Code: 9A02501 **R9**

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

ELECTRICAL AND ELECTRONIC MEASUREMENTS

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain why PMMC instruments are the most widely used instruments. Discuss their advantages and disadvantages.
(b) A moving coil instrument has a resistance of 12 Ω and gives a full scale deflection when carrying 50 mA. Show how it can be adopted to measure voltage up to 700 V and current 100 A.

2 (a) Explain the design features of current transformers that help to minimize the errors.
(b) The ratio error of a given 1000/5 A CT is zero when feeding 5 VA, UPF burden at rated current estimate the iron loss of the transformer at this operating condition if the secondary has 198 turns and minding resistance of 0.02 Ω. Neglect leakage reactance.

3 Describe the constructional details and working principle of the single phase dynamometer wattmeter.

4 Describe the construction and working of a co-ordinate type AC potentiometer. How it can be standardized. Explain how an unknown voltage can be measured with it.

5 (a) Draw the circuit of a Kelvin's double bridge used the measurement of low resistance. Derive the condition for balance.
(b) State the advantages and disadvantages of Ander son's bridge.

6 (a) Write short notes on determination of B – H loop by method of reversals.
(b) The coil of a ballistic galvanometer has 115 turn of mean area $25 \times 40\ mm^2$ the flux density is the air gap is 0.12 Wb/m^2 and the moment of inertia is 0.5×10^{-6} Nm/rad. What current must be passes to give a deflection of 100º?

7 Explain the measurement of phase, frequency, current and voltage by using cathode ray oscilloscope.

8 (a) Write brief notes on successive approximation type digital voltmeter.
(b) What is digital tachometer explain with neat diagram.

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Code: 9A02502

R9

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

TRANSMISSION OF ELECTRIC POWER

(Electrical and Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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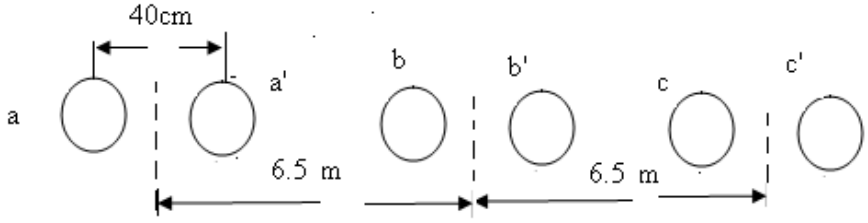
1 (a) Derive the expression for capacitance of a three-phase line by considering the effect of earth. Why for all practical purposes the effect of earth on the capacitance can be neglected?

(b) Determine the inductance per km per phase of a single circuit 460 KV line using two bundle conductors per phase as shown in the figure. The diameter of each conductor is 5.0 cm. Neglect the effect of transposition.



2 (a) Differentiate between short and medium transmission lines

(b) A single phase overhead transmission line is delivering 600 KVA load at 2 KV. Its resistances and reactance are 0.18 Ω and 0.36 Ω respectively. Determine the voltage regulation if the load power factor is: (i) 0.8 lagging. (ii) 0.8 leading.

3 A 50 Hz 3-phase transmission line is 280 km long. It has a total series impedance of (35 + j140) ohms and a shunt admittance of 930 x 10^{-6} mho. It delivers 40 MW at 220 KV with 90% power factor lagging. Determine the following for a long line.

(i) Sending end voltage. (ii) Voltage regulation.

(iii) Transmission efficiency. (iv) A, B, C, D constants.

4 (a) Show that a traveling wave moves with a velocity of light on the overhead line.

(b) A 3-Φ transmission line has conductors 1.5 cm in diameter spaced 1m apart in equilateral formation. The resistance and leakage are negligible. Find the natural impedance of the line.

Contd. in Page 2

5 (a) What is corona? How it helps the environment?

(b) In a 3-phase overhead line, the conductors have an overall diameter of 3.0 cm each and are arranged in delta formation. Assuming a critical disruptive voltage of 250 KV between lines and an air density factor of 0.9 and irregularity factor $m_0 = 0.95$, find the minimum spacing between conductors allowable, assume fair weather conditions.

6 (a) Explain the construction and operation of pin type insulator

(b) A string of four suspension type insulators is connected across 285 KV line. The self-capacitance of each unit is equal to 5 times pin to earth capacitance. Calculate:
(i) The potential across each unit.
(ii) The string efficiency.

7 Write short notes on:

(a) Stringing charts.

(b) Sag-templates.

(c) Effect of wind and ice loading on calculation of sag.

8 A single core 66 KV cable working on 3-phase system has a conductor diameter of 2 cm and a sheath of inside diameter 5.3 cm. If two inter sheaths are introduced in such a way that the stress varies between the same maximum and minimum in the three layers. Find:
(i) Positions of intersheaths.
(ii) Voltage on the intersheaths.
(iii) Maximum and minimum stresses.

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Code: 9A02503

R9

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

CONTROL SYSTEMS

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

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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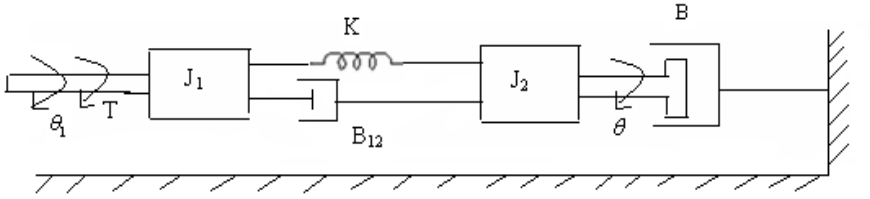
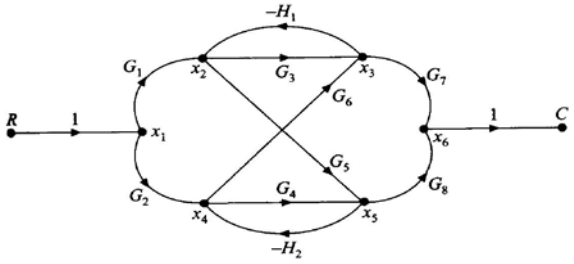
1 (a) Explain the classification of control systems.

(b) Write the differential equations governing the mechanical rotational system shown in the figure.



2 Using mason gain formula find the transfer function $^{C}/_{R}$ for the signal flow graph shown in figure.



3 (a) Explain about various test signals used in the control systems.

(b) For the servomechanism with open loop transfer function given below, what types of input signal gives rise to a constant steady state error and calculate their values.

$G(s) = 10/ [s^2(s + 1) (s + 2)]$.

4 (a) Explain the Routh-Hurwitz criterion to determine the stability of the system.

(b) Examine the characteristic equation $s^4 + 2s^3 + s^2 + 4s + 2 = 0$ for stability.

5 (a) Explain the procedure to determine the transfer function from Bode plots.

(b) Draw the Bode phase plot for the system having the following transfer function:

$G(s) = 20/[s(1 + 3s)(1 + 4s)]$

6 With the help of Nyquist plot assess the stability of the system $G(s) = 3/s(s + 1) (s + 2)$. What happens to the stability if the numerator of the function is changed from 3 to 30?

7 The open loop transfer function of a certain unity feedback control system is given by $G(s) = K/s(s + 4) (s + 80)$. It is desired to have the velocity error constant, $K_v = 30$ sec^{-1} and the phase margin to be at least 33^0. Design a phase lag series compensator.

8 (a) Obtain state variable representation of a field controlled D.C motor.

(b) Find the state transition matrix for a given system matrix. $A = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix}$

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Code: 9A02504

R9

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

POWER ELECTRONICS

(Common to EEE and E.Con.E)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Give the construction details of an SCR with the help of schematic diagram and the circuit symbol.

(b) Explain the importance of gate signal in SCR.

2 Draw the R-triggering circuit and explain with proper waveforms.

3 (a) Describe the operation of a single phase two pulse midpoint converter with relevant waveforms. Derive an expression for average output voltage.

(b) A single phase half controlled bridge converter is supplied at 230 V, 50 Hz, with source inductance of 2 mH. Neglecting resistance voltage drop, when the converter is operating at a firing angle of 45^0, and the load current is constant at 10 A. Determine the load voltage.

4 (a) Show that the effect of source inductance on the performance of single phase fully converter is present an equivalent resistance of ωLs/π ohms in series with the internal rectifier voltage.

(b) Mention the advantages and disadvantages of source inductance.

5 (a) Describe the operation of three pulse converter with R-load and draw associate waveforms.

(b) Derive the voltage and RMS current relationships for three pulse converter with R-load.

6 (a) Derive the expression output current in terms of source voltage, load impedance and firing angle for a single-phase ac voltage regulator with RL load.

(b) A single-phase voltage controller feeds power to resistive load of 4 Ω from 230 V, 50Hz source. Determine: (i) The peak values of average and rms thyristors currents for any firing angle α.
(ii) The minimum circuit turn-off time for any firing angle α.
(iii) The ratio of third harmonic voltage to fundamental voltage for α = π/3.

7 (a) For type-A chopper connected to RLE load. Write the basic voltage equations and derive the expressions for the maximum and minimum values of load current in terms of source voltage V_S, R and E.

(b) For the ideal type-A chopper circuit, E_{dc} = 220 V, chopping frequency = 500 Hz; duty cycle α = 0.3 and R = 1 Ω; L = 3 mH; and E_b = 23 V. Compute
(i) The input power. (ii) Power absorbed by the back e.m.f E_b. (iii) Power loss in the resistor.

8 A 1-phase bridge inverter is used to supply a load of 10 Ω resistance, 24 mH inductance from a 360 V dc source. If the inverter is operating at 60 Hz, determine the steady state power delivered to the load for:
(i) Square wave operation. (ii) Quasi square wave operation with an on-period of 0.6 of a cycle.

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Code: 9A02505

R9

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

ELECTRICAL MACHINES - III

(Electrical and Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 (a) Obtain the expression for the RMS value of EMF induced in an alternator.

(b) An alternator is operating at no load has an induced EMF of 346.4 V/ph and a frequency of 60 Hz. If the pole flux is decreased by 15% and the speed is increased by 6.8%.
Determine: (i) The induced EMF. (ii) Frequency.

2 (a) Explain the effect of armature reaction in the induced voltage when the power factor is zero lagging and zero leading.

(b) Calculate the RMS value of EMF induced per phase of an 8-pole, 3-phase, 50 Hz, alternator has 120 slots and each slot has 10 conductors. The coil span is 12 slots. The flux per pole has a fundamental component of 0.12 Wb and a 20% of third harmonic component.

3 Sketch and explain the open circuit and short circuit characteristics of synchronous machine. How voltage regulation can be calculated by the use of their results?

4 (a) A 3-phase, 11 KV, 10 MW, 50 Hz star connected alternator has synchronous impedance of (0.8 + j8) ohms /ph. If the excitation is such that OC voltage is 14 KV, determine:
(i) The maximum output of generator. (ii) The current and power factor at this output

(b) Explain the terms synchronizing power & synchronizing torque.

5 A 20-pole, 30 KW, 660 V, 50 Hz, star connected synchronous motor is operating with it's per phase generated voltage exactly equal to the phase voltage applied to armature. At loaded condition the motor is retarded by 5^o mechanical from its synchronous position. Per phase synchronous reactance and the effective armature resistance are 10 Ω and 1 Ω respectively. Calculate:

(a) Armature current.

(b) The total power drawn by the motor from bus.

(c) The developed power.

6 (a) Explain the construction of 'excitation circle' for a synchronous motor.

(b) With neat diagram and explanation, show how damper winding prevents oscillations.

7 A 230 V, 50 Hz, 4-pole single phase Induction motor has following parameters:
Stator resistance = 2.51 Ω , Rotor resistance referred to stator = 7.81Ω ,
Magnetizing reactance = 150.88 Ω; Stator reactance = 4.62 Ω,
Rotor reactance referred to stator = 4.62 Ω. Determine the main winding current and power factor when the motor is running at a slip of 5%.

8 (a) Explain the construction of permanent magnet stepper motor.

(b) With neat diagram explain the vector diagram of AC series motor.

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Code: 9AHS401 **R9**

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

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common to CE, BT, ME, EEE, ECC and MCT)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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1 What is managerial economics? What type of issues comes under the preview of managerial economics?

2 What is elasticity of demand? Explain how point elasticity and arc elasticity are improved methods of measuring elasticity of demand.

3 What is a limiting factor? Explain how BEP can be used for choosing a product mix when there is a limiting factor. Illustrate.

4 Define perfect competition market. Explain the important features of perfect competition?

5 Explain the features of sole trader form of organization. Discuss the merits and demerits of sole trade's form of organization.

6 (a) What are the limitations of accounting rate of returns?
(b) How is profitability index of a project calculated? What are its advantages?

7 Explain the following concepts and illustrate their treatment with imaginary data:
(a) Depreciation.
(b) Prepaid expenses.
(c) Reserve for bad and doubtful debts.
(d) Income received in advance.

8 What is meant by ratio analysis? Explain briefly various techniques of ratio analysis?

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