

Code: 9A02308

R09

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ELECTRICAL MACHINES - I

(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Show that the torque developed in a doubly-excited magnetic system is equal to the rate of increase of field energy with respect to displacement at constant currents.
- 2 Explain in detail how direct quantity is obtained as an output in dc generator, with the help of neat sketches.
- 3 (a) What is the effect of armature reaction at leading and trailing pole tips of a dc generator? Explain with the help of neat sketches.
(b) Discuss the methods to minimize the effect of armature reaction in brief.
- 4 What are the different types of self-excited dc generators? Obtain the terminal voltage and current expressions from the equivalent circuit representations of them.
- 5 (a) Draw and explain the load characteristics of a separately-excited dc generator.
(b) Two dc shunt generator are operating in parallel. Their no-load voltages are 250 V and characteristics are linear. At 230 V, generator-1 can deliver 320 KW and generator-2 can deliver 610 KW. Find the total load 'P' and load supplied by each at 250 V.
- 6 A 240 V, 4-pole dc shunt motor has two-circuit armature winding with 500 conductors. The armature circuit resistance is 0.22Ω , field resistance is 150Ω and the flux per pole is 0.02 Wb . Neglect the armature reaction. Determine the speed and torque developed, if the motor draws 16 A from the mains.
- 7 The armature and field resistances of a 300 V, dc shunt motor are 0.6Ω and 260Ω respectively. When driving a load of constant torque at 600 rpm, the armature current is 25 A. If it is required to increase the speed from 600 rpm to 750 rpm, calculate the resistance to be connected in the shunt field circuit.
- 8 Explain the experimental procedure to conduct 'Retardation Test' on a dc shunt machine with the help of connection diagram. How the different losses are estimated from the test results?

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ELECTRONIC DEVICES & CIRCUITS

(Common to EIE, E.Con.E, ECE, ECC, CSS, IT, CSE, EEE & MCT)

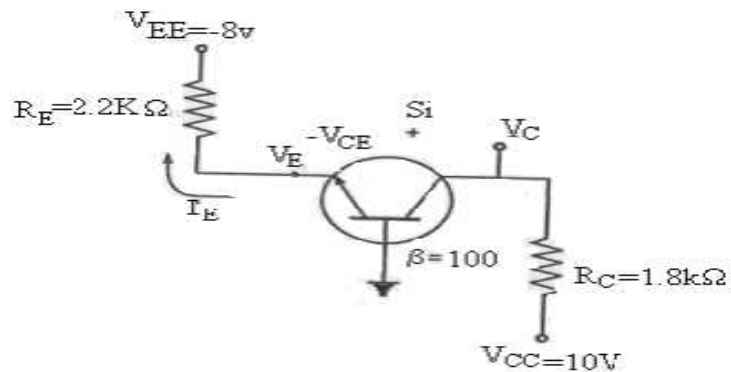
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- 1 (a) Draw the forward characteristic of semiconductor diode and briefly explain the method of obtaining the characteristic.
(b) Mention the reason for silicon devices to work at higher temperatures when compared to germanium devices with necessary energy band diagrams.
- 2 (a) Derive an expression for ripple in a π -section filter when used with a half wave rectifier.
(b) A full-wave single phase rectifier employs a π -section filter consisting of two $4\ \mu\text{F}$ capacitances and a $20\ \text{H}$ choke. The transformer voltage to the center tap is $300\ \text{V}_{\text{rms}}$. The load current is $500\ \text{mA}$. Calculate the dc output voltage and the ripple voltage. The resistance of the choke is $200\ \Omega$.
- 3 (a) Define α , β , γ of a transistor and show how they are related to each other.
(b) Why does the CE configuration provide large current amplification while CB does not?
- 4 (a) For the circuit shown below, determine I_E , V_C and V_{CE} . Assume $V_{BE} = 0.7\ \text{V}$.



- (b) Compare the advantages and disadvantages of biasing schemes.
- 5 (a) Explain the construction and its operation of N-channel JFET with neat diagram.
(b) Explain JFET parameters.
- 6 (a) Draw the two biasing circuits for JFET and explain.
(b) Briefly explain the small signal model of JFET.
- 7 (a) Draw the hybrid equivalent circuits for CB, CE and CC configurations.
(b) Define h-parameters along with its units.
- 8 (a) Explain the working principle of UJT with its characteristics.
(b) Define the gate power dissipation and explain its importance in SCR.

MATHEMATICS - III
(Common to EEE, EIE, E.Con.E, ECE and ECC)

Time: 3 hours

Max Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 (a) Prove that $\Gamma(n) \Gamma(1 - n) = \frac{\pi}{\sin n\pi}$.
(b) State and prove Rodrigne's formula.
- 2 (a) If $f(z)$ is a regular function of z ,
prove that $\frac{\partial^2}{\partial x^2} + \frac{\partial^2}{\partial y^2} |f(z)|^2 = 4 |f'(z)|^2$
(b) Define an analytic function. Find the analytic function $f(z) = u + iv$ given $u = a(1 + \cos\theta)$.
- 3 (a) Find all values of z which satisfy $\sin z = 2$.
(b) Find all principal values of $(1 + i\sqrt{3})^{(1+i\sqrt{3})}$.
- 4 (a) Evaluate $\int_{0,0}^{1,3} 3x^2y \, dx + (x^3 - 3y^2) \, dy$ along the curve (i) $y = 3x$. (ii) $y = 3x^2$.
(b) Evaluate $\int_C \frac{dz}{z^8(z+4)}$ where C is the circle $|z| = 2$.
- 5 (a) Obtain the Taylor series expansion of: $f(z) = \frac{e^z}{z(z+1)}$ about $z = 2$.
(b) Define singular point, expand $f(z) = \frac{e^{2z}}{(z-1)^3}$ as Laurent's series about the singular point $z = 1$.
- 6 (a) Evaluate $\int_C \frac{4-3z}{z(z-1)(z-2)} \, dz$ where C is the circle $|z| = \frac{3}{2}$ using residue theorem.
(b) Evaluate by contour integration $\int_0^\infty \frac{dx}{1+x^2}$
- 7 (a) Use Rouché's theorem to show that the equation $z^5 + 15z + 1 = 0$ has one root in the disk $|z| < \frac{3}{2}$ and four roots in the annulus $\frac{3}{2} < |z| < 2$.
(b) State and prove fundamental theorem of algebra.
- 8 (a) Show that the function $W = \frac{4}{z}$ transform the straight line $x = c$ in the z -plane in to a circle in the w -plane.
(b) Find the bilinear transformation that maps the points $1, i, -1$ in to the points $2, i, -2$.

Code: 9ABS303

R09

B.Tech II Year I Semester (R09) Supplementary Examinations, May 2013

ENVIRONMENTAL SCIENCE

(Common to EEE, EIE, E.Con.E, ECE, ECC and CSS)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions
All questions carry equal marks

- 1 Name and describe the major layers of the atmosphere. What are the important effects in each layer?
- 2 Fresh water is the biggest crisis facing the world today. Comment.
- 3 (a) What is ecological succession? Give an account of general process of succession in nature.
(b) Describe the characteristic features, structure and function of forest ecosystem.
- 4 Write an explanatory note on value of biodiversity.
- 5 Define soil pollution. List some soil pollutants their causes, effects and control measures.
- 6 "From unsustainable to sustainable development, the need of the hour". Comment.
- 7 What is AIDS? Describe the sources and mode of transmission of HIV infection.
- 8 Give an account of visits to a local area to document environmental assets.

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013

FLUID MECHANICS & HYDRAULIC MACHINERY

(Electrical & Electronics Engineering)

Time: 3 hours

Max. Marks: 70

Answer any FIVE questions

All questions carry equal marks

- 1 (a) Define surface tension. Derive the relationship between surface tension and pressure inside a droplet of liquid in excess of outside pressure.
(b) One liter of crude oil weighs 9.6 N. Calculate its specific weight, density and specific gravity.
- 2 (a) What is stream tube? What are its characteristics?
(b) A pipe AB branches into two pipes from B, one pipe C has a diameter of 150 mm and the other pipe D has a diameter of 200 mm. The diameter at A is 450 mm and at B is 300 mm. The velocity of water at A is 2 m/s. If the velocity in pipe D be 4 m/s, determine the discharge through pipe AB, the velocity at B and velocity at C.
- 3 (a) Explain the principle of venturimeter with a neat sketch. Derive the expression for the rate of flow of fluid through it.
(b) An oil of specific gravity 0.9 is flowing through a venturimeter having inlet diameter 20 cm and throat diameter 10 cm. The oil-mercury differential manometer shows a reading of 20 cm. Calculate the discharge of oil through the horizontal Venturimeter. Take $C_d = 0.98$.
- 4 (a) Derive the equation for the force of impact of a fluid jet on a series of normal flat vanes mounted on a wheel. The vane velocity is less than jet velocity.
(b) A water jet of 7.5 cm diameter with a velocity of 40 m/s strikes a flat plate inclined at 45° to the horizontal. Determine the normal force on the plate:
(i) When the plate is stationary and
(ii) When the plate moves with a velocity of 20 m/s in the direction of jet and away from it. Also find the power and efficiency of jet when the plate is moving.
- 5 (a) Describe pumped storage plant with a neat sketch.
(b) Write short notes on:
(i) Scroll casing. (ii) Draft-tube and (iii) Tailrace.
- 6 (a) Differentiate between reaction turbines and hydraulic turbines.
(b) Draw a neat diagram of pelton turbine and explain its working.
- 7 (a) What are the conditions for the kinematic similarity to exist between model and prototype?
(b) How do you compare the performance of a turbine under different working conditions?
- 8 (a) Discuss in general the important operating characteristics of an axial flow pump.
(b) Define and derive an expression for the specific speed of a pump. How does specific speed help in pump selection?

B. Tech II Year I Semester (R09) Supplementary Examinations, May 2013
ELECTRICAL CIRCUITS

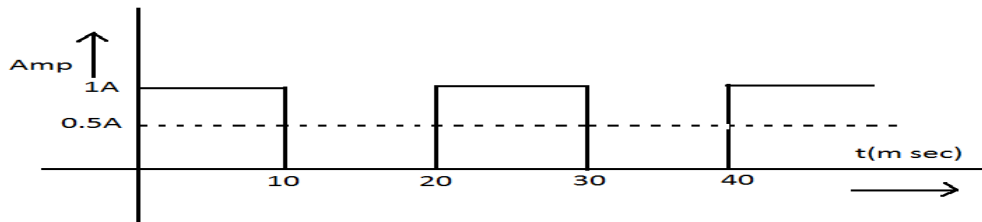
(Common to EEE, EIE, E.Con.E, ECE and ECC)

Time: 3 hours

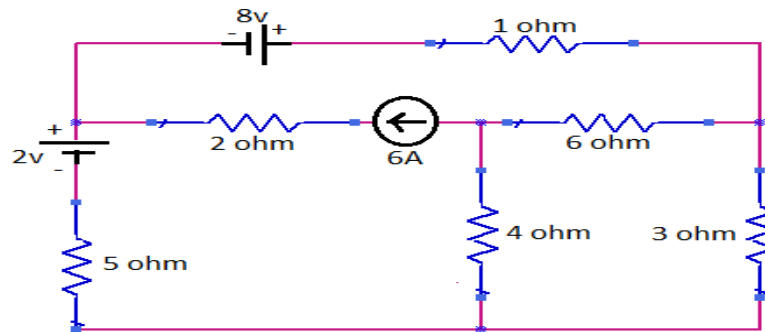
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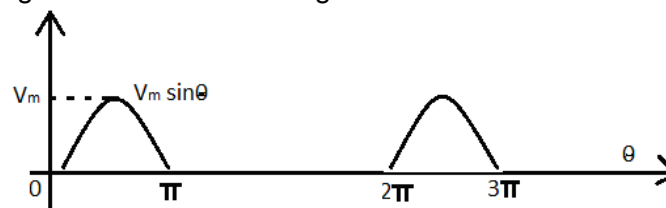
- 1 (a) Write a note on capacitor and V-I relationship associated with it.
 (b) A non alternating periodic waveform has been shown in figure. Find its form factor.



- 2 (a) A resistance R is connected in series with a parallel circuit comprising two resistances of 12 and 8 ohms. The total power dissipated in the circuit is 700 Watts when the applied voltage is 200 V. Calculate the value of R.
 (b) Using nodal analysis, determine the power supplied by 8 V voltage source.

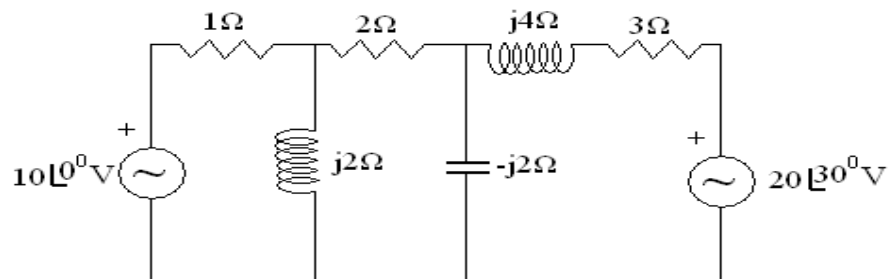


- 3 (a) Explain significance of average value.
 (b) Find RMS and average value of the following wave form.

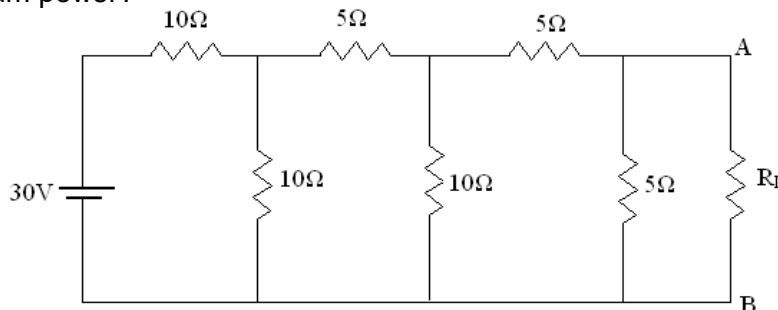


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- 4 (a) Give the expression for frequency and current at resonance in parallel resonance circuit.
 (b) A RLC series circuit consists of $R = 50$ ohms $L = 0.16$ H and $C = 4$ micro farads. Calculate resonant frequency, quality factor, band width and half power frequencies.
- 5 (a) Explain dynamically induced emf and statically induced emf.
 (b) Find the AT required to produce of 0.6 mwb in the air gap of a magnetic circuit which has an air gap of 0.4 mm. The iron ring has 5 cm^2 cross section and 50 cm mean length, take $\mu_r = 2000$ and leakage coefficient is 1.2 and exciting current is 2.5 A, find out number of turns.
- 6 (a) Write the properties of tie-set matrix and cut-set matrix.
 (b) Using mesh analysis, calculate current through all the elements using mesh analysis.



- 7 (a) Write limitations of Norton's theorem.
 (b) In the network shown, find the value of R_L for maximum power transfer. What is the value of maximum power?



- 8 Find the voltage across 20 Ω resistor using superposition theorem and verify it using nodal analysis.

