliness of a lubricant? How can this be improved?[4+6+6]

8. (a) Distinguish between the followings.

   i. Proximate analysis and ultimate analysis
   ii. Straight run gasoline and Cracked gasoline.

(b) The percentage composition of a sample of anthracite coal was found by weight to be, carbon = 90, Oxygen = 3.0, Hydrogen = 3.3, Sulphur = 0.9, Nitrogen = 0.8 and Ash = 2.0. Calculate the minimum weight of air required for the complete combustion of 1 Kg of this fuel. If 50% excess of air is supplied, find the percentage composition of dry flue gas by weight. [6+10]

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Code No: Z0103/R05

Set No. 1

I B.Tech Supplementary Examinations, November 2009
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Differentiate between interference and diffraction.
   (b) Explain Rayliegh's criterion for resolving power of a telescope.
   (c) A plane transmission grating having 6000 lines/cm is used to obtain a spectrum of light from a sodium lamp in the second order. Calculate the angular separation between two sodium lines D_1 and D_2 of wavelengths 5890 A.U. and 5896 A.U. [6+6+4]

2. (a) Discuss the various methods by which polarized light can be produced.
   (b) A beam of linearly polarized light is changed into circularly polarized by passing it through a 30 μm thick birefringent crystal. Assuming its thickness is minimum and for a light of wavelength 589.3 nm incident on it normally, find the difference of refractive indices of the ordinary and extra-ordinary rays. [10+6]

3. (a) Explain the dependence of super-conducting state of a metal on temperature and strength of the magnetic field in which the metal is placed.
   (b) Write a note on Meissner effect.
   (c) What are Cooper pairs? [6+6+4]

4. (a) With necessary theory and energy level diagram, explain the working of a Helium-Neon gas laser.
   (b) Mention some important applications of lasers. [10+6]

5. (a) Write notes on:
      i. fibre materials
      ii. light sources for fibre optics
      iii. photo-detectors for fibre optics.
   (b) Explain the terms
      i. numerical aperture and
      ii. acceptance angle of a fibre.

   Derive expressions for them. [6+10]

6. (a) Explain with suitable example the ferromagnetic materials.

(b) What are the applications of ferromagnetic materials.

(c) Explain the soft and hard magnetic materials. [6+4+6]

7. (a) Draw the (112) and (120) planes, and the [112] and [120] directions of a simple cubic crystal.

   (b) Derive an expression for the inter-planar spacing in the case of a cubic structure.

   (c) Calculate the glancing angle at (110) plane of a cubic crystal having axial length 0.26 nm corresponding to the second order diffraction maximum for the X-rays of wavelength 0.065 nm. [4+8+4]

8. (a) Distinguish between Frenkel and Schottkey defects.

   (b) Derive an expression for the energy change due to creation of vacancies inside a solid. [8+8]

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Code No: Z0103/R05

Set No. 2

I B.Tech Supplementary Examinations, November 2009
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the principle of superposition of waves.
   (b) Explain the phenomenon of interference.
   (c) With relevant diagram explain Young's experiment on the basis of wave theory. [4+4+8]

2. (a) Write notes on:
      i. Piezo-electric effect and
      ii. Magnetostriction effect.
   (b) Describe with a neat circuit diagram to produce ultrasonics by piezo-electric effect. [8+8]

3. (a) Describe Josephson effects and their applications.
   (b) Write a note on flux quantization.
   (c) The London penetration depths for lead at temperatures 3 K and 7.1 K are respectively 39.6 nm and 173 nm. Calculate its transition temperature as well as depth at 0 K. [6+4+6]

4. (a) Describe the principle, construction and working of a semiconductor laser.
   (b) Write the applications of laser. [10+6]

5. (a) Explain the terms 'numerical aperture' and 'acceptance angle'.
   (b) With the help of a suitable diagram explain the principle, construction and working of an optical fibre as a wave guide.
   (c) An optical fibre has a core material of refractive index of 1.55 and cladding material of refractive index 1.50. The light is launched into it in air. Calculate its numerical aperture. [6+6+4]

6. (a) Explain clearly the difference between hard and soft magnetic materials. What are mixed ferrites? Mention their uses.
   (b) How ferrites are superior to ferromagnetic materials? [10+6]

7. (a) State and explain Bragg's law.
   (b) Describe with suitable diagram, the powder method for determination of crystal structure.

(c) A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant of 0.28 nm. Find the glancing angle for the second order diffraction. [6+6+4]

8. (a) Write in detail the different kinds of crystal imperfections.
   (b) Explain the significance of Burgers vector. [10+6]

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Code No: Z0103/R05

Set No. 3

I B.Tech Supplementary Examinations, November 2009
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) How the fringes are obtained in diffraction and why they are unequally spaced?
   (b) Give the theory of Fraunhofer diffraction due to a double slit and compare the results obtained with that due to single slit. [6+10]

2. (a) Discuss the various methods by which polarized light can be produced.
   (b) A beam of linearly polarized light is changed into circularly polarized by passing it through a 30 μm thick birefringent crystal. Assuming its thickness is minimum and for a light of wavelength 589.3 nm incident on it normally, find the difference of refractive indices of the ordinary and extra-ordinary rays. [10+6]

3. (a) What are DC and AC Josephson effects?
   (b) What is a SQUID? Explain its functioning.
   (c) Write any three applications of superconductivity. [8+5+3]

4. (a) Explain the terms
      i. absorption,
      ii. spontaneous emission
      iii. stimulated emission
      iv. population inversion, relating to laser.
   (b) Describe the principle of lasing action.
   (c) Mention the important characteristics of laser beam. [8+4+4]

5. (a) Describe the construction of a typical optical fibre and give the dimensions of the various parts.
   (b) Define the acceptance angle and numerical aperture. Obtain an expression for the numerical aperture of an optical fibre.
   (c) Calculate the numerical aperture and acceptance angle for an optical fibre with core and cladding refractive indices being 1.48 and 1.45 respectively. [4+8+4]

6. (a) Discuss the spin arrangements in ferromagnetic, ferrimagnetic and anti-ferromagnetic materials.
   (b) How does an anti-ferromagnetic substance differ from diamagnetic substance? [10+6]

7. (a) State and explain Bragg's law.
   (b) Describe with suitable diagram, the powder method for determination of crystal structure.
   (c) A beam of X-rays of wavelength 0.071 nm is diffracted by (110) plane of rock salt with lattice constant of 0.28 nm. Find the glancing angle for the second order diffraction. [6+6+4]

8. (a) Explain the various point defects in a crystal.
   (b) Obtain the expression for the equilibrium concentration of vacancies in a solid at a given temperature. [8+8]

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Code No: Z0103/R05

Set No. 4

I B.Tech Supplementary Examinations, November 2009
ENGINEERING PHYSICS
(Common to Civil Engineering, Mechanical Engineering, Chemical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) State the conditions for interference in Young's double slit experiment.
   (b) Show that the fringe width of bright and dark fringes in Young's experiment is same.
   (c) A light of wavelength 5500 A.U. is incident on a double slit. The overall separation of 5 fringes is 0.01 mm on the screen, which is 2 m away from the slit. Find the slit separation and fringe width. [4+8+4]

2. (a) Explain the following:
      i. Polarized light
      ii. Double refraction .
   (b) Calculate the thickness of a quarter wave plate for a monochromatic light of wavelength 600 nm, if the refractive indices of ordinary and extra-ordinary rays in the medium are 1.5442 and 1.5533 respectively. [10+6]

3. (a) Explain the various factors affecting the architectural acoustics and their remedies.
   (b) The volume of a room is 600 m^3. The wall area of the room is 220 m^2, the floor area is 120 m^2 and the ceiling area is 120 m^2. The average sound absorption coefficient
      i. for walls is 0.03,
      ii. for ceiling is 0.80, and
      iii. for floor is 0.06.

   Calculate the average sound absorption coefficient and reverberation time. [10+6]

4. (a) Explain the following typical characteristics of laser:
      i. coherence
      ii. divergence and
      iii. monochromaticity.
   (b) Explain the principle and working of a Ruby laser. [6+10]

5. (a) Derive expressions for the numerical aperture and the fractional index change of an optical fibre.

(b) Write a note on the applications of optical fibres.

(c) Calculate the fractional index change for a given optical fibre if the refractive indices of the core and the cladding are 1.563 and 1.498 respectively. [8+4+4]

6. (a) Define crystal lattice, unit cell, lattice parameter and co-ordination number.

(b) Consider a Body Centered Cubic lattice of identical atoms having radius R. Compute

i. the number of atoms per unit cell
ii. the co-ordination number and
iii. the packing fraction. [8+8]

7. (a) What are Miller indices? Explain.

(b) Derive an expression for the interplanar spacing between two adjacent planes of Miller indices (h k l) in a cubic lattice of edge length 'a'.

(c) Calculate the interplanar spacing for (321) planes in a simple cubic crystal whose lattice constant is 4.2 A.U. [4+8+4]

8. (a) Give an account on the effects of dislocations on the properties of solids.

(b) Explain the significance of Burgers vector. [10+6]

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Code No: Z0202/R05 **Set No. 1**

I B.Tech Supplementary Examinations, November 2009

MATHEMATICAL METHODS

(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions

All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find a real root of 3x–e^x+sinx=0 using Newton Raphson method.

   (b) Construct difference table for the following data:

x	0.1	0.3	0.5	0.7	0.9	1.1	1.3
F(x)	0.003	0.067	0.148	0.248	0.370	0.518	0.697

   And find F(0.6) using a cube that fits at x=0.3, 0.5, 0.7 and 0.9 using Newton's forward formula. [8+8]

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

x	10	15	20	25	30	35
y	35.3	32.4	29.2	26.1	23.2	20.5

   (b) Evaluate $\int_0^1 \frac{dx}{1+x}$ taking h= 0.25 using cubic splines. [8+8]

3. Find the solution of $\frac{dy}{dx} = x - y$ at x=.4 subject to the condition y=1, at x=0 and h=.1 using Milne's method. Use Euler's modified method to evaluate y(.1), y(2) and y(.3). [16]

4. (a) For what value of K the matrix
$$\begin{bmatrix} 4 & 4 & -3 & 1 \\ 1 & 1 & -1 & 0 \\ k & 2 & 2 & 2 \\ 9 & 9 & K & 3 \end{bmatrix}$$ has rank 3.

   (b) Solve the following tridiagonal system x_1+2x_2=5,x_1+3x_2+x_3=6, x_2-2x_3+x_4=3, 3x_3-5x_4=2 by expressing the coefficient matrix as a product of a lower triangular and upper triangular matrices. [8+8]

5. (a) Find the eigen values and the corresponding eigen vectors of the matrix. $\begin{bmatrix} 2 & 2 & 1 \\ 1 & 3 & 1 \\ 1 & 2 & 2 \end{bmatrix}$

   (b) If A and B are n rowed square matrices and if A is invertible show that A^{-1} B and BA^{-1} have the same eigen values. [10+6]

6. (a) Prove that $\frac{1}{2}\begin{bmatrix} 1+i & -1+i \\ 1+i & ,i-i \end{bmatrix}$ is unitary

   (b) Find the index and the signature of the quadratic form $3x^2$+$5y^2$+$6z^2$–2xy+2xz–2yz. [6+10]

7. (a) Find the Fourier series to represent f(x) $= x^2 - 2$, when $-2 \leq x \leq 2$

   (b) Show that the Fourier sine transform of
   $$f(x) = \begin{cases} x & for\, 0 < x < 1 \\ 2-x & for\, 1 < x < 2 \\ 0 & for\, x > 2 \end{cases}$$
   is $2\frac{sins(1-\cos s)}{s^2}$. [8+8]

8. (a) Form the partial differential equation by eliminating the arbitrary constants a, b from $2z = (x+a)^{1/2} + (y-a)^{1/2} + b$.

   (b) Solve the partial differential equation.,$z^4p^2 + z^4q^2 = x^2y^2$.

   (c) Find $Z^{-1}\left[\frac{z}{z^2+11z+24}\right]$. [5+5+6]

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Code No: Z0202/R05

Set No. 2

I B.Tech Supplementary Examinations, November 2009
MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find a real root of the equation $x^3 - \text{x} - 4 = 0$ by bisection method.
   (b) Derive the formula to estimate the polynomial of degree 'n' using Lagrange's interpolation method. [8+8]

2. (a) Fit a parabola of the form y=a+bx+cx^2.

x	-3	-2	-1	0	1	2	3
y	4.63	2.11	.67	.09	.63	2.15	4.58

   (b) Evaluate $\int_0^4 e^x dx$ using Simpson's $\frac{1}{3}rd$ rule. Taking h=.5. [8+8]

3. Consider the initial value problem $y' = x(y + x)$, $y(0) = 2$ using step sizes h =.2 evaluate y(.2), y(.4) and y(.6) by Euler's modified formula and compute y(.8) using Milne's method. [16]

4. (a) Find the non singular matrices P and Q such that PAQ is in the normal form of the matrix and find the rank of the matrix.$A = \begin{bmatrix} 1 & 1 & 1 \\ 1 & -1 & -1 \\ 3 & 1 & 1 \end{bmatrix}$
   (b) Find the values of a and b for which the equations

$$x + ay + z = 3, \quad x + 2y + 2z = b, \quad x + 5y + 3z = 9$$

   are consistent. When will these equations have a unique solution? [8+8]

5. Diagonalize the matrix A where $A = \begin{bmatrix} 1 & 0 & 0 \\ 0 & 3 & -1 \\ 0 & -1 & 3 \end{bmatrix}$ [16]

6. (a) Define :
   i. Spectral Matrix
   ii. Quadratic Form
   iii. Canonical form.

(b) Reduce the quadratic form $3x^2 + 5y^2 + 3z^2 - 2yz + 2zx - 2xy$ to the canonical form. [6+10]

7. (a) Expand ($\frac{L}{2}$- x) in $-L < x < L$.
   (b) Expand f(x) = cos x; $0 < x < \pi$ in half range sine series.
   (c) Find the finite Fourier cosine transform of f(x) = $\begin{cases} x & if\ 0 < x < \pi/2 \\ \pi - x & if\ \pi/2 < x < \pi \end{cases}$ [5+5+6]

8. (a) Form the partial differential equation by eliminating the arbitrary function from $z = f(y) + \phi(x + y)$.
   (b) Solve the partial differential equation $(y^2 + z^2)p - xyq + zx = 0$.
   (c) Find
      i. $Z(-2)^n$
      ii. Z (na^n). [5+5+6]

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Code No: Z0202/R05

Set No. 3

I B.Tech Supplementary Examinations, November 2009
MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find a root of e^x sinx=1 using Newton Raphson's method.

   (b) Use Lagrange's formula to calculate f(3) from the following table

x :	0	1	2	4	5	6
f(x) :	1	14	15	5	6	19

[8+8]

2. (a) Derive normal equations to fit the straight line y=a+bx.

   (b) Evaluate $\int_0^2 e^{-x^2}$ dx using Simpsons $\frac{1}{3}$ rule.Taking h = 0.25. [8+8]

3. Use Euler's modified method to find approximate values of the solution of $\frac{dy}{dx}$ = y–x + 5 at the points x = 2.1, 2.2. with initial condition y(2) = 1. [16]

4. (a) Find the rank of the matrix A by reducing it to the normal form

   Where A= $\begin{bmatrix} 1 & 1 & 1 & 1 \\ 1 & 2 & 3 & -4 \\ 2 & 3 & 5 & -5 \\ 3 & -4 & -5 & 8 \end{bmatrix}$

   (b) Find whether the following set of equations are consistent if so, solve them.
   5x + 3y + 7z = 4; 3x + 26y + 2z = 9; 7x + 2y + 10z = 5. [8+8]

5. Diagnolize the matrix $\begin{bmatrix} -1 & 2 & -2 \\ 1 & 2 & 1 \\ -1 & -1 & 0 \end{bmatrix}$ [16]

6. (a) Identify the nature of the quadratic form $-3\,x_1^2 - 3x_2^2 - 3x_3^2 - 2x_1x_2 - 2x_1x_3 + 2x_2x_3$

   (b) If $A = \begin{pmatrix} 2 & 3+2i & -4 \\ 3-2i & 5 & 6i \\ -4 & -6i & 3 \end{pmatrix}$ show that A is Hermitian and iA is skew-Hermitian matrices. [8+8]

7. (a) Expand f(x) = cos ax as a Fourier series in $(-\pi, \pi)$ where a is not an integer. Hence prove that cot$\theta = \frac{1}{\theta} + \frac{2\theta}{\theta^2-\pi^2} + \frac{2\theta}{\theta^2-4\pi^2} + \ldots\ldots\ldots\ldots$

(b) If the Fourier transform of f(t), F[f(t)]=f(s) then prove that $F\left[t^n f\left(t\right)\right] = \left(-1\right)^n \frac{d^n}{ds^n}\left(f\left(s\right)\right)$ [8+8]

8. (a) Form the partial differential equation by eliminating the arbitrary function $z = f_1(y + 2x) + f_2(y - 3x)$.

   (b) Solve the partial differential equation p tan x+q tan y=tanz.

   (c) State and prove final value theorem. [5+5+6]

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Code No: Z0202/R05

Set No. 4

I B.Tech Supplementary Examinations, November 2009
MATHEMATICAL METHODS
(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Find a real root of x^3+x–1=0 using bisection method.
   (b) Derive Newton-Gregory forward interpolation formula. [8+8]

2. (a) By the method of least squares fit a parabola of the form y=a+bx+cx^2 for the following data.

x	2	4	6	8	10
y	3.07	12.85	31.47	57.38	91.29

   (b) Derive the formula to evaluate $\int_a^b ydx$ using trapezoidal rule.
   (c) Use the trapezoidal rule with n=4 to estimate $\int\limits_0^1 \frac{dx}{1+x^2}$ correct to four decimal places. [8+4+4]

3. Find y(.1) and y(.2) using Runga kuta 4th order formul given that $y' = x^2 - y$ and y(0)=1. [16]

4. Find the values of λ for which the equations. $(\lambda - 1)x + (3\lambda + 1)y + 2\lambda z = 0$ $(\lambda - 1)x + (4\lambda - 2)y + (\lambda + 3)z = 0$, $2x + (3\lambda + 1)y + 3(\lambda - 1)z = 0$ will have a nontrivial solution and solve them for each value of λ. [16]

5. Verify cayley Hamilton theorem and hence find A^{-1} and A^4 for the matrix
$$A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$
[16]

6. Reduce the quadratic form x^2+y^2+2z^2-2xy+4xz+4yz to the canonical form. [16]

7. (a) Given that f(x) = x + x^2 for $-\pi <$ x $< \pi$ find the Fourier expansion of f(x). Deduce that $\frac{\pi^2}{6} = 1 + \frac{1}{2^2} + \frac{1}{3^2} + \frac{1}{4^2} + ...$
   (b) State and prove Fourier integral theorem [8+8]

8. (a) Form the partial differential equation by eliminating the arbitrary functions from $z = xf_1(x + t) + f_2(x + t)$.

(b) Solve the partial differential equation $p^2x^4 + y^2zq = 2z^2$.

(c) Solve the difference equation $u_{n+1} + \frac{1}{4}u_n = (\frac{1}{4})^4, n \geq 0$, u(0)=0 u_1=1 using Z-Transforms [5+5+6]

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Code No: Y2302/R05

Set No. 1

I B.Tech Supplementary Examinations, November 2009
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Bio-Technology)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) With a neat sketch explain the construction and principle of operation of dynamometer type watt meter.
   (b) Two 40W tube lights are ON for a period of six hours a day. Calculate the total energy consumed by them in a month? [10+6]
2. (a) Show that single phase induction motors are not self starting.
   (b) Explain the construction and working principle of any type of 1-phase induction motor. [8+8]
3. (a) Shown that for circuit show in the figure 3athe output voltage is 5 V when either V_1 or V_2 or both is 5 V. Assume the ideal behaviour of the diode.

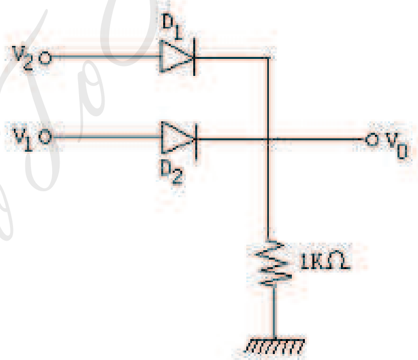

Figure 3a

   (b) Determine V_o and I_D for the networks shown in the figure 3b.

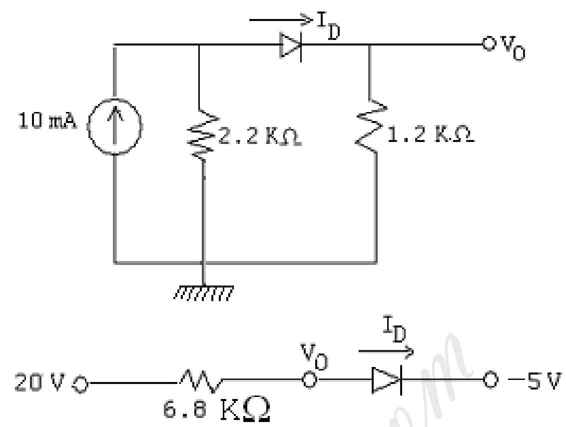

Figure 3b

4. (a) The half wave rectifier shown in the figure 4a is fed with a sinusoidal voltage V=20 sin100t.
   i. Sketch the output waveform.
   ii. Determine the DC output voltage assuming ideal diode behaviour.
   iii. Repeat the calculations assuming the simplified diode (silicon) model.

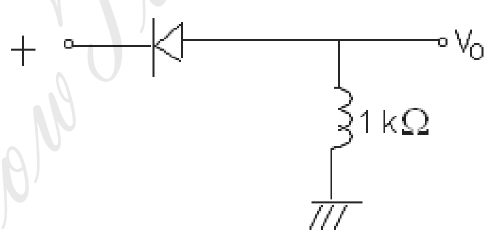

Figure 4a

   (b) Draw the circuit diagram of full wave rectifier having two diodes and explain its operation. [8+8]

5. (a) Draw the circuit of a transistor (n-p-n) in the CB configuration. Sketch the input & output characteristics and explain the shape of the curves qualitatively.
   (b) For the circuit in figure 5b shown for n-p-n transistor, calculate the collector and base currents. Assume $h_{FE} = 50$. Explain Q point. [8+8]

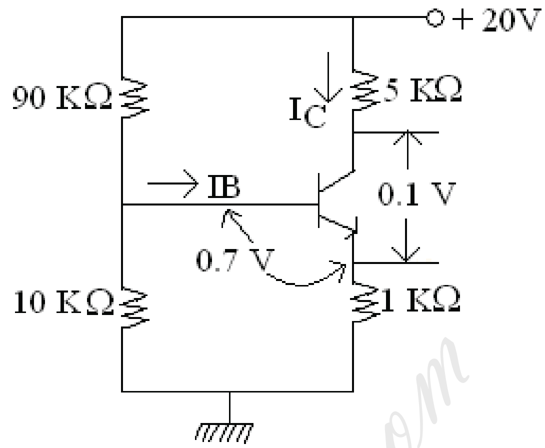

Figure 5b

6. (a) Define class A, B, AB, B and C operation of amplifiers.
   (b) Draw the circuit diagram of a push-pull amplifier and explain how even harmonics are eliminated.
   (c) Derive the relation between gain with feed back and without feedback.[6+6+4]

7. (a) Explain the effect of temperature on
      i. i/p bias current
      ii. i/p off set current
      iii. i/p offset voltage.
   (b) Explain in brief the applications of OP-AMP. [8+8]

8. (a) Explain with a block diagram the major blocks of a digital computer.
   (b) Implement the following with either NAND or NOR gates. Use only 4 gates only the normal inputs are available.
   $F = w'xz + w'yz + x'yz' + wxy'z$.
   (c) With a circuit diagram, explain Counter type A to D converter. [4+6+6]

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Code No: Y2302/R05

Set No. 2

I B.Tech Supplementary Examinations, November 2009
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Bio-Technology)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Determine the voltage V_{AB} in the circuit shown in the figure 1a

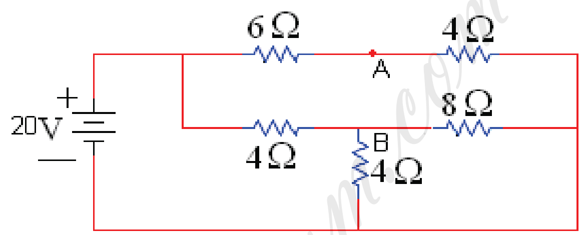

Figure 1a

(b) Find the power dissipated in 40 Ω resistor of figure 1b shown. [10+6]

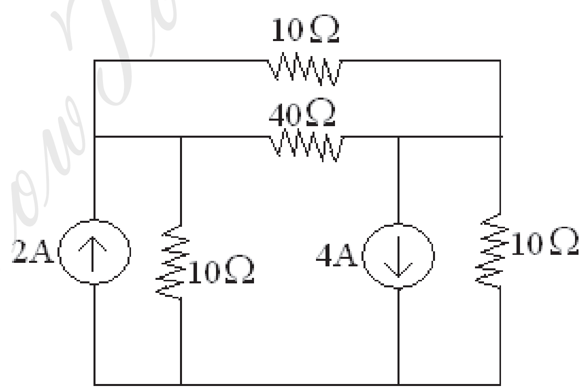

Figure 1b

2. (a) Name the various parts of a D.C machine and give the materials used for each part. Also show the magnetic path.

(b) Explain the principle of operation of D.C motor. [8+8]

3. (a) For the network shown in the figure 3(a)i determine the range of R_L and I_L that will result in V_{RL} being maintained at 10 V.

i. Determine the maximum Wattage rating of the diode.

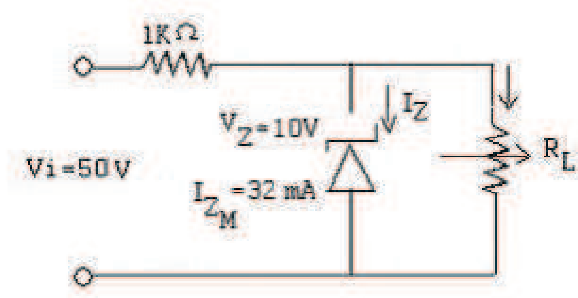

Figure 3(a)i

ii. The reverse saturation current of the diode is 1 μA. Its peak inverse Voltage is 500V. Find r_i, V_o that PIV is not exceeded. show in figure 3(a)ii & figure 3(a)ii

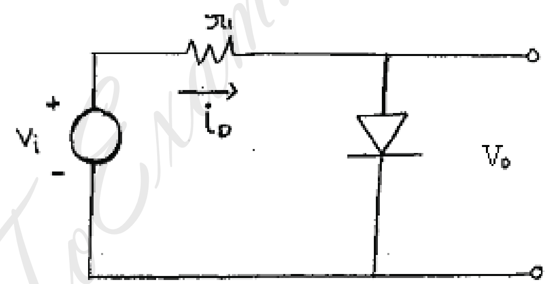

Figure 3(a)ii

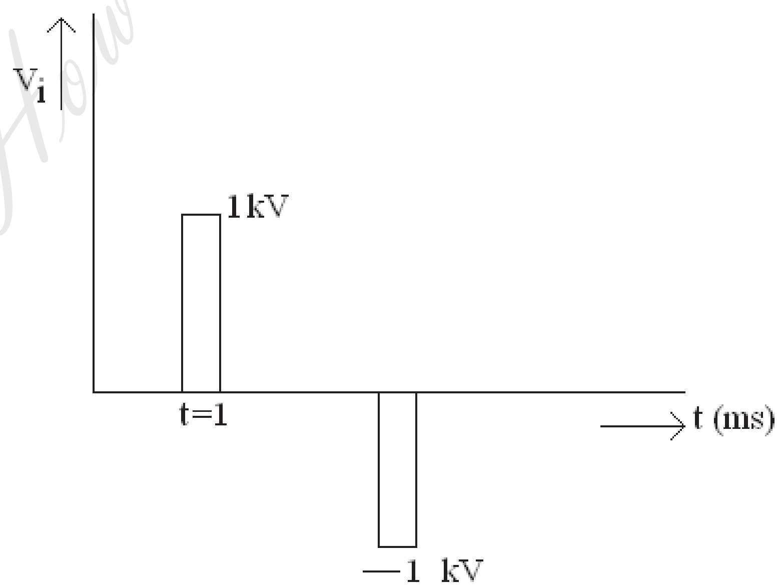

Figure 3(a)ii

4. (a) The half wave rectifier shown in the figure 4a is fed with a sinusoidal voltage

V=20 sin100t.

i. Sketch the output waveform.
ii. Determine the DC output voltage assuming ideal diode behaviour.
iii. Repeat the calculations assuming the simplified diode (silicon) model.

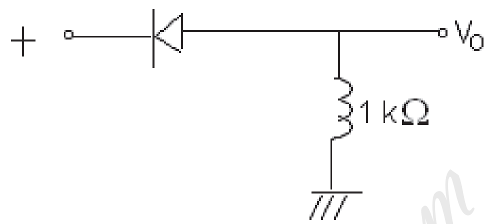

Figure 4a

(b) Draw the circuit diagram of full wave rectifier having two diodes and explain its operation. [8+8]

5. (a) Write short notes on
   i. Thermal runaway
   ii. Early effect in BJT
   iii. UJT as a relaxation oscillator.

   (b) From the relevant characteristics show that $g_m \times \Upsilon_d = \mu$ of a given FET. [10+6]

6. (a) List out different distortions that occur in amplifiers and discuss.

   (b) Enumerate the effect of negative feedback on the various characteristics of the amplifier.

   (c) Draw the circuit diagram of an emitter follower circuit and mention what type of feedback is employed? Justify your answer. [6+6+4]

7. (a) Explain the working principle of Colpitt's oscillator and derive the formula for the O/P signal frequency.

   (b) Explain the operation of one-shot circuit with relevant waveforms. [8+8]

8. (a) Explain the following switching circuit in binary logic notation as shown in the figure8a

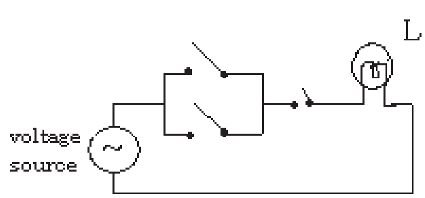

Figure 8a

(b) Define a register. Construct a shift register using S-R flip-flops and explain its operation.

(c) Convert the following numbers:

i. $(101101.\ 101101)_2$ decimal number

ii. $(5345)_{10}$ to binary number. [4+6+6]

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Code No: Y2302/R05

Set No. 3

I B.Tech Supplementary Examinations, November 2009
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Bio-Technology)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks
⋆⋆⋆⋆⋆

1. (a) Derive an equation for the total power consumed in a three ? phase circuit. Will it depend on the type of load connected?
   (b) Three identical impedances $10\angle 53.1^0$ *ohm* are connected in delta to a 3-phase, 240 volt balanced supply. Find the line currents and power consumed. [8+8]

2. (a) Give the various power stages of a 3-phase induction motor(the various stages from the input to induction motor to output) and explain each stage.
   (b) Explain principle of operation of three − phase induction motor. [8+8]

3. (a) For the network shown in the figure 3(a)i determine the range of R_L and I_L that will result in V_{RL} being maintained at 10 V.
      i. Determine the maximum Wattage rating of the diode.

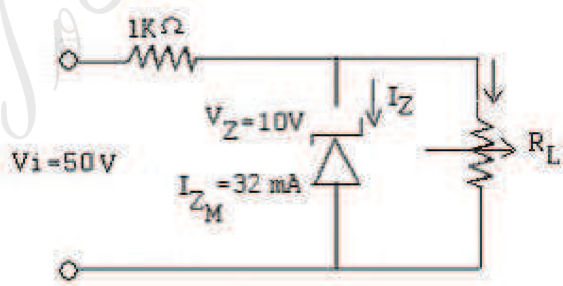

Figure 3(a)i

      ii. The reverse saturation current of the diode is 1 μA. Its peak inverse Voltage is 500V. Find r_i, V_o that PIV is not exceeded. show in figure 3(a)ii & figure 3(a)ii

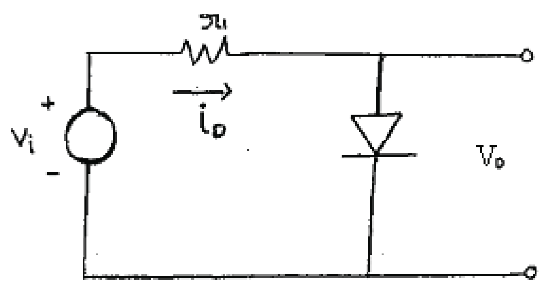

Figure 3(a)ii

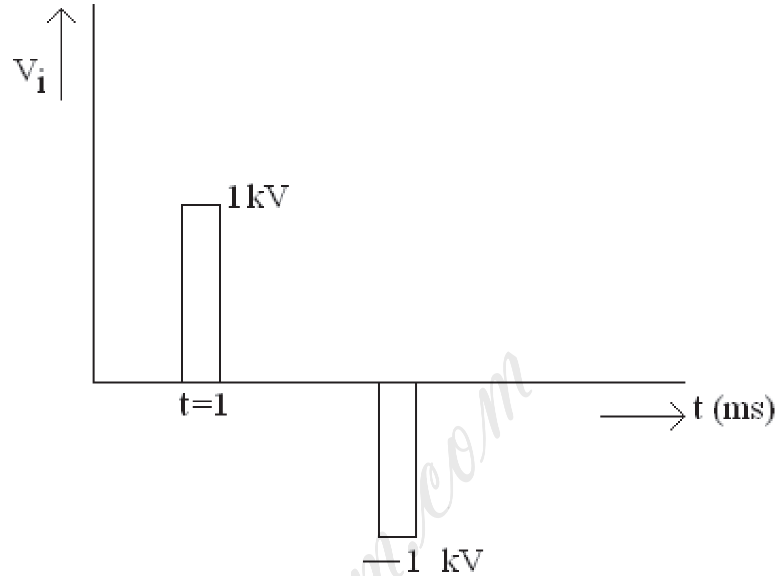

Figure 3(a)ii

4. (a) Sketch typical SCR forward and reverse characteristics.
   (b) Identify all regions of the characteristics and all important current and voltage levels.
   (c) Explain the shape of the curves in terms of the SCR two transistor equivalent circuit.
   (d) Explain why always silicon but not Germanium is used in the construction of SCR.
   (e) Obtain the expression for total current through SCR and Triac. [4+3+3+3]

5. (a) Sketch the basic structure of an n-channel JFET and draw the family of drain characteristics, explain the shape of the curves qualitatively. Explain what do you mean by pinch off voltage?
   (b) For the circuit in figure 5b shown determine V_D for the given component values and if I_{Po} = 8 mA and V_P = -4 V. [8+8]

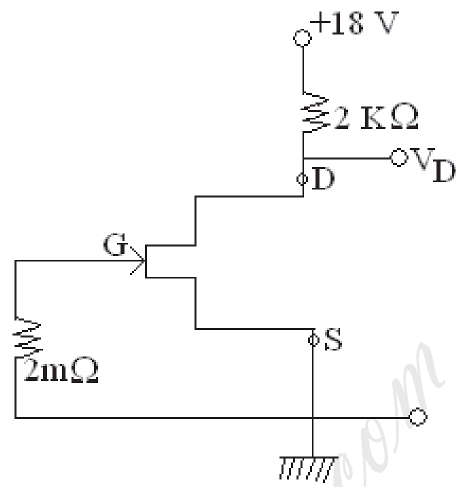

Figure 5b

6. (a) Compare the three transistor amplifier configurations with related to A_I, A_v, R_i and R_0.

   (b) For the circuit shown calculate A_I, A_V, R_i and R_0 using approximate h-parameter model. Assume $h_{fe} = 50$, $h_{ie} = 1100\ \Omega$, $h_{oe} = 25\ \mu A/V$, $h_{re} = 2.5 \times 10^{-4}$ as shown in the figure 6b. [16]

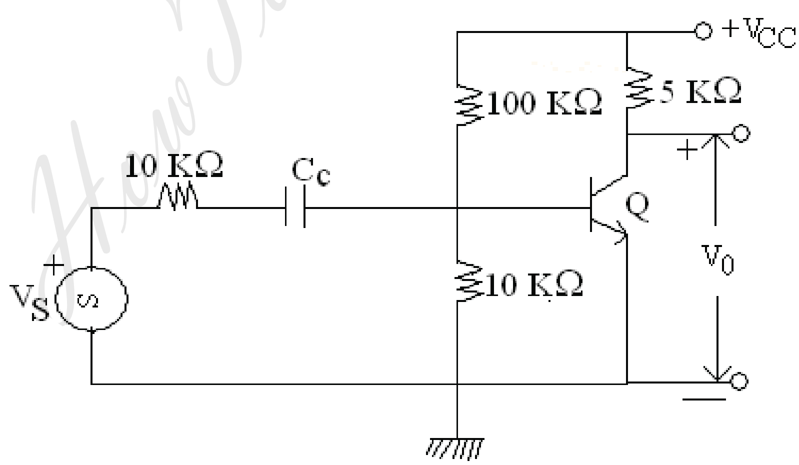

Figure 6b

7. (a) What kind of feedback is incorporated in the Wien bridge oscillator circuit and why?

   (b) In a colpitts oscillator using FET, the frequency of oscillations is observed to be 2.5 MHz. Oscillator uses L=10 μH, $C_1 = 0.02\ \mu$F. Find

      i. the value of C_2

      ii. If L is doubled the new value of frequency oscillations.

(c) Explain about the applications of OP-AMPs. [4+6+6]

8. (a) Realize Full-adder using logic gates.
   (b) Explain the principle of operation of D to A converter.
   (c) Simplify the following functions
      i. $A'BC' + A'C'D + A'B'D' + AC + BCD'$
      ii. $A'B'D' + A'CD + A'BC$. [4+4+8]

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Code No: Y2302/R05

Set No. 4

I B.Tech Supplementary Examinations, November 2009
BASIC ELECTRICAL AND ELECTRONICS ENGINEERING
(Bio-Technology)

Time: 3 hours Max Marks: 80

Answer any FIVE Questions
All Questions carry equal marks

⋆ ⋆ ⋆ ⋆ ⋆

1. (a) Derive an equation for the total power consumed in a three ? phase circuit. Will it depend on the type of load connected?
   (b) Three identical impedances $10\angle 53.1^0$ *ohm* are connected in delta to a 3-phase, 240 volt balanced supply. Find the line currents and power consumed. [8+8]

2. (a) Does the induction motor have any similarities with the transformer. Compare the similarities and differences between them.
   (b) A 20 h.p, 400 V, 50 Hz, 3-phase induction motor has an efficiency of 80% and working at 0.7 p.f. The motor is connected to 400 Volts, 3-phase supply calculate the current drawn by the motor from the mains. [8+8]

3. (a) Prove that the concentration of holes in an intrinsic semiconductor is given by $p = N_v e^{-(E_F - E_V)/KT}$.
   (b) Prove that for intrinsic semiconductor n_i^2 proportional to $T^3 e^{-E_{GO}/KT}$ [6+10]

4. (a) The half wave rectifier shown in the figure 4a is fed with a sinusoidal voltage V=20 sin100t.
      i. Sketch the output waveform.
      ii. Determine the DC output voltage assuming ideal diode behaviour.
      iii. Repeat the calculations assuming the simplified diode (silicon) model.

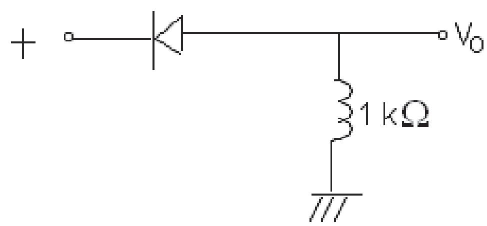

Figure 4a

   (b) Draw the circuit diagram of full wave rectifier having two diodes and explain its operation. [8+8]

5. (a) Compare the merits and drawbacks of FET and BJT.
   (b) Sketch the basic structure of an n-channel JFET.

(c) Define the pinch off voltage V_P and sketch the depletion region before and after pinch-off and explain the reason. [6+4+6]

6. (a) Compare the differences between voltage amplifiers and power amplifiers.
   (b) Show that the maximum theoretical efficiency of class B push-pull amplifiers is 78.5%.
   (c) Draw the circuit of a transformer coupled power amplifier and explain its operations with help of load-line analysis. [4+6+6]

7. (a) List out the characteristics of OP-AMP.
   (b) Explain about the concept of 'Virtual Ground' in OP-AMPs.
   (c) Draw the circuit diagram of emitter coupled differential amplifier and obtain its DC analysis.. [6+4+6]

8. (a) Realize Full adder using Half adders.
   (b) What are universal gates? Explain them.
   (c) Simplify the following functions.
      i. $ABC + A'B'C + A'BC + ABC' + A'B'C'$
      ii. $xyz + x'y + xyz'$. [4+4+8]

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Code No: A0102/RR

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I B.Tech Supplementary Examinations, November 2009
APPLIED MECHANICS
(Civil Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. A mast AB supported by a spherical socket at A and horizontal guy wires BC and BD carries a vertical load P at B as shown in Figure 1. Find the axial force induced in each of the three members of this system. [16]

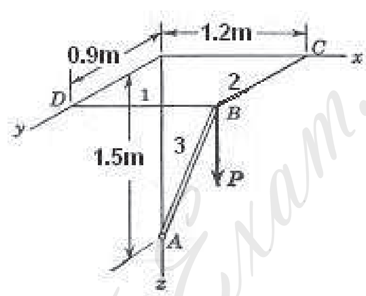

Figure 1:

2. (a) Find the least horizontal force 'P' to start motion of any part of the system of three blocks resting upon one another as shown in figure2. The weights of the blocks are A = 3000N, B = 1000N, C = 2000N. Between A and B μ= 0.3, between B and C, μ = 0.2 and between C and the ground μ = 0.1.

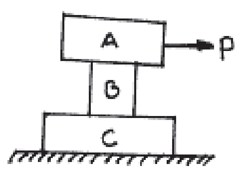

Figure 2:

(b) A block overlying a 10^0 wedge on a horizontal floor and leaning against a vertical wall and weighing 1500N is to be raised by applying a horizontal force to the wedge. Assuming the coefficient of friction to be 0.3, determine the minimum horizontal force to be applied to raise the block. [8+8]
{As shown in the Figure3}

3. An open flat belt drive connects two parallel shafts 1200mm apart. The driving and driven shafts rotate at 350 r.p.m and 140 r.p.m respectively and the driven

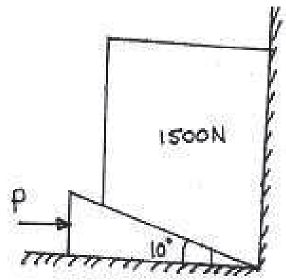

Figure 3:

pulley is 400 mm in diameter. The belt is 5mm thick and 80mm wide. Coefficient of friction between belt and pulley is 0.3 and maximum permissible tension in the belting is $1.4N/mm^2$. Determine.

(a) Diameter of driving pulley.

(b) Maximum power that may be transmitted by the belting and

(c) Required initial tension in the belt. Neglect centrifugal tension. [16]

4. (a) Define the terms centroid, moment of inertia and radius of gyration.

   (b) Compute moment of inertia of hemisphere about its diametral base of radius 'R'. [6+10]

5. A cylinder of diameter 400mm and height 1000mm rests vertically. Over this, a cone of base diameter 400mm and height 500mm is placed such that the axis of the cone coincides with the axis of the cylinder. Find out the mass moment of inertia of this composite solid about a line which passes through the vertex of the cone and which is parallel to the base of the cylinder if the mass density is $4000kg/m^3$. [16]

6. (a) A particle is projected with a velocity of 10m/s at an angle of elevation of 60^0. Find

   i. The equation of the path of motion.
   ii. The length of latus rectum of the path of motion
   iii. Time required to cover the range.
   iv. The length of range.

   (b) An electric train which starts from one station is uniformly accelerated for the first 10 seconds, during which period it covers 150 metres. It then runs with constant speed until it is finally retarded uniformly in the last 40 metres. Calculate the maximum speed and the time taken over the journey to the next stopping station which is 600m form the previous station. [8+8]

7. (a) A homogeneous sphere of radius of a=100 mm and weight W=100 N can rotate freely about a diameter. If it starts from rest and gains, with constant

angular acceleration, an angular speed n=180rpm, in 12 revolutions, find the acting moment. .

(b) A block starts from rest from'A'. If the coefficient of friction between all surfaces of contact is 0.3, find the distance at which the block stop on the horizontal plane. Assume the magnitude of velocity at the end of slope is same as that at the beginning of the horizontal plane.
As shown in the Figure4. [8+8]

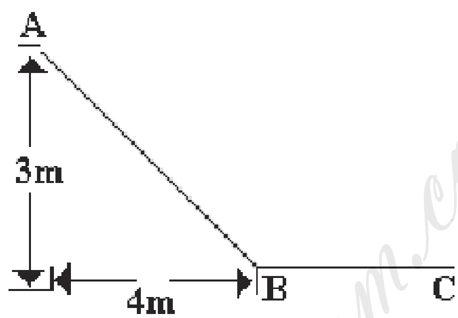

Figure 4:

8. A weight of 10N attached to a spring oscillates at a frequency of 60 oscillations per minute. If the maximum amplitude is 30mm, find the tension induced in the spring. Also find the spring constant and the maximum velocity in the spring. [16]

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Code No: A9906/RR **RR**

I B.Tech Supplementary Examinations, November 2009
SOLID STATE PHYSICS
(Common to Electrical & Electronic Engineering, Electronics & Communication Engineering, Computer Science & Engineering, Electronics & Instrumentation Engineering, Bio-Medical Engineering, Information Technology, Electronics & Control Engineering, Computer Science & Systems Engineering, Electronics & Telematics, Electronics & Computer Engineering and Instrumentation & Control Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Explain the crystal structure of diamond with a two-dimensional diagram.
   (b) What is packing fraction? Calculate the packing fraction for a BCC lattice.
   (c) If the edge of the unit cell of the cube in the diamond structure is 0.356 nm, calculate the number of atoms/m^3. [6+6+4]
2. (a) What are Miller indices? How are they obtained?
   (b) Explain Schottky and Frankel defects with the help of suitable figures. [6+10]
3. (a) Derive time independent Schrodinger's wave equation for a free particle.
   (b) Explain the physical significance of wave function.
   (c) An electron is bound in a one-dimensional infinite well of width 1×10^{-10}m. Find the energy values in the ground state and first two excited states. [8+4+4]
4. (a) Explain the origin of energy bands in solids.
   (b) Assuming the electron - lattice interaction to be responsible for scattering of conduction electrons in a metal, obtain an expression for conductivity in terms of relaxation time and explain any three draw backs of classical theory of free electrons.
   (c) Find the temperature at which there is 1% probability of a state with an energy 0.5 eV above Fermi energy. [6+6+4]
5. (a) What is intrinsic break down in dielectric materials?
   (b) Explain electronic polarization in atoms and obtain an expression for electronic polarisability in terms of the radius of the atom.
   (c) A parallel plate capacitor has an area of 100 cm^2, with a separation of 1 cm and is charged to a potential of 100 V. Calculate the capacitance of the capacitor and the charge on the plates. [4+8+4]
6. (a) What is meant by hysteresis in magnetic materials?
   (b) What are magnetic domains? Explain hysteresis basing on domain theory. [6+10]

7. (a) Obtain an equation for the conductivity of an intrinsic semiconductor in terms of carrier concentration and carrrier mobilities. Suggest a method for evaluating the energy gap of a semiconductor. Explain the temperature dependence of intrinsic conductivity.

   (b) The variation of the resistivity of intrinsic germanium with temperature is given in the following table: [10+6]

T(K)	385	455	556	714
ρ(Ohm-m)	0.028	0.0061	0.0013	0.000274

Determine the value of E_g.

8. (a) Derive expressions for the numerical aperture and the fractional index change of an optical fiber.

   (b) Explain the advantages of optical communication system.

   (c) The numerical aperture of an optical fiber is 0.39. If the difference in the refractive indices of the material of its core and the cladding is 0.05, calculate the refractive index of material of the core. [8+4+4]

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Code No: A9912/RR **RR**

I B.Tech Supplementary Examinations, November 2009
ENGINEERING MECHANICS
(Common to Mechanical Engineering, Mechatronics, Metallurgy & Material Technology, Production Engineering, Aeronautical Engineering and Automobile Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. (a) Define free body diagram, Transmissibility of a force and resultant of a force.

   (b) Two identical rollers, each of weight 100 N, are supported by an inclined plane and a vertical wall as shown in Figure1. Assuming smooth surfaces, find the reactions induced at the points of support A, B and C. [6+10]

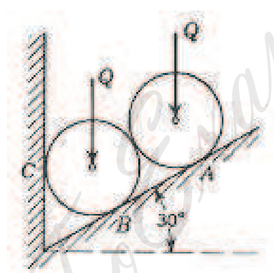

Figure 1:

2. (a) Two blocks which are connected by a horizontal link AB are supported on two rough planes as shown in Figure 2. The coefficient of friction for block 'A' is 0.4. The angle of friction for the block B on the inclined plane is ϕ=20^0. Find the smallest weight W_1 of the block A for which equilibrium can exist.

   (b) Three blocks as shown in figure 3, are placed on a 20^0 incline in contact with each other and at rest. Determine if any of the blocks will move and the friction force on each.
   For A and C, coefficient of static friction $\mu_s = 0.5$
   For A and C, coefficient of kinetic friction $\mu_k = 0.4$
   For B, coefficient of static friction, $\mu_s = 0.3$
   For B, coefficient of kinetic friction $\mu_k = 0.2$. [8+8]

3. An open belt running over two pulleys 1500 mm and 1000 mm diameters connects two parallel shafts 48000 mm apart. The initial tension in the belt when stationary is 3000N. If the smaller pulley is rotating at 600 r.p.m and coefficient of friction between the belt and pulley is 0.3. Determine the power transmitted taking centrifugal tension into account. The mass of belt is given as 0.6703 kg/m length. [16]

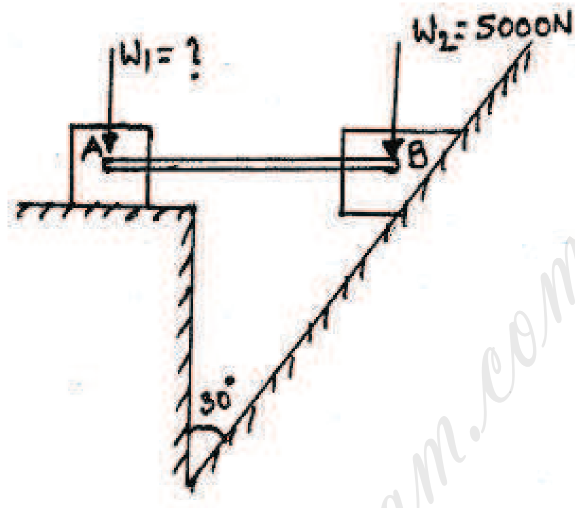

Figure 2:

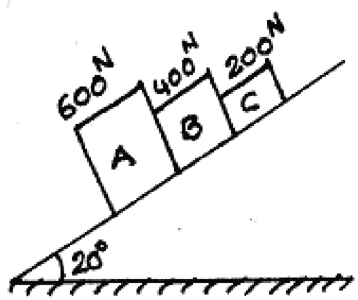

Figure 3:

4. (a) From first principles deduce an expression to determine the centroid of a triangle of base ‘b’ and height ‘h’.

   (b) Determine the centroidal co-ordinates of the shaded area as shown in figure 4. [8+8]

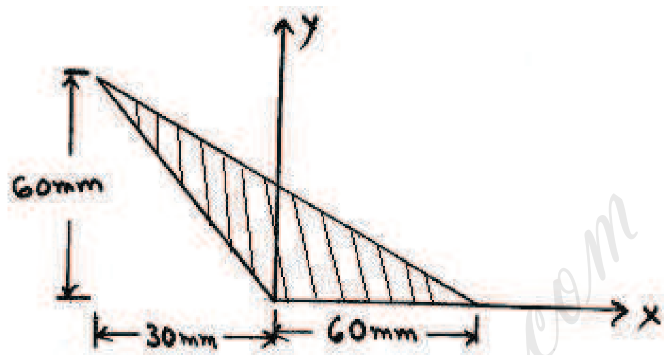

Figure 4:

5. The area shown in figure5 is revolved about x –axis to form a homogeneous solid of revolution of mass ‘m’. Determine the mass moment of inertia of the solid about x-axis. [16]

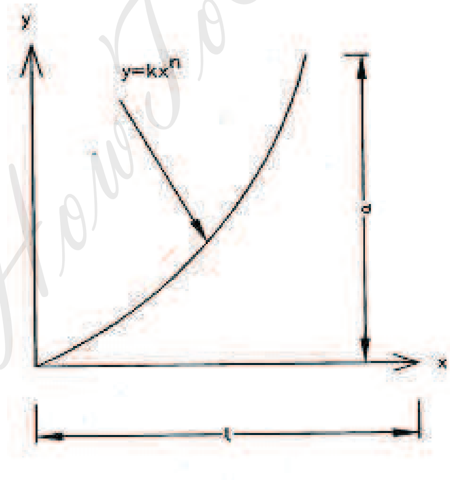

Figure 5:

6. (a) With respect to the plane motion of rigid bodies, explain

      i. Instantaneous centre of rotation
      ii. Centrode
      iii. Absolute and relative velocity

   (b) A bomber flies along a horizontal line at an altitude of 1500m with a velocity of 400 km per hour

i. Find at what horizontal distance before passing over a target on the ground, a bomb should be dropped so as to hit the target on the ground.

ii. calculate the magnitude and direction of the velocity with which the bomb will hit the target.

iii. Where will be the bomber when the bomb strikes the target?
Take g = 9.81 m/sec^2. [8+8]

7. If W_a:W_b:W_c is in the ratio of 3:2:1 , find the accelerations of the blocks A, B, and C. Assume that the pulleys are weightless. {As shown in the Figure6}. [16]

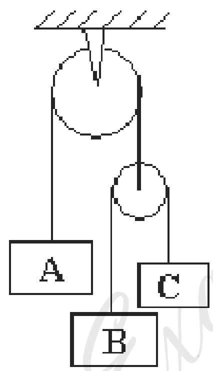

Figure 6:

8. The weight of an empty railway wagon is 240 KN on loading it with goods weighing 320KN, its springs get compressed by 80mm.

(a) calculate its natural period of vibration when

i. empty and

ii. loaded as above.

(b) It is set into natural vibrations with amplitude of 100mm,when empty. Calculate the velocity when its displacement is 40mm from statical equilibrium position. [16]

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Code No: A0802/RR

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I B.Tech Supplementary Examinations, November 2009
STRENGTH OF MATERIALS
(Chemical Engineering)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks
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1. (a) Explain the hardness and toughness of a material.
   (b) Describe the various types of stress.
   (c) Find the total deformation and stresses in the steel bar shown in Figure1 Below [4+4+8]

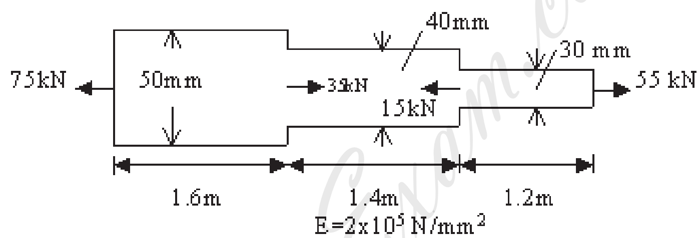

Figure 1:

2. A steel rod of 20mm diameter passes centrally through a brass tube of 40mm external diameter and 30mm internal diameter. The tube is closed at each end by rigid plates of negligible thickness. The nuts are tightened lightly home on the projected parts of the rod. If the temperature of the assemble is raised by 80^0C, calculate the stresses developed in brass and steel.
   Take $E_{steel} = 210$ GPa, $E_{brass} = 100$ GPa
   $\alpha_{steel} = 11.8 \times 10^{-6}$ per ^{0}C, $\alpha_{brass} = 19 \times 10^{-6}$ per ^{0}C. [16]

3. Draw shear force and bending moment diagrams and mark the salient values. [16] (figure2) shown in below.

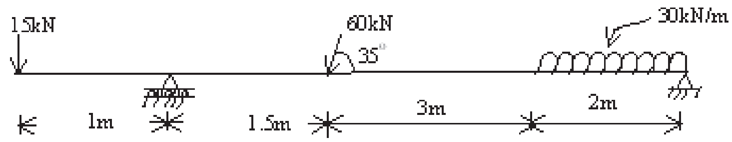

Figure 2:

4. (a) List the assumption involved in the theory of simple bending.
   (b) Compare the weight of two beams of the same material and equal strength. One beam is of solid circular cross section, while the other beam is of hollow circular section, the internal diameter being 0.8 times the external diameter.

(c) Find the section modulus for a rectangular cross section of 200mm × 350mm. [4+8+4]

5. A beam of square section is used as a beam with one diagonal horizontal. The beam is subjected to a shear force F at a section. Find the maximum shear in the cross section of the beam and draw the shear distribution diagram for the section. [16]

6. State and explain the five theories of elastic failure in thick cylindrical shells. Based on the above find the safe ratio of thickness of wall to bore of the tube. [16]

7. At a point within a body subjected to two mutually perpendicular directions, the stresses are 80 N/mm^2 tensile and 40 N/mm^2 tensile. Each of the above stresses is accompanied by a shear stress of 60 N/mm^2. Determine the normal stress, shear stress and resultant stress on an oblique plane inclined at an angle of 45^0 with the axis of minor tensile stress. [16]

8. Find the dimensions of a hollow shaft of internal diameter = 0.6 * external diameter, to transmit 150 kW at 250 r.p.m. if the shearing stress is not to exceed 70 N/mm^2. If a blending moment of 3000 Nm is now applied to the shaft find the speed at which it must be driven to transmit the same power for the same value of the maximum shearing stress. [16]

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Code No: A2301/RR

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I B.Tech Supplementary Examinations, November 2009
FUNDAMENTALS OF BIOLOGY
(Bio-Technology)

Time: 3 hours **Max Marks: 80**

Answer any FIVE Questions
All Questions carry equal marks

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1. Describe the characteristics of living organisms and explain their classification. [16]
2. Describe the economic importance of medicinal plants. [16]
3. Describe the adaptations of animals to aquatic life. [16]
4. What are the fouling organisms? Describe the significance of fouling organisms in fishery. [16]
5. What are the parasites that cause parasitic diseases to domestic lines tock and discuss the control measures? [16]
6. Define transgenic animal Explain the most practiced methods for producing transgenic animals. [16]
7. Explain in detail the general characters of micro organisms with the help of necessary diagrams. [16]
8. What is a bio polyester? Describe the advantages and disadvantages of bio polyesters. [16]

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