# B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EAS101** **Paper ID:0211103**

## Mathematics - I

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)

a) Show that the vectors $X_1 = (1,2,3)$ and $X_2 = (4,-2,7)$ are linearly independent.

b) If $\dfrac{1}{u} = \sqrt{x^2 + y^2 + z^2}$, show that

$$x\frac{\partial y}{\partial x} + y\frac{\partial y}{\partial y} + z\frac{\partial y}{\partial z} = -u$$

c) If $u = \dfrac{y^2}{2x}$, $v = \dfrac{x^2 + y^2}{2x}$, find $\dfrac{\partial(u,v)}{\partial(x,y)}$

d) Write Maclaurin's theorem for two variables.

e) Evaluate the integral:

$$\int_0^1 \int_0^{\sqrt{1-y^2}} 4y\, dy\, dx$$

f) Define gamma function and evaluate the value of $\Gamma(1/2)$

g) If $r = |\vec{r}|$ where $\vec{r} = x\hat{i} + y\hat{j} + z\hat{k}$, find value of

$$\nabla\left(\frac{1}{r}\right) \text{and } \nabla \log |\vec{r}|$$

h) Determine the constant $\lambda$ so that the vector
$\vec{V} = (x+3y)\hat{i} + (y-2z)\hat{j} + (x+\lambda z)\hat{k}$ is solenoidal.

2.

a) Test consistency f the following equations: (6)

x + y +z = 6; x – y + 2z = 5; 3x + y + z = 8;
2x – 2y + 3z = 7.

b) Verify Cayley-Hmilton theorem for the matrix (6)

$$A = \begin{bmatrix} 3 & 1 & 1 \\ -1 & 5 & -1 \\ 1 & -1 & 3 \end{bmatrix}$$

3.

a) The matrix $A = \begin{bmatrix} a & c \\ c & b \end{bmatrix}$ is transformed to the diagonal form D = $T^{-1}AT$, where $T = \begin{bmatrix} \cos\theta & \sin\theta \\ -\sin\theta & \cos\theta \end{bmatrix}$ find the value of $\theta$ which gives this diagonal transformation. (6)

b) If $u = \sin^{-1}\left[\dfrac{x+y}{\sqrt{x}+\sqrt{y}}\right]$, show that $x\dfrac{\partial u}{\partial x} + y\dfrac{\partial u}{\partial y} = \dfrac{1}{2}\tan u$. (6)

4.

a) Find the first six terms of the expansion of the function $e^x\log(1+x)$ in a Taylor's series in the neighborhood of the point (0,0). (6)

b) Transform the equation $\dfrac{\partial^2 v}{\partial x^2} + \dfrac{\partial^2 v}{\partial y^2} = 0$ by putting $x = r\cos\theta, y = r\sin\theta$. (6)

5.

a) Discuss the maxima and minima of the function (6)

$$x^2 + y^2 + \frac{2}{x} + \frac{2}{y}$$

b) Using Lagrange's method of multipliers, find the maxima and minima of $x^2 + y^2$ subject to the condition $ax^2 + 2cxy + by^2 = 1$ (6)

6.

a) Change the order of integration in the following integral and evaluate: (6)

$$\int_{0}^{4a}\int_{x^2/4a}^{2\sqrt{ax}} dydx$$

b) Find the volume of the ellipsoid. (6)

$$\frac{x^2}{a^2}+\frac{y^2}{b^2}+\frac{z^2}{c^2}=1$$

7.

a) Express the following integral in terms of Beta function: (6)

$$\int_{0}^{1}\frac{x^2}{\sqrt{1-x^5}}dx$$

Also evaluate the integral $\int_{0}^{\infty} e^{-x^2}dx$

b) Define curl of a vector point function along with its physical interpretation. (6)

8.

a) If $\vec{F}=(2x+y)\hat{i}+(3y-x)\hat{j}$, (6)

Evaluate $\int_{c}\vec{F}.d\vec{r}$, where C is the curve in the xy-plane consisting of the straight lines from (0,0) to (2,0) and then to (3,2).

b) Find a unit normal vector to the surface $x^2y + 2xz = 4$ at the point (2,-2,3). (6)

Also state Gauss's divergence theorem.

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EEC101** **Paper ID: 0211108**

## Basic Electronics Engineering

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Explain the formation of depletion region at P-N junction.
   b) Find the reverse saturation current of a Si diode at 50°C temperature if the reverse saturation current of this diode at 27°C is 1 μA.
   c) Define α and $\beta$ with respect to BJT and derive the relationship between them.
   d) How is an FET used as voltage variable resistor?
   e) What are the characteristics of an ideal operational amplifier?
   f) Find the output voltage of the following op-amp circuit shown in fig. (1).

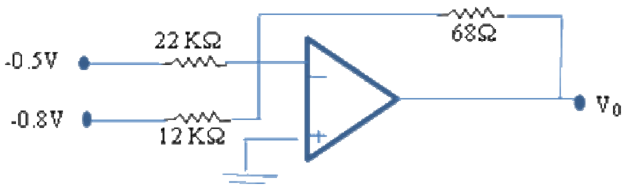


Fig. (1)

   g) Convert the following numbers as indicated:
      i) $(25)_{10}$ = $(\ )_2$
      ii) $(A6B)_{16}$ = $(\ )_2$
   h) Represent AND and OR gate using NAND gate only.

2.
   a) Draw the forward and reverse characteristics of Ge diode and a Si diode. Explain and compare them. (6)
   b) Find $R_{Lmax}$, $R_{Lmin}$, $I_{Lmax}$ and $I_{Lmin}$ for the given zener regulator circuit if the required output voltage across $R_L$ is 5V and $I_{Zmax}$ = 0.8mA Vz=5V in fig (2). (6)

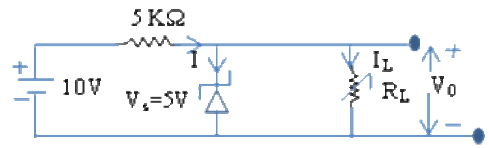


Fig (2)

3.
   a) Draw the circuit of full wave bridge rectifier and derive the following parameters- (6)
      i) Average value of O/P voltage.
      ii) Ripple factor
      iii) PIV.
   b) Draw and explain the input and output characteristic of CE configuration of NPN transistor. (6)

4.
   a) Find IC, IB, IE and operating point of the transistor in the following circuit in fig.(3) if $\beta$ = 100. (6)

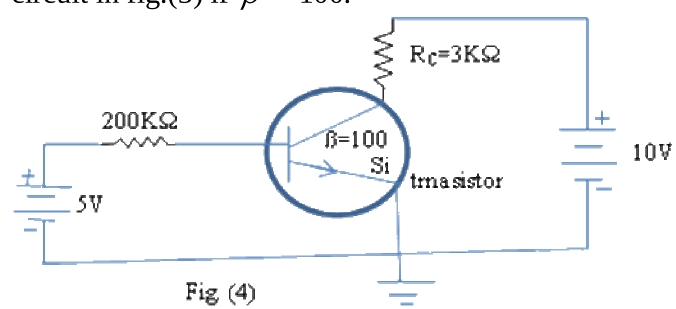


Fig (4)

   b) For a CE amplifier circuit with h-parameters (6)
      $h_{ie}$ = 1.1kΩ, $h_{re}$ = 2.5x$10^{-4}$
      $h_{fe}$ = 50, $h_{oe}$ = 25μA/V and
      load resistance $R_L$ = 4kΩ , source resistance Rs. = 10kΩ
      Calculate $A_v$ , $A_i$, $R_i$ and $R_o$.

5.

a) Sketch the structure of a n type channel depletion type MOSFET and explain its principle of operation with neat diagram. (6)

b) Determine the following for n-channel JFET in fig. (5)

i) $I_{DQ}$

ii) $V_{DS}$

iii) $V_D$

iv) $V_s$

## B.Tech. I SEMESTER EXAMINATION 2010-11

**Course Code: EEE101** **Paper ID: 0212106**

## Basic Electrical Engineering

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Why are the A.C. quantities expressed in R.M.S. values and not in average values?
   b) What is the reactance of 100µF capacitor at (i) A.C. supply of 50Hz (ii) D.C. supply.
   c) What do you understand by active and reactive component of current in an A.C. circuit?
   d) Why are the moving iron instruments popular for measurement of current and voltage?
   e) What will be the power factor, if one wattmeter reads zero in two wattmeter method?
   f) What happens when the transformer is connected to the D.C. supply?
   g) Why D.C. series motor should never be started at no load?
   h) Why rotor of an induction motor can never attain synchronous speed.
2. State and prove maximum power transfer theorem. Find the maximum possible efficiency in this case. (12)
3. Using Norton's theorem, find the current in resistance of 50Ω in given circuit and verify your answer with Theyenin theorem. (12)

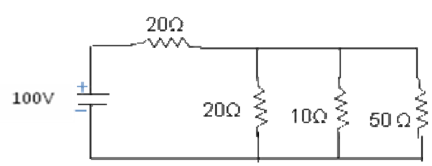

Fig 3(a)

4. Derive the relationship between resonant frequency and half power frequencies in R-L-C series circuit. (12)
5. Explain two wattmeter method for three phase power measurement and derive the relation. (12)

$$\tan\theta = \sqrt{3}\frac{W_1 - W_2}{W_1 - W_2}$$

6. How the iron loss and copper loss are measured in transformer? (12)
7. Explain the principal of operation of three phase induction motor. Draw and explain the torque and slip characteristic. (12)
8. Compare the synchronous motor with three phase induction motor. Why synchronous motor runs with lagging and leading power factor. (12)

**B.TECH. FIRST SEMESTER EXAMINATION 2010-11**

**Course Code: EHM101** **Paper ID: 0111112**

## English Communication-I

**Time: 3 Hours** **Max. Marks: 50**

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (2x5=10)
   a. What are the functions of adjectives, adverbs and?
   b. What is suffix? Give two examples.
   c. Identify the subject and predicate parts in the following sentences:
      i) The third period is vacant.
      ii) Mangoes are fruits.
   d) What are channels of communication?
   e) What do you understand by fragmented sentence? Give two examples.
   f) What is ellipsis? Give two examples.
   g) What is the central idea of the essay ‘A Bookish Topic’?
   h) What is not Priestley’s view of literature?

2. Write a brief note on the elements of human communication. (8)

3. “Communication is essential part of day-to-day life.” Elaborate. (8)

4. What are the barriers to communication? (8)

5. What are the essential features of Gandhian outlook? (8)

6. What is a series? What are the elements of a series? (8)

7. What are homophones? Use the following homophones in your own sentences: (8)
   a) Brake; Break
   b) Cast; Caste
   c) Check; Cheque
   d) Fair; Fare

8. Give the antonym of the following: (8)
   a) Abundance
   b) Thoughtful
   c) Encourage
   d) Ability

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EME101** **Paper ID: 0211101**

## Engineering Mechanics

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Comment on the statement that lines of action of any two components of a force intersect on the line of action of the force.
   b) Friction is a necessary evil. Comment the validity of this statement.
   c) Define shear force and bending moment.
   d) What is a framed structure? List its application.
   e) Define and explain Longitudinal strain, Lateral strain and Poisson's ratio.
   f) What are principal planes and principal stresses?
   g) Define radius of gyration. How is it related to moment of inertia?
   h) Define polar modulus. How is it related to the strength of the shaft?

2.
   a) What is a force polygon? How a force polygon is drawn to determine the magnitude of the resultant of a concurrent force system. (6)
   b) A train weighing 3500kN has a frictional resistance of 5N/kN. What average pull will be required if it is to attain a speed of 72 km/h from rest in 5 minutes on the level? (6)

3.
   a) Describe how you would proceed to draw shear force and bending moment in case of a concentrated load being applied at the mid span of a simply supported beam. (6)
   b) Below Fig. 1.0 shows the sear force diagram of a beam ABCD. Find the position of the supports and the magnitude of reactions. (6)

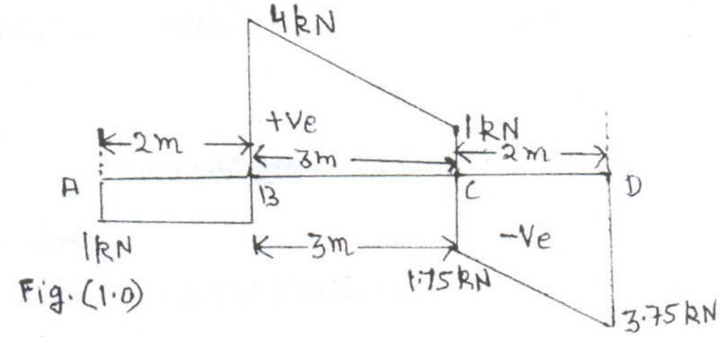

Fig. (1.0)

4. Determine the forces in all the members of the truss loaded and supported as shown in Fig 2.0 (12)

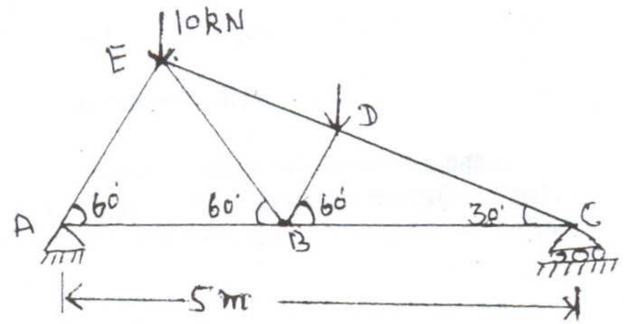

Fig. (2.0)

5.
   a) Sketch stress strain diagram for ductile material and explain its salient features. How does stress strain curve for brittle materials differ from this curve? (12)
   b) A steel tie rod 50 mm in diameter and 2.5m long is subjected to a pull of 100kN calculate the percentage change in extension produced under the same pull by boring the rod centrally for 1.2m length, the bore being 25mm in diameter. For steel modulus of elasticity is $2.5 \times 10^5 N/mm^2$. (6)

6.

a) $\sigma_x$ and $\sigma_y$ are the principal stresses in a strained material. Prove that the resultant stress on the plane carrying maximum shear stress is given by (6)

$$\sigma_r = \sqrt{\frac{\sigma_x^2 + \sigma_y^2}{2}}$$

b) A bar of cross section 800 mm2 is acted upon by axial tensile forces of 50kN applied at each end of the bar. Determine normal and shear stresses on a plane inclined at 30° to the direction of loading.
For what inclination of the plane maximum shear stress occurs? For this plane find the normal and shear stresses. (6)

7.

a) Define section modulus. How it is related to moment of Inertia? Set up relations for the section modulus of the following sections- (6)
i) Circular section
ii) Hollow circular section

b) The moment of inertia of a beam section 50cm deep is 69490 $cm^4$. Find the longest span over which a beam of this section, when simply supported, could carry a uniformly distributed load of 50kN per meter run. The maximum flange stress in the material is not to exceed $110 N/mm^2$ (6)

8.

a) Draw shear stress distribution for shafts of solid and hollow circular cross section. (6)

b) A hollow shaft is to transmit a uniform torque of 30kNm. The total angular twist in 2.5m length of the shaft is not to exceed 2 degree and the allowable shearing stress is 85MPa. Determine the external and internal diameter of the shaft. Take modulus of rigidity of the shaft material as 80GPa. (6)

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: ECS101** **Paper ID: 0211104**

## Computer Basics

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Differentiate between Static RAM and Dynamic RAM.
   b) What are Input and Output devices? List some of the important devices.
   c) What are advantages and disadvantages of Ring Network Topology?
   d) Define information. Why do we need information theory?
   e) What is World Wide Web?
   f) Give any five external DOS commands with their syntax.
   g) What is meant by JPEG? What are the recommendations of JPEG used for?
   h) Draw a flow chart to find sum of N natural number.

2. Draw the block diagram of the computer. Also give various components together with their functions. (12)

3. Write differences among compiler, assembler, and interpreter with example. (12)

4. 
   a) Explain different types of Data Transmission. (6)
   b) Define LAN and WAN. (6)

5. What are advantages of WWW? How do we find information on it? How is it different from internet? What is the role of URL in WWW? (12)

6. List the major features, advantages, disadvantages of following packages. (4x3=12)
   a) MS-Word
   b) MS-Excel
   c) MS-Powerpoint

7. Discuss the basic infrastructure of E-commerce. (12)

8. Write short notes on: (6x2=12)
   a) Impact of information technology in distance education.
   b) Electronic Governance.

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EAS102** **Paper ID: 0211103**

## Physics

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Determinate the speed of flight of a clock which appears to loose 2 minutes every hour.
   b) What happen to the ring system when the Newton's ring apparatus is immersed in a liquid of refractive index μ?
   c) Which is better laser Ruby or He-Ne? Why?
   d) Determine the minimum number of lines in a grating which just resolve in the second order with wavelength of sodium lines 5890Å and 5896 Å.
   e) Calculate the percentage contraction in the length of a rod in the frame of reference moving with velocity 0.8c in the direction.
   f) i) Parallel to its length and ii)at an angle 30° with its length.
   g) What is Double refraction? Define ordinary and extra-ordinary ray.
   h) How Hysteresis curve can be used to select material for construction of electromagnets.
   i) What is Poynting vector and what does it signify?

2.
   a) Derive Einstein's mass-energy equivalence relation. (9)
   b) Calculate the speed at which mass of a body becomes double of its rest mass. (3)

3. Derive Maxwell's equations in different form. (12)

4. What is Compton's Shift? Show that the change in wavelength of photon is given by $\Delta\lambda = h(1-\cos\phi)/(m_0 c)$ where $m_0$ is the rest mass of electron. (12)

5. Describe the construction and theory of plane transmission grating and explain the spectrum formation by it. (12)

6. Describe the construction and working of nicol prism. How it can be used as an analyzer and polarizer? (12)

7. What is spontaneous and stimulated emission? Explain Ruby laser. (12)

8. What are Newton's rings? Explain how it can be used to determine the wavelength of light. (12)

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EME102** **Paper ID: 0211101**

## Manufacturing Sciences

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) What is creep and what is its significance?
   b) What is Extrusion? Draw neat sketch of two types of extrusion processes.
   c) What is DIE casting? Explain with neat sketch.
   d) Make a neat and labled diagram of cupola furnace.
   e) Give any five differences in the shaping and planning machine.
   f) Classify welding processes.
   g) Differentiate between first and third angle method of projection.
   h) Describe the offset method of isometric projection.

2. Define the following properties of materials- (2x6=12)
   a) Stiffness
   b) Malleability
   c) Ductility
   d) Toughness
   e) Hardness
   f) Elasticity

3. 
   a) Compare hot working and cold working. (6)
   b) What is rolling? Explain with neat diagram. (6)

4. 
   a) Describe mould making in detail with neat diagram. (6)
   b) Explain the different allowances provided on pattern. (6)

5. Explain the function of different parts of lathe machine. (12)

6. 
   a) What are the differences between soldering and brazing? (6)
   b) Explain resistance welding with neat diagram. (6)

7. Describe with neat sketch- (3x4=12)
   a) Line Parallel to H.P.
   b) Line Parallel to V.P.
   c) Line inclined to H.P.
   d) Line Inclined to V.P.

8. 
   a) What is Isometric Scale? (4)
   b) Describe the box method of Iso-metric projection. (8)
      i) the principle planes and
      ii) the stress components on these planes.

## B.Tech I SEMESTER EXAMINATION 2010-11

**Course Code: EAS103** **Paper ID: 0211103**

## Chemistry

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

***Note: Attempt six questions in all. Q. No. 1 is compulsory.***

1. Answer any five of the following (limit your answer in 50 words). (3x5=15)
   a) Explain why O-nitrophenol is more volatile than p-nitrophenol?
   b) What is the stabilization energy? And how it differs from bond energy?
   c) What do you mean by Tacticity? How Polymers are classified on the basis of Tacticity?
   d) Explain the conduction property of Graphite. How it is take place?
   e) What is the Break Point Chlorination?
   f) How the resins are regenerated in an ion exchange process?
   g) Define Flash, Fire and Drop Point.
   h) What approaches do you think to deal with global warming?

2. Show how the LCAO method related to wave mechanics. Give rise to bonding and anti-bonding orbitals (molecular orbitals), by using the MO theory predict, the bond order and magnetic behavior of following diatomic molecules- (12)

   $O_2^{2-}$ , $NO^+$, $CO^-$, HCl .

3. What is unit cell? How they are classified? Assume, two molecules of iron are associated per unit cell, calculate its edge length and radius, if the density of iron atom is 7.86kg/m$^3$. (Atomic weight of iron atom = 56) (12)

4. Defines the terms –'Phase', 'Components' and degrees of freedom and also draw a neat labeled phase diagram of water system and explain the areas and curves in it. What is the significance of the triple point and meta stable curve in this system. (12)

5. What are the electrode concentration cells explain with examples. Calculate EMF of the following cell at 25°C. (12)
   Zn-Hg(0.05M) | $Zn^{2+}$ | Zn-Hg(1.50M)
   (R=8.31JK$^{-1}$MOL$^{-1}$, F=96500 Coulomb/mol)

6. How will you calculate the calorific value in bomb calorimeter? (12)
   A sample of coal containing 75% C, 23% H, 2% ASH when coal is tested in laboratory by bomb calorimeter for measuring its calorific value, the following data were obtained:

   Weight of coal burnt = 7.75g
   Weight of water in-copper calorimeter = 580gm
   Water equivalent in bomb and calorimeter = 2000gm
   Rise in temperature of water in calorimeter is = 2.5°C
   Acid correction = 40 calori
   Cooling correction = 3.5°C

   Calculate the gross and net calorific value of the coal in calori/gram. Assuming the latent heat of condensation of steam is 580 cal/gram.

7. Discuss the ion-exchange process for treatment of boiler feed water. How it remove the hardness of water? What are the advantage and limitation of this process? (12)

8. Discuss the various physical properties of liquid lubricants. (12)