Code No: R21014 **R10** SET - 1

II B. Tech I Semester, Regular Examinations, Nov – 2012
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What are the pressure measuring devices? Explain the working of an inverted U tube differential manometer.
   b) A pipe containing water at 172 kN/m^2 pressure is connected by a differential guage to another pipe 1.5m lower than first pipe and containing water at high pressure. If the difference in the heights of the two mercury columns of the guage is equal to 75mm, what is the pressure in the lower pipe? Specific gravity of mercury is 13.6.

2. Find the net hydrostatic force per unit width on the rectangular gate AB in Figure 1 and the line of action. Specific gravity of Glycerin is 1.263.

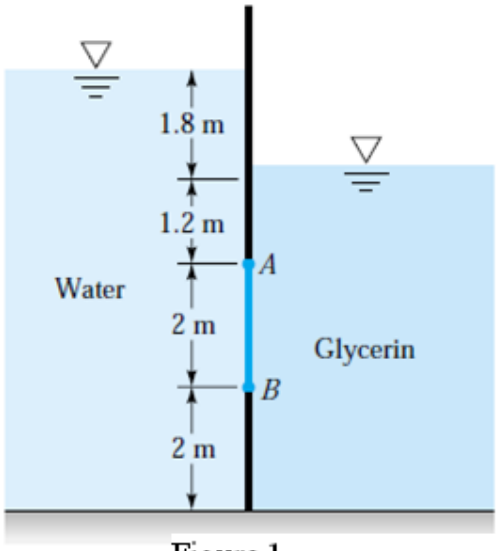

Figure 1

3. a) What is flow net? What are its characteristics? What are the uses of flow nets?
   b) A flow field is represented by a velocity potential function as given below $\varphi = c(2x^2 - 3y^2)$ verify whether it is a valid function or not? If valid, then find out the corresponding stream function.
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4. A pipeline carrying oil of specific gravity 0.87., changes in diameter from 200 mm diameter at a position A to 500 mm diameter at a position B which is 4 m at a higher level. If the pressure at A and B are 9.81 N/cm^2 and 5.886 N/cm^2 respectively and the discharge is 200 litres/s, determine the loss of head and direction of flow.

5. For the velocity profile for laminar boundary layer $\frac{u}{U} = \frac{3}{2}\left(\frac{y}{\delta}\right) - \frac{1}{2}\left(\frac{y}{\delta}\right)^2$ Find the boundary layer thickness, shear stress, force and co-efficient of drag in terms of Reynolds number.

6. a) Water at 15^{0}c flows between two large parallel plates at a distance of 1.6 m apart. Determine i) the maximum velocity ii) the pressure drop per unit length and iii) the shear stress at the walls of the plates if the average velocity is 0.2 m/s. the viscosity of water at 15^{0}C is given as 0.01 poise.
   b) Describe Reynold's experiment to demonstrate the two types of flow.

7. A pipe of diameter 20 cm and length 2000 m connects two reservoirs, having difference in water levels as 20 m. Determine the discharge through the pipe. If an additional pipe of diameter 20 cm and length 1200 m is attached to the last 1200 m length of the existing pipe, find the increase in the discharge. Take f = 0.015 and neglect minor losses.

8. a) Derive an equation for discharge of an orifice meter.
   b) An orifice meter with orifice diameter 15 cm is inserted in a pipe of 30 cm diameter. The pressure gauges fitted upstream and downstream of the orifice meter give readings of 14.715 N/cm^2 and 9.81 N/cm^2 respectively. Find the rate of flow of water through the pipe in litres/sec. Take C_d = 0.60.

Code No: R21014 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Define and Write short note on the fallowing
   i) Pascal Law ii) Hydrostatic law iii) Surface Tension

   b) The velocity distribution in a fluid is give by u = 30000 y (1-2y) where u is the velocity in m/sec at a distance of y meters normal to the boundary. If the dynamic viscosity of fluid is 1.8 × 10 poise, determine the shear stress at y = 0.2m.

2. a) Explain three conditions of equilibrium of a floating body.
   b) Panel *ABC* in the slanted side of a water tank is an isosceles triangle with the vertex at *A* and the base *BC* = 2 m, as in Fig. 1. Find the water force on the panel and its line of action.

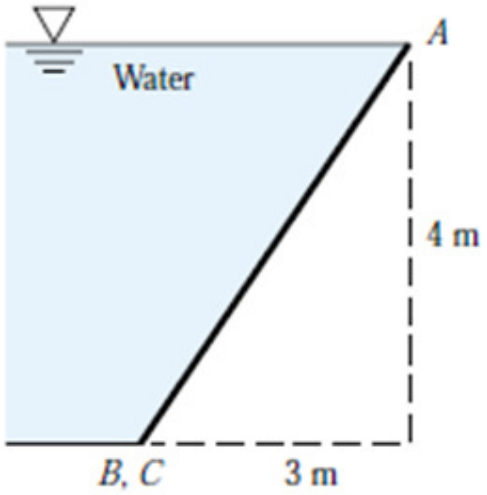

Figure 1

3. a) Define Steady flow and unsteady flow
   b) Show that $=x^2-y^2$ represents on two dimensional irrotational flow. Find the potential function

4. State Bernoulli's theorem for steady flow of an incompressible fluid. Derive an expression for Bernoulli's equation from the first principle and state the assumptions made for such a derivation.
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5. Air is owing over a smooth plate with a velocity of 8 m/s. The length of the plate is 1.5 m and width 1 m. If the laminar boundary exists upto a value of Reynold number = 5 x 10^5, find the maximum distance from the leading edge upto which laminar boundary layer exists. Find the maximum thickness of laminar boundary layer if the velocity profile is given by $\frac{u}{U} = \left(\frac{y}{\delta}\right) - \left(\frac{y}{\delta}\right)^2$ Take Kinematic viscosity for air = 0.15 stokes.

6. a) Determine i) the pressure gradient, ii) the shear stress at the two horizontal parallel plates and ii) the discharge per meter width for the laminar flow of oil with a maximum velocity of 2 m/sec between two horizontal parallel fixed plates which are 100 mm a part. Given μ = 2.4525 N s/m^2.
   b) Describe Reynold's experiment to demonstrate the two types of flow.

7. Lubricating oil of specific gravity 0.82 and dynamic viscosity 12.066 x 10^2 N.s/m^2 is pumped at a rate of 0.02 m^3/s through a 0.15 m diameter 300 m long pipe. Calculate the pressure drop, average shear stress at the wall of the pipe and the power required to maintain the flow, if the pipe is inclined at 15 degree with the horizontal and the flow is in upward direction.

8. a) Derive the expression for computing the discharge through an orfice meter
   b) A rectangular notch of 250 cm width is used to mesure the flow rate of water in an open channel. If the actual flow rate is 1.16 m^3/s, under a head of 0.253 m. Determine the coefficient of discharge of the notch.

Code No: R21014 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) For measuring small pressure differences, explain with sketches how an inclined U-tube manometer is used.

   b) A pressure gauge is fitted at the bottom of a closed vessel to which a simple manometer is also fitted as shown in figure 1. Determine the reading indicated by the pressure gauge, if manometric liquid is mercury.

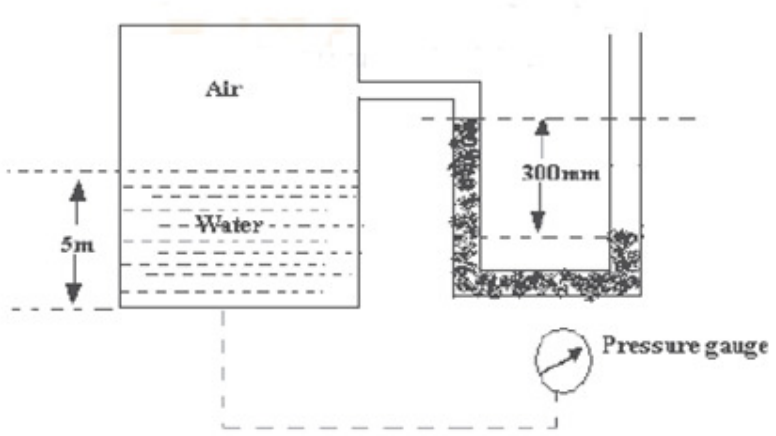

Figure 1

2. Derive an expression for the depth of centre of pressure from free surface of liquid of an inclined plane surface submerged in the liquid.

   b) Find the total pressure and position of centre of pressure on a triangular plate of base 2.4m and height 3.6m which is immersed in water in such a way that the plan of the plate makes an angle of 600 with the free surface of the water. The base of the plate is parallel to water surface and is at a depth of 3.0m from water surface.

3. a) What type of acceleration is to be expected if:
   i) Stream lines are parallel and equidistant
   ii) Stream lines are straight and converging
   iii) Stream lines are curved but equispaced
   iv) Stream lines are curved and converging
   b) Derive the equation for a stream line.
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4. Crude oil of specific gravity 0.85 flows upwards at a volume rate of flow of 60 litre per second through a vertical venturimeter with an inlet diameter of 200 mm and a throat diameter of 100 mm. The coefficient of discharge of the venturimeter is 0.98. The vertical distance between the pressure tappings is 300 mm. (i) if two pressure gauges are connected at the tappings such that they are positioned at the levels of their corresponding tapping points, determine the difference of readings in N/mm^2 of the two pressure gauges. (ii) If a mercury differential manometer is connected, in place of pressure gauges, to the tappings such that the connecting tube upto mercury are filled with oil, determine the difference in the level of the mercury column.

5. For the velocity pro_le for turbulent boundary layer $\frac{u}{U} = \left(\frac{y}{\delta}\right)^{1/7}$ Obtain an expression for boundary layer thickness, shear stress and drag force on one side of the plate, in terms of Reynold`s number. Given the shear stress for turbulent boundary layer as $0.0225\rho u^2\left(\frac{\mu}{\rho}u\delta\right)^{1/4}$

6. a) Draw neat sketch of Reynold's apparatus and explain how the laminar flow can be demonstrated with the help of the apparatus.
   b) Two parallel plates kept 100 mm apart having laminar flow of oil between them with a maximum velocity of 1.5 m/sec. Calculate discharge per meter width, shear stress at the plates and the difference in pressure between two points 20 m apart. Assume viscosity of oil to be 0.0245 poise.

7. Determine the rate of low of water through a pipe of diameter 20 cm and length 50 m when one end of the pipe is connected to a tank and other end of the pipe is open to the atmosphere. The pipe is horizontal and th height of water in the tank is 4 m above the ceneter of the pipe. Consider all minor losses and take f = 0.009 in the formula $h_f = \frac{4flv^2}{2gD}$

8. A broad crested weir of 50 m length has 50 cm height of water above its crest. a) Find the maximum discharge by neglect the velocity of approach. b) If the velocity of approach is to be taken into consideration, find the maximum discharge when the channel has a cross sectional area of 50 m^2 on the upstream side. Take $C_d = 0.60$.

Code No: R21014 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
FLUID MECHANICS
(Civil Engineering)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Define and Write short note on the fallowing
   i) Pascal Law ii) Hydrostatic law iii) Surface Tension
   b) An inverted U-tube manometer is connected to two horizontal pipes A and B through which water is owing. The vertical distance between the axes of these pipes is 20cm. When an oil of specific gravity 0.7 is used as a gauge fluid, the vertical heights of water columns in the two limbs of the inverted manometer (when measured from the respective centre lines of the pipes) are found to be same and equal to 25cm. Sketch the configuration. Determine the difference of pressure between the pipes.

2. a) What do you mean by Hydrostatic pressure.
   b) Define Total pressure and centre of pressure
   c) A circular plate 2.5m in diameter is submerged in water as shown in figure 1. Its greatest and least depths below free surface of water are 3m and 2m respectively. Find i) Total pressure on front face of the plate and ii) the position of centre of pressure

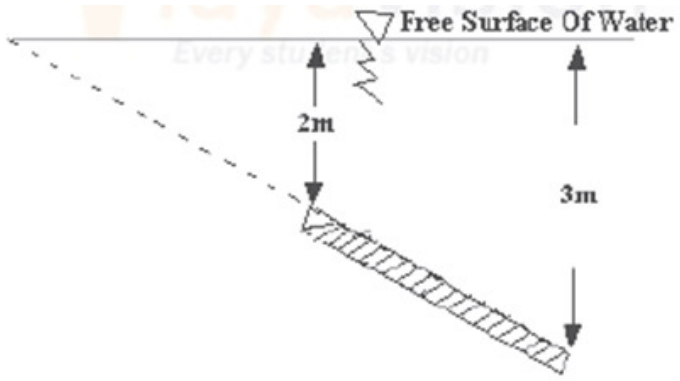

Figure 1

3. a) What are Stream function and velocity functions?
   b) Define the Equation of Continuity? Derive the Continuity Equation for three dimensional flow from fundamentals by indicating the assumptions made where ever is required.

4. A 30 cm x 15 cm venturimeter is provided in a vertical pipe line carrying oil of specific gravity 0.9, the flow being upwards. The difference in elevation of the throat section and entrance section of the venturimeter is 30 cm. the differential U tube mercury manometer shows a gauge deflection of 25 cm. Calcualte the (i) the discharge of oil, and (ii) the pressure diffrenece between the entrance section and throat section. Take the coefficient of meter as 0.98 and specific gravity of mercury as 13.6.
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5. a) Explain the phenomenon of boundary layer separation and its influence on the drag of an immersed body.
   b) In a at plate of 2m length and 1m wide, experiments were conducted in a wind tunnel with a wind speed of 50 Km/hr. The plate is kept at such an angle that the coefficients of drag and lift are 0.18 and 0.9 respectively. Determine drag force, lift force, resultant force and power exerted by the air stream on the plate. Take density of air as 1.15 Kg/m^3.

6. a) Prove that the velocity distribution of viscous flow between two parallel plates when both plates are fixed across a section parabolic in nature. Also prove that maximum velocity is equal to one and half times the average velocity.
   b) Water is flowing between two large parallel plates which are 2 m a part. Determine maximum velocity, pressure drop per unit length and shear stress at walls of the plate, if the average velocity is 0.4 m/sec. Take viscosity of water as 0.01 poise.

7. A pipe of diameter 20 cm and length 10,000 m laid at a slope of 1 in 200. An oil of specific gravity = 0.9 and μ = 1.15 poise is pumped up at the rate of 20 litres per second. Find the head lost due to friction. Also find the power required to pump the oil.

8. a) What are the advantages of triangular Notch over Rectangular Notch?
   b) A rectangular channel 2.0 m wide has a discharge of 250 litres per second, which is measured by a right angled V – notch weir. Find the position of the apex of the notch from the bed of the channel if maximum depth of water is not to exceed 1. 3m. Take c_d = 0.62.

Code No: R21026 **R10** SET - 1

II B. Tech I Semester, Regular Examinations, Nov – 2012
ELECTRONIC DEVICES AND CIRCUITS
(Com. to EEE, ECE, EIE, ECC, CSE, IT, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Trace the path of an electron in perpendicular electric and magnetic fields.
   b) In a CRT, a pair of deflecting plates is spaced 1cm apart and the virtual cathode is observed at 2cm from the starting point of deflecting plates. The distance from the centre of plates to the screen is 48cm. Calculate
   i) Deflection produced by deflecting voltage of 60V
   ii) Angle which the beam makes with the axis of the tube on emerging from the field, if the final anode voltage is 2000 V. (9M+6M)

2. a) Show that the Fermi energy level lies in the centre of forbidden energy band for an intrinsic semiconductor.
   b) Find the concentration of holes and electrons in a p-type Silicon at 300K assuming resistivity as 0.02Ω-cm. Assume μ_p=475m^2/V-sec, n_i=1.45*10^{10}/cm^3 (10M+5M)

3. a) What is Tunnel diode? Explain its characteristics with the help of energy band diagrams
   b) Explain about construction of LED and its voltage drop and current with necessary diagrams. (10M+5M)

4. A voltage of 500 cos wt is applied to Half Wave Rectifier with load resistance of 5KΩ Define and derive the values of Maximum DC Voltage component, R.M.S. current, Ripple Factor, Transformer Utilization Factor, PIV and Rectifier Efficiency of the rectifier. (15M)

5. a) What is a transistor? Explain about its operation.
   b) Derive Emitter Efficiency, Transport factor and large signal current gain and derive the relation between them. c) Explain how transistor works as an amplifier (4M+7M+4M)

6. a) Draw the circuit diagram of Common Drain amplifier and derive expressions for voltage gain and input resistance.
   b) What are the values of I_D and g_m for V_{GS} = -1.5V if I_{DSS} and V_P are given as 8.4mA and – 3V respectively. (9M+6M)

7. a) Explain the need of biasing and stabilization.
   b) If the various parameters of a CE amplifier which uses the self bias method are V_{CC}=12V, R_1=10KΩ, R_2=5KΩ, R_C=1KΩ, R_e=2KΩ and β=100, find
   i) The coordinates of the operating point and
   ii) The stability factor, assuming the transistor to be of silicon. (3M+12M)

8. Derive the expressions for voltage gain, current gain, input impedance, output impedance of CE amplifier, using exact and approximate model. (15M)
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Code No: R21026 **R10** SET - 2

II B. Tech I Semester, Regular Examinations, Nov – 2012
ELECTRONIC DEVICES AND CIRCUITS
(Com. to EEE, ECE, EIE, ECC, CSE, IT, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) An electron is moving perpendicular to magnetic field (B). Analyze the trajectory of electron and derive expression for Radius (R) of trajectory and period of rotation (T).
   b) An electron having initial velocity corresponding to 300V is projected perpendicularly into a uniform magnetic field of intensity 10^{-3}Wb/m^2. Find
      i) Radius of path of one revolution
      ii) Time taken for one revolution (9M+6M)

2. If the electron is accelerated at an angle of 40^0.
   a) What is Hall Effect? Derive an expression for Mobility (μ).
   b) An n-type Si bar whose resistivity is 1000Ω-m and width 1cm is used in Hall Effect experiment. If the current in the bar is 10μA and Hall voltage is 40mV. Find the mobility if the applied magnetic field is of intensity 0.3077Wb/m^2 and also find out the Hall Coefficient. (9M+6M)

3. a) Compare the characteristics of PN junction diode, Zener Diode and Tunnel diode.
   b) Explain Law of Junction.
   c) For a Ge diode, the I_0=2μA and the voltage of 0.26V is applied. Calculate the forward and reverse dynamic resistance values at room temperature. (6M+5M+4M)

4. a) Explain the operation of Full Wave Rectifier with necessary graphs.
   b) A 3KΩ resistive load is to be supplied with a D.C. voltage of 300V from A.C. voltage of adequate magnitude and 50Hz frequency by wave rectification. The LC filter is used along the rectifier. Design the bleeder resistance, turns ratio of transformer, VA rating of transformer and PIV rating of diodes. (7M+8M)

5. a) Explain the operation of CB Configuration of BJT and its input and output Characteristics briefly
   b) A transistor with α=0.97 has a reverse saturation current of 1μA in CB configuration.
   Calculate the value of leakage current in the CE configuration. Also find the collector current and the emitter current if the value of base current is 20μA. (7M+8M)

6. a) Why we call FET as a Voltage Controlled Device.
   b) Define DC Drain resistance, AC Drain Resistance, Amplification Factor and derive them. (5M+10M)

7. a) What is Biasing? Explain the need of it. List out different types of biasing methods
   b) In a Silicon transistor circuit with a fixed bias, V_{CC}=9V, R_C=3KΩ, R_B=8KΩ,β=50,V_{BE}=0.7V. Find the operating point and Stability factor. (7M+8M)

8. a) Analyze a Single stage transistor amplifier using h-parameters.
   b) Give the approximate h-parameter conversion formulae for CC and CB configuration in terms of CE. (7M+8M)
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Code No: R21026 **R10** SET - 3

II B. Tech I Semester, Regular Examinations, Nov – 2012
ELECTRONIC DEVICES AND CIRCUITS
(Com. to EEE, ECE, EIE, ECC, CSE, IT, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Describe the two dimensional motion of an electron in perpendicular electric and magnetic fields
   b) In a CRT, a pair of deflecting plates is spaced 0.5cm apart and the distance from origin of plates to screen is 25cm. The distance from the centre of plates to the screen is 24cm. The final anode voltage is 1000V. Calculate i) Deflection produced by deflecting voltage of 30V ii) Angle which the beam makes with the axis of the tube on emerging from the field. (9M+6M)
2. a) Explain about the carrier concentration and Fermi level in intrinsic semiconductors. Also derive the number of electrons and holes present in it.
   b) The Hall Effect is used to determine the mobility of holes in a p-type silicon bar. Assume the bar resistivity is 2, 00,000Ω-cm, the magnetic field intensity is 0.1Wb/m^2 and the width is 3mm. the measured values of the current and Hall voltage are 10mA and 50mV respectively. Find the mobility of holes. (10M+5M)

3. a) Explain about current components of a PN junction diode.
   b) Explain V-I characteristics and Temperature dependence of characteristics.
   c) Explain Einstein's relation and find out the diffusion constant of holes if their mobility is given as 0.039m^2/v-sec. (4M+7M+4M)

4. a) Explain the operation of Full Wave Rectifier with Induction filter with necessary diagrams.
   b) A diode whose internal resistance is 20Ω is to supply power to a 100Ω load from 110V (R.M.S) source of supply. Calculate i) Peak Load Current ii) DC Load Current iii) AC Load Current iv) % Regulation from No load to given load (7M+8M)

5. a) What is Transistor? Explain operation of a Transistor in CE configuration.
   b) In which configuration we find Base width modulation? Explain about it.
   c) If a transistor, with α=0.96 and emitter to base resistance 80 Ω is placed in Common Emitter Configuration. Find A_I, A_V and A_P (6M+4M+5M)

6. a) Explain the working principle of UJT with its characteristics.
   b) For the Common Source Amplifier, calculate the value of the voltage gain, given
      i) r_d=100KΩ, R_L=10KΩ, g_m=300μ and R_O=9.09KΩ.
      ii) If C_{DS}=3pF, determine the output impedance at a signal frequency of 1MHz. (8M+7M)

7. a) What is the necessity of biasing circuits? Derive the expression for stability factor of self bias circuit
   b) Explain in detail about Thermal Runaway and Thermal Resistance. (8M+7M)

8. a) Give disadvantages of h-parameter analysis.
   b) Give the approximate h-parameter conversion formulae for CB and CE configuration in terms of CC.
   c) Compare A_V, A_I, R_i and R_o of CE, CB and CC configurations (3M+8M+4M)

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Code No: R21026 **R10** SET - 4

II B. Tech I Semester, Regular Examinations, Nov – 2012
ELECTRONIC DEVICES AND CIRCUITS
(Com. to EEE, ECE, EIE, ECC, CSE, IT, BME)

Time: 3 hours Max. Marks: 75

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Derive an expression for magneto static deflection sensitivity in the case of CRT.
   b) An electron moving with a velocity of 10^7m/sec enters a uniform magnetic field at an angle of 30^0 with it. Calculate the magnetic flux density required in order that the radius of helical path is 2m. Also calculate the time taken by the electron for one revolution. (9M+6M)

2. a) Discuss Continuity Equation.
   b) Calculate the intrinsic concentration of Germanium in carriers/m^3 at a temperature of 320^0K given that ionization energy is 0.75eV and Boltzmann's constant K=$1.374*10^{-23}$J/^{0}K. Also calculate the intrinsic conductivity given that the motilities' of electrons and holes in pure germanium are 0.36 and 0.17m^2/volt-sec respectively (9M+6M)

3. a) Derive an expression for transition capacitance.
   b) Explain Avalanche and Zener Breakdowns.
   c) Explain about PIN and Photo diodes. (7M+4M+4M)

4. a) Derive the expression for Ripple factor for Full Wave Rectifier with L-Section filter. Explain the necessity of a bleeder resistor.
   b) A sinusoidal voltage whose V_m=24V is applied to half-wave rectifier. The diode may be considered to be ideal and R_L=1.8KΩ is connected as load. Find out peak value of current, RMS value of Current, DC value of current and Ripple factor. (7M+8M)

5. a) Explain the operation of CC Configuration of BJT and its input and output characteristics briefly
   b) Explain about Punch through and Base width modulation. (7M+8M)

6. a) Draw the FET tree and draw circuit symbols for all types of FET.
   b) Why we call FET as a Voltage Controlled Device.
   c) What are the values of I_D and g_m for V_{GS} = -0.8V if I_{DSS} and V_P are given as 12.4mA and -6V respectively. (6M+4M+5M)

7. a) What is the need of biasing?
   b) In a Self bias circuit containing R_1=80KΩ, R_2=25KΩ, R_e=2KΩ, R_C=2KΩ, β=100, V_{CC}=12V, V_{BE}=0.7V. Find the operating point, S and S'. (3M+12M)

8. a) Give the advantages of h-parameter analysis.
   b) The h-parameters of a transistor used in a CE circuit are h_{ie}=1KΩ, h_{re}=0.001. h_{fe}=50, h_{oe}=100K. The load resistance for the transistor is 1KΩ in the collector circuit. Determine R_i, R_O, A_V, A_i in the amplifier stage (Assume R_s= 1KΩ) (3M+12M)
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Code No: X0221 **R07** SET - 1

II B. Tech I Semester Supplementary Examinations Nov – 2012
MATHEMATICS - III
(Com. to EEE, ECE, EIE, ECC)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Evaluate $\int_0^1 \left\{ \sqrt[3]{x \ln\left(\frac{1}{x}\right)} \right\} dx$.

   b) Evaluate $\int_0^{\frac{\pi}{2}} \sin^6\theta \cos^7\theta \, d\theta$.

   c) Show that $\frac{d}{dx}\left[x^n J_n(x)\right] = x^n J_{n-1}(x)$.

2. a) If f(z) is an analytic function, Show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2}\right)|f(z)|^2 = 4|f'(z)|^2$

   b) Find the analytic function whose imaginary part is e^x (x sin y + y cosy).

3. a) Find the all the roots of the equation $e^z = -2$.
   b) Separate into real and imaginary parts of f(z)=cot(x+ *i*y).
   c) Find the real part of the principal value of $(1 + i)^{1-i}$

4. a) Evaluate $\int_0^{3+i} z^2 \, dz$ along the path the real axis to 3 and then vertically to 3+*i*.

   b) Use Cauchy's integral formula to evaluate

   $\int_C \frac{1}{z^2+9} dz$ Where *C* is the circle i) $|Z - 3i| = 4$ ii) $|Z + 3i| = 2$.

5. a) Find Taylor's expansion of f (z) = sin z about the point $z = \frac{\pi}{2}$.

   b) Find the Laurent series of $f(z) = \frac{(z-2)(z+2)}{(z+1)(z+4)}$, *for* $1 < |z| < 4$.

   c) What type of singularity has the function $f(z) = \frac{1 - e^{2z}}{z^4}$
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6. a) Determine the poles of the function $f(z) = \dfrac{z^2 - 2x}{(z+1)^2\,(z^2+1)}$ and find residue at each pole.

   b) Evaluate $\oint_C \dfrac{\tan z}{(z^2 - 1)}\,dz$ *where C is* $|z| = 3/2$.

   c) Use residue theorem to evaluate $\int_0^{2\pi} \dfrac{d\theta}{\sqrt{2 - \cos\theta}}$

7. a) State and prove Argument principle.
   b) Use Rouche's theorem to determine the number of zeros of the polynomial $p(z) = e^z - 4z^n + 1$ which lie inside the circle $|z| = 1$.

8. a) Determine the image of the region $|z - 2i| = 2$ under the transformation $w = \dfrac{1}{z}$.

   b) Determine the bilinear transformation that maps the points $z_1 = 0, z_2 = i, z_3 = \infty$ into the points $w_1 = 0, w_2 = \dfrac{1}{2}, w_3 = \infty$ respectively.

Code No: X0221 **R07** SET - 2

II B. Tech I Semester Supplementary Examinations Nov – 2012
MATHEMATICS - III
(Com. to EEE, ECE, EIE, ECC)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Evaluate $\int_0^2 \left\{x^3\sqrt{8-x^3}\right\}dx$.

   b) Evaluate $\int_0^{\frac{\pi}{2}} \frac{3\sqrt{\sin 8x}}{\sqrt{\cos x}}dx$

   c) Show that $\frac{d}{dx}\left[x^{-n}J_n(x)\right] = -x^n J_{n+1}(x)$

2. a) If $f(z)$ is an analytic function,
   Show that $\left(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2}\right)|f(z)|^n = n^2|f(z)|^{n-2}|f'(z)|^2$

   b) Find the analytic function whose real part is e^{2x}(x cos 2y – y sin 2y).

3. a) Find the all Solutions of the equation $e^{2z-1}=1$.
   b) Separate into real and imaginary parts of f (z) =tan(x + *i*y).
   c) Find the real part of the principal value of $i^{\log(1+i)}$.

4. a) Evaluate $\int_0^{2+i} z^{-2}dz$ along the path of real axis to 2 and then vertically to 2+i.

   b) Use Cauchy's integral formula to evaluate $\int_C \frac{e^z}{z^2+1}dz$ where C is the circle

   i) $|z-i|=1$. *ii)* $|z+i|=1$.

5. a) Find Taylor's expansion of f(z) = *cos z* about the point $z=\frac{\pi}{2}$.

   b) Find the Laurent series of $f(z)=\frac{z^2-1}{(z+2)(z+3)}$, *for* $|z|>3$.

   c) What type of singularity has the function $f(z)=\frac{z-\sin z}{z^2}$.
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6. a) Determine the poles of the function $f(z)=\dfrac{z^2+1}{z^2-z}$. and the find residue at each pole.

   b) Evaluate $\oint_C \dfrac{\cosh z}{z^3-3iz}\,dz$ *where C is* $|z|=1$.

   c) Use residue theorem to evaluate $\int_0^{2\pi} \dfrac{d\theta}{2+\cos\theta}$.

7. a) State and prove Rouche's theorem.
   b) Use Rouche's theorem to determine the number of zeros of the polynomial $P(z)=z^4-8z+10$ that lie within the annulus region $1<|z|<3$.

8. a) Find and plot the rectangular region $0\le x\le 2, 0\le y\le 1$ under the transformation
   $w=\sqrt{2}\,e^{\frac{i\pi}{4}}z$.
   b) Determine the bilinear transformation that maps the points $z_1=-2$, $z_2=0$, $z_3=2$ into the points $w_1=\infty$, $w_2=\dfrac{1}{2}$, $w_3=\dfrac{3}{4}$ respectively

Code No: X0221 **R07** SET - 3

II B. Tech I Semester Supplementary Examinations Nov – 2012
MATHEMATICS - III
(Com. to EEE, ECE, EIE, ECC)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Evaluate $\int_0^a \left\{ x^4 \sqrt{a^2 - x^2} \right\} dx.$

   b) Evaluate $\int_0^{\frac{\pi}{2}} \sqrt{Cot\,\theta}\, d\theta$

   c) Prove that $(n+1)\,P_{n+1}(x) = (2n+1)\,x\,P_n(x) - nP_{n-1}(x)$.

2. a) If $f(z)$ is an analytic function,
   Show that $\left(\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{dy^2} \right) \left| Re(f(z))^2 \right| = 2\left| f'(z) \right|^2$.

   b) Find the analytic function whose imaginary part is $\frac{2\sin x \sin y}{(\cos 2x + \cosh 2y)}$.

3. a) Find the all Solutions of the equation $e^z = 3+4i$.
   b) Separate into real and imaginary parts of $f(z) = \cos(x + iy)$.
   c) Find the principal value of $(1+i)^{2-i}$.

4. a) Evaluate $\int_{1+i}^{2+i} (2x + iy + 1)\, dz$ along the path the straight line joining $1-i$ and $2+i$.

   b) Use Cauchy's integral formula to evaluate $\int_C \frac{cosz}{(z - \pi i)^2} dz$ where C is the circle $|z| = 5$.

5. a) Find Taylor's expansion of $f(z) = \log(1+z)$ about the point z=0.

   b) Find the Laurent's expansion of $f(z) = \frac{7z - 2}{(z+1)\,z\,(z-2)}$ in the region $1 < |z+1| < 3$.

   c) What type of singularity has the function $f(z) = \frac{e^{2z}}{(z-1)^4}$
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6. a) Determine the poles of the function $f(z) = \dfrac{z^2}{(z-1)^2 (z+2)}$ and the residue at each pole.

   b) Evaluate $\int_C \dfrac{dz}{\sinh z}$ Where C is the circle $|z| = 4$, using residue theorem

   c) Use residue theorem to evaluate $\int_0^{2\pi} \dfrac{d\theta}{\frac{5}{4} + \sin\theta}$

7. a) State and prove Fundamental theorem of Algebra.
   b) Use Rouche's theorem to determine the number of zeros of the polynomial $P(z)=z^7-z^3+12$ lie within the annulus region $1<|z|<2$.

8. a) Determine and plot the image of the region $1 \le |z| \le \dfrac{3}{2}$ *and* $\dfrac{\pi}{6} \le |\theta| \le \dfrac{\pi}{3}$ *under* $w = z^2$.

   b) Determine the bilinear transformation that maps the points $z_1=-1$, $z_2=i$, $z_3=1$ into the points $w_1= 0$, $w_2=i$, $w_3= \infty$ respectively.

Code No: X0221 **R07** SET - 4

II B. Tech I Semester Supplementary Examinations Nov – 2012
MATHEMATICS - III
(Com. to EEE, ECE, EIE, ECC)

Time: 3 hours Max. Marks: 80

Answer any FIVE Questions
All Questions carry Equal Marks
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1. a) Evaluate $\int_0^1 x^4 \left[\ln\left(\frac{1}{x}\right)\right]^3 dx$.

   b) Show that $\int_0^{\frac{\pi}{2}} \sqrt{\tan\theta}\, d\theta$.

   c) Show that $n\, p_n(x) = x p_n'(x) - P'_{n-1}(x)$.

2. a) If $f(z)$ is an analytic function, show that $\left[\frac{\partial}{\partial x}|f|\right]^2 + \left[\frac{\partial}{\partial y}|f|\right]^2 = (f')^2$

   b) Find the analytic function whose real part is $\frac{\sin 2x}{(\cosh 2y - \cos 2x)}$.

3. a) Find the all Solutions of the equation $e^{2z-1}=1+i$.
   b) Separate into real and imaginary parts of $f(z) = \sin(x + iy)$.
   c) Find the principal value of $(1+i)^{i}$.

4. a) Evaluate $\int_0^{1+i} (x^2 + iy)dz$ along the paths y=x and $y=x^2$.

   b) Use Cauchy's integral formula to evaluate $\int_C \frac{e^{2z}}{(z+1)^4} dz$

   Where C is the circle $|z| = 3$.

5. a) Find Taylor's expansion of $f(z) = \frac{2z^3 + 1}{z^2 + z}$ about the point z = i.

   b) Find the Laurent's expansion of $f(z) = \frac{z^2 - 6z - 1}{(z-1)(z-3)(z+2)}$ in the region $3 < |z+2| < 5$.

   c) What type of singularity has the function $f(z) = z^2 e^{\frac{1}{z}}$.
~~~~~~~~~~~~~~~~~~~~~~

6. a) Find the residue of $f(z) = \dfrac{ze^z}{(z-1)^3}$ at its pole.

   b) Evaluate $\oint_C \dfrac{\cosh 5z}{z^2+4}$ *where C is* $|z - i| = 2$.

   c) Use residue theorem to evaluate $\int_0^{2\pi} \dfrac{d\theta}{7+6\cos\theta}$.

7. a) State and prove Liouvill's theorem.
   b) Use Rouche's theorem to determine the number of zeros of the polynomial $p(z) = z^4 - 5z + 1$ that lie within the annulus region $1 < |z| < 2$.

8. a) Determine and plot the image of the region $-1 \le x \le 1$ *and* $-\pi \le y \le \pi$ under $w = e^z$.
   b) Determine the bilinear transformation that maps the points $z_1=0$, $z_2=1$, $z_3=\infty$ into the points $w_1=-1$, $w_2=-i$, $w_3=1$ respectively.

Code No: X0325 **R07** SET - 1

II B. Tech I Semester Supplementary Examinations Nov – 2012
METALLURGY AND MATERIAL SCIENCE
(Com to ME, MM, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What are the important characteristics of grain boundaries? Discuss the role of grain boundaries for low temperature and high temperature applications.
   b) Differentiate between a crystal, a grain and a grain boundary.

2. a) What is solid solution? What are the different types of solid solutions? Explain with suitable examples?
   b) Distinguish between intermetallic compounds and interstitial compounds.

3. Draw a typical equilibrium phase diagram of Fe-C diagram and explain the cooling of any one alloy.

4. a) Explain with neat diagrams how the micro-structure of a pure metal may change with additions of alloying elements.
   b) What is allotropy? Discuss various allotropic forms of Iron and give their properties.

5. a) What are M_S and M_f temperatures in TTT diagrams? Explain in detail the significance of these temperatures
   b) Explain the effect of alloying elements on TTT diagrams?

6. What is Duralumin? Give the chemical composition, heat treatment procedure, mechanical properties and applications of the duralumin.

7. a) Give composition, properties and uses of the following alloys.
      i) Muntz Metal
      ii) Gun metal
      iii) Bell metal.
   b) What are the properties and advantages of nanomaterials.

8. Write short notes on the following:
   a) Carbon-carbon composites
   b) Cryogenic treatment of alloys
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Code No: X0325 **R07** SET - 2

II B. Tech I Semester Supplementary Examinations Nov – 2012
METALLURGY AND MATERIAL SCIENCE
(Com to ME, MM, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain why grain boundaries are irregular in shape?
   b) Distinguish clearly between low angle grain boundary and high angle grain boundary.

2. a) Explain the Hume-Rothery rules for the formation of solid solutions?
   b) What is alloying? Why alloying is necessary? Explain

3. What is a phase diagram? Explain with neat sketch the phase diagram of iron-carbon phase diagram and explain the various reactions taking place in it.

4. Discuss in detail the classification, microstructure and applications of cast irons.

5. a) Write short notes on hardening?.
   b) Explain the stages of tempering?

6. Explain the composition, properties & uses of
   a) Alpha brass
   b) Beta brass

7. a) Classify steels and give their mechanical properties and applications.
   b) Write short notes on glasses?

8. a) What is a matrix? What are the various types of matrices used in the composite materials. Explain the advantages, disadvantages and applications of each one of them.
   b) State the differences between wrought and cast Aluminium alloys.
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Code No: X0325 **R07** SET - 3

II B. Tech I Semester Supplementary Examinations Nov – 2012
METALLURGY AND MATERIAL SCIENCE
(Com to ME, MM, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) What do you understand by metallic bonding? Why is it non-directional nature?
   b) Compare and contrast Metallic, covalent and Ionic bonds, give examples.

2. Write short notes on:
   a) Ionic solids
   b) Electron compounds

3. Define and explain the following terms:
   a) Coring b) Phase Rule c) Lever rule d) Miscibility gaps

4. a) Explain the phase changes that take place when an eutectoid steel is cooled from 900^0C to room temperature.
   b) Distinguish between steels and cast irons and highlight the importance of each of them as engineering materials.

5. Define and discuss the following terms.
   a) Ledeburite b) Pearlite c) Martensite d) Austenite

6. a) Classify copper alloys and discuss the mechanism of increasing strength of copper alloys.
   b) What are the characteristics of titanium that makes it attractive for certain engineering applications?

7. a) Define cermets? What are the properties and application of cermets in industries?
   b) What is a natural composite? What are the different types of composite materials?

8. Write short notes on
   a) Reinforced materials
   b) Metal Ceramic Mixtures
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Code No: X0325 **R07** SET - 4

II B. Tech I Semester Supplementary Examinations Nov – 2012
METALLURGY AND MATERIAL SCIENCE
(Com to ME, MM, AME)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain electron cloud. What is the role of electron cloud in Metallic bond?
   b) Describe the binding of atoms in Metals

2. a) What are interstitial compounds? Explain their properties?
   b) What are electron compounds? Describe their properties and applications?

3. a) Explain the following terms in phase diagrams:
      i) Solidus line ii) Liquidus line iii) Solvus line
   b) Construct a phase diagram in which two solids completely soluble in solid and liquid state.

4. a) Explain why S.G Iron is stronger and tougher than gray iron with same matrix
   b) Distinguish between white heart and black-heart malleable Iron

5. a) What is annealing? What is the purpose of annealing?
   b) What is pack carburising? What are the different pack carburising methods?

6. a) Draw the Cu - Zn phase diagram, label all the points, lines and phases present in it.
   b) Give the properties and applications of Titanium alloys?

7. Write short notes on the properties and applications of cermets glasses, abrasive materials.

8. Write short notes on
   a) Crystalline Ceramics
   b) Abrasive Materials
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Code No: X0526 **R07** SET - 1

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
UNIX AND SHELL PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the following commands with their syntax and examples.
   i) man ii) echo iii) passwd iv) date
   b) How many options are there in "ls" command .Explain? (8M+8M)

2. Describe the file handling and process utilities in detail. (16M)

3. a) Explain in detail about Redirection.
   b) Explain about Command-Line Editing and Command Substitution. (8M+8M)

4. a) Define grep. Briefly explain the differences between fgrep, egrep with examples.
   b) List the differences between grep and sed. (8M+8M)

5. a) What are the different types of operators used in awk shell script? Explain.
   b) Mention different types of loop statements in awk shell script. (8M+8M)

6. a) Explain the environmental variables in korn shell.
   b) Explain how arguments are validated in korn shell. (8M+8M)

7. a) Write a short note on start-up and shutdown scripts.
   b) Write a C shell script to generated Fibonacci series. (8M+8M)

8. Explain the following system calls with an example.
   a) File handling system calls
   b) Dictory handled system calls.
   (8M+8M)
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Code No: X0526 **R07** SET - 2

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
UNIX AND SHELL PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the following commands with suitable examples.
   mkdir, rmdir, lp, who, uname, rm, printf.
   b) Explain about the features of UNIX. (8M+8M)

2. a) Explain about the UNIX file system.
   b) Explain in detail about backup utilities. (8M+8M)

3. a) Write a program to display the number of lines, words and characters in a file.
   b) What are the system variables in UNIX? Explain? (8M+8M)

4. a) Explain the following commands
   i) Delete patterns space commands. ii) Change commands. iii) Append commands.
   b) List all regular expressions of sed. (8M+8M)

5. a) Write a short note on string functions and mathematical functions in awk.
   b) Write an awk program to illustrate the concept of associate arrays. (8M+8M)

6. a) Explain the special parameters and variable in korn shell.
   b) Explain command execution and command history. (8M+8M)

7. a) What is the exit status of a command? Explain with example.
   b) Describe about "eval" command with an example. (8M+8M)

8. Explain briefly about the following system calls:
   a) create( ) b) lseek( ) c) link( ) d) stat( ) (16M)
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Code No: X0526 **R07** SET - 3

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
UNIX AND SHELL PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. a) Explain the structure of a UNIX command with an example.
   b) Explain about tar and gzip? (8M+8M)

2. Explain the following commands with their syntax and examples.
   i) Finger ii) telnet iii) sort iv) egrep vi) tee (16M)

3. a) Write a shell script to find out whether a given number is prime number or not.
   b) Explain the command that eliminates duplicate entries in a file along with options. (8M+8M)

4. Explain in detail about grep operation and draw the flow chart with an example. (16M)

5. a) Explain about awk command and its options.
   b) List various applications of awk, grep and sed. (8M+8M)

6. a) Explain in detail Argument validation in Korn Shell.
   b) Explain the output statement in korn shell. (8M+8M)

7. a) Write a c shell program to merge two files
   b) Explain different special parameters that are available in C-shell. (8M+8M)

8. Briefly explain about the following system calls:
   open, read, lseek, syslink, stat, lstat, chmod, chown. (8M+8M)
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Code No: X0526 **R07** SET - 4

II B. Tech I Semester, Supplementary Examinations, Nov – 2012
UNIX AND SHELL PROGRAMMING
(Com. to CSE, IT)

Time: 3 hours Max. Marks: 80

Answer any **FIVE** Questions
All Questions carry **Equal** Marks
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1. Explain the following commands with their syntax and examples.
   i) PATH ii) echo iii) pwd iv) stty v) cat vi) more vii) wc viii) cp (16M)

2. a) Explain about the UNIX file system.
   b) Describe briefly about Text processing utilities and disk utilities. (8M+8M)

3. a) Define filter? How they are used in UNIX program? Explain any 3 filter commands.
   b) Write a shell program to arrange three numbers in ascending order. (8M+8M)

4. a) Explain the differences between various grep commands.
   b) Differentiate between sed and grep. (8M+8M)

5. a) Write a program to check whether a given number is a Armstrong number or not.
   b) Explain in detail about any four string functions in awk (8M+M8)

6. a) Explain briefly about environment variables in Korn shell.
   b) Write a Korn shell script to find the factorial of a number. (8M+M8)

7. a) Explain piping in C shell with example.
   b) Write a C shell program to copy the content of one file to another. (8M+8M)

8. Define system call. Explain in detail about the working and syntax of file structure related system calls. (16M)
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