Code :9ABS302 **R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**MATHEMATICS-III**
**(Electrical & Electronics Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**

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1. (a) Define Beta function and prove that $\beta(m,n) = \frac{\Gamma(m)\Gamma(n)}{\Gamma(m+n)}$
   (b) Prove that:
      i. $j_{\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\sin x$
      ii. $j_{-\frac{1}{2}}(x) = \sqrt{\frac{2}{\pi x}}\,\text{cosx}$
2. (a) State Cauchy Reimann equations. Show that $f(z) = z + 2\overline{z}$ is not analytic anywhere in the complex plane.
   (b) Define Harmonic function. Find the regular function. Whose imaginary part is $e^x$sin y.
3. (a) Find all values of z which satisfy.
      i. $e^z = -2$
      ii. $e^z = 1 + i$
   (b) Find all principal values of $\left(\frac{\sqrt{3}}{2} + \frac{i}{\sqrt{2}}\right)^{(1+i\sqrt{3})}$
4. (a) Integrate $f(z) = x^2 + ixy$ from A(1,1) to B(2,8) along
      i. The straight line AB.
      ii. The curve C:x=t, y=$t^3$.
   (b) Evaluate using cauchy's theorem
   $\int \frac{z^3 e^{-z}}{(z-1)^3} dz$
5. (a) Expand $f(z) = \sin z$ in Taylor's series about $z = \frac{\pi}{4}$
   (b) State Laurent's theorem, find the Laurent series expansion of the function
   $f(z) = \frac{z^2-6z-1}{(z-1)(z-3)(z+2)}$
6. (a) Find the residue of $\frac{z^2-2z}{(z+1)^2(z^2+1)}$
   (b) Evaluate $\int_0^\infty \frac{dx}{(x^2+a^2)^2}$
7. (a) State Rouche's theorem. Use Rouche's theorem to find the number of zero's of the polynomial $z^{10} - 6z^7 + 3z^3 + 1 if\ |z| < 1$
   (b) Show that the equation $z^4 + 4(1+i)z + 1 = 0$ has one root in each quadrant.
8. (a) Show that the transformation $w = \frac{1}{z}$ maps a circle to a circle or to a straight line if the former goes through the origin.
   (b) Find the bilinear transformation which maps $\infty, i, 0$ in the z-plane in to -1, -i, 1 in the w-plane.

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**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**ENVIRONMENTAL SCIENCE**
**(Electrical & Electronics Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering, Computer Science & Systems Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**

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1. (a) Write importance of education on environmental issues.
   (b) Explain need for students from all courses to be aware of environmental issues.
2. (a) What do you mean by floods and drought?
   (b) Discuss consequence of drought.
   (c) Define aquifer.
3. (a) Discuss in detail about estuaries, ponds, and oceans.
   (b) Define ecosystem.
4. Discuss in detail about in-situ and ex-situ conservation of biodiversity.
5. Discuss in detail about nuclear hazards and thermal pollution.
6. Write note on air prevention and control of pollution and water prevention and control of pollution.
7. Discuss about role of information technology in environment and human health.
8. Write detailed report on the local polluted industrial site.

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Code :9A01308 **R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**FLUID MECHANICS & HYDRAULIC MACHINERY**
**(Electrical & Electronics Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**
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1. (a) Differentiate between:
   i. Absolute and gauge pressure
   ii. Simple manometer and differential manometer
   iii. Piezometer and pressure gauge.
   (b) Calculate the pressure due to a column of 0.4m of (a) water, (b) an oil of specific gravity 0.9,and (c) mercury of specific gravity 13.6. Take density of water, $\rho = 1000\frac{kg}{m^3}$.
2. (a) Name the different forces present in a fluid flow. For the Euler's equation of motion, which forces are taken into consideration?
   (b) A conical tube of length 3.0 m is fixed vertically with its smaller end upwards the velocity of flow at the smaller end is 4 m/s while at the lower end it is 2 m/s. The pressure head at the smaller end is 2.0 m of liquid. The loss of head in the tube is $0.95(v_1 - v_2)^2/2g$, where $v_1$ is the velocity at the smaller end and $v_2$ at the lower end respectively. Determine the pressure head at the lower end. Flow takes place in downward direction.
3. (a) What do you understand by the terms: major energy loss and minor energy losses in pipes?
   (b) Find the velocity of an oil through a pipe, when the difference of mercury level in a differential U-tube manometer connected to the two tappings of the pitot-tube is 15 cm. Take specific gravity of oil = 0.8 and co-efficient of pitot- tube as 0.98.
4. A jet of water having a velocity of 40m/sec strikes a curved vane, which is moving with a velocity of 20m/sec. The jet makes an angle of $30^0$ with the direction of motion of the vane at inlet and leaves at an angle of $90^0$ to the direction of motion of the vane at outlet. Draw the velocity triangles at inlet and outlet and determine the vane angles at inlet and outlet so that the water enters and leaves the vane without shock.
5. (a) Discuss the factors that should be considered while selecting the turbine for a particular power plant.
   (b) Where do you provide pumped storage plants? Explain the working of a pumped storage plant.
6. (a) How will you classify the turbines? Explain in detail.
   (b) A pelton wheel is to be designed for the following specifications. Power = 735.75 KW S.P, Head = 200m, Speed = 800 r.p.m., $\eta = 0.86$ and jet diameter is not to exceed one-tenth the wheel diameter. Determine:
   i. Wheel diameter
   ii. The number of jets required,and
   iii. Diameter of the jet. Take $C_v = 0.98$ and speed ratio = 0.45.
7. (a) What are the quantities? Define the unit quantities for a turbine. Why are they important?
   (b) A turbine is to operate under a head of 30m at 300 r.p.m. The discharge is $10m^3/s$. If the efficiency is 90% determine :
   i. Specific speed of the machine,
   ii. Power generated and
   iii. Type of the turbine.
8. (a) Define the terms:
   i. Priming
   ii. Manometric efficiency
   iii. Net positive suction head.
   (b) A centrifugal pump running at 1220 rpm delivers 0.25 $m^3/s$ against a head of 20m. Calculate the discharge, head and power if the speed is increased to 1440 rpm.

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Code :9A02305 **R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**ELECTRICAL CIRCUITS**
**(Electrical & Electronics Engineering, Electronics & Instrumentation Engineering, Electronics & Control Engineering, Electronics & Communication Engineering, Electronics & Computer Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**
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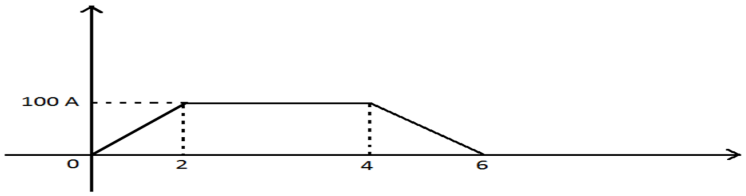
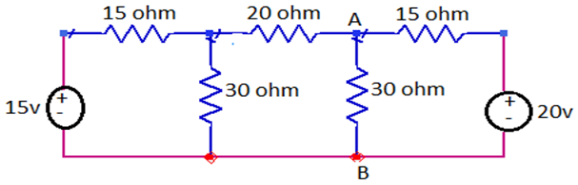
1. (a) What is the difference between an ideal source and a practical source. Draw the relevant characteristics of the above sources.
   (b) A current wave form flowing through an inductor of 1mH is shown in the figure. Obtain and sketch the waveform of the voltage across the inductor.




2. (a) State and explain Kirchoff's laws using neat diagrams.
   (b) Determine the current in branch A-B by Kirchoff's laws.

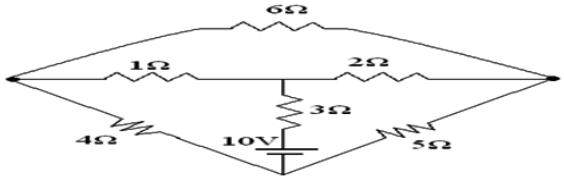



3. (a) Derive the basic equation of an alternating quantity. Hence state its various forms.
   (b) A 50Hz sinusoidal voltage applied to a single phase circuit has its RMS value of 200V. its value at t=0 is 28.3 volt positive. The current drawn by the circuit is 5A RMS and lags behind the voltage by one sixth of a cycle. Write the expressions for instantaneous values of voltage and current.

4. Show that the locus of the current in an R-L circuit with R variable is a semicircle. Find the radius and the center of the circle.

5. (a) State and explain Faradays laws of Electromagnetic Induction.
   (b) Explain dynamically induced emf.
   (c) An iron ring has mean diameter of 20 cm and a cross section of 2 $cm^2$ . It is uniformly wound with 2000 turns with insulated wire and a current of 2A produces a flux of 0.2mwb .calculate relative permeability of iron.

6. Draw the network graph for the network shown in figure, Find the number of possible trees for that graph and draw all possible trees.



7. Find maximum power transferred to the load resistance RL for the circuit shown fig 1.
8. Find the current through 12Ω resistor using superposition theorem. fig 2.

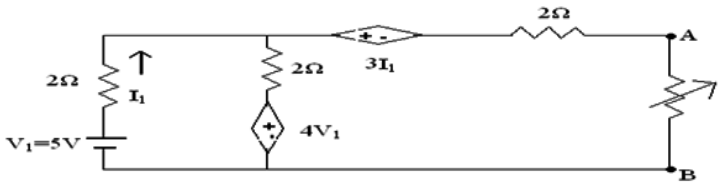



Figure 1: Figure for Question No.7

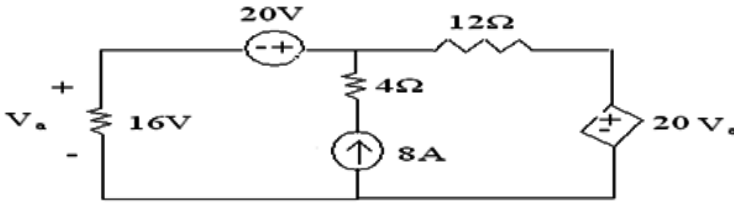



Figure 2: Figure for Question No.8

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Code :9A02308 **R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**ELECTRICAL MACHINES-I**
**(Electrical & Electronics Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**

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1. (a) What is electromechanical energy conversion?
   (b) Develop the block diagram of general electromechanical energy conversion device using energy balance equation.
2. With the help of neat sketches show the constructional features of a dc machine and brief the function of each component of the machine.
3. What is Armature reaction? Explain in detail the phenomenon of armature reaction in a 2-pole dc generator with the help of neat sketches of flux distribution in space and relevant vector diagrams, before and after the armature reaction.
4. (a) What are the methods of excitation of dc generators? Explain with the help of diagrams.
   (b) A 6-pole generator has 1000 armature conductors and is wave-wound. If the flux per pole is 0.02 Wb and the speed is 500 rpm, calculate the emf generated. If the above machine is self-excited, and the armature and field resistances are 0.5 Ω and 250 Ω respectively, calculate the output current when the armature current is 40 A.
5. (a) Distinguish between external and internal characteristics of dc generators.
   (b) Draw the load characteristics of a separately-excited dc generator and explain.
6. (a) Explain in detail with the help of relevant flux distribution diagrams, the principle of operation of dc motor.
   (b) What are the basic requirements to produce torque in a dc motor?
7. Explain the different methods of speed control of dc shunt motors in detail with the help of diagrams.
8. (a) Discuss the various losses in dc machines in detail.
   (b) Compare Swinburne's test and Hopkinson's test conducted on dc machines. List the advantages and limitations of both.

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Code :9A04301a **R9**

**II B.Tech I Semester(R09) Supplementary Examinations, May 2011**
**ELECTRONIC DEVICES & CIRCUITS**
**(Electrical & Electronics Engineering)**

**Time: 3 hours** **Max Marks: 70**

**Answer any FIVE questions**
**All questions carry equal marks**

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1. (a) Discuss temperature dependence of PN diode VI characteristics.
   (b) Derive an expression for dynamic resistance of PN diode.
   (c) The voltage across a silicon diode at room temperature is 0.65 Volts when 2.2 mA current flows through it. If the voltage increases to 0.75 Volts, Calculate the diode current.
2. (a) With circuit and necessary waveforms explain the operation of centered tapped FWR.
   (b) Derive the expression for ripple for the circuit FWR with inductor filter.
3. (a) Explain input characteristics transistor CB configuration.
   (b) A transistor with $\alpha = 0.95$ has a reverse saturation current of 1uA 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 25 uA.
4. (a) What are the draw backs transistor fixed bias circuit.
   (b) Derive an expression for stability factor S in self bias circuit.
5. (a) With neat structure explain the principle of operation of JFET.
   (b) Explain how depletion mode MOSFET can also act as enhancement mode MOSFET.
6. (a) Derive an expression for voltage gain, Input Impedance and output impedance of CS amplifier at low frequencies.
   (b) Discuss self biasing of JFET.
7. (a) Give the comparison of CE,CC and CB amplifier with respect to voltage gain current gain Input impedance and output impedance.
   (b) Find expression for voltage gain, current gain, Input impedance and output impedances of CC amplifier using simplified hybrid model.
8. Discuss the principle of operation and VI characteristics of
   (a) Light Dependent resistor
   (b) Uni Junction Transistor

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