Code: 9A02501

R9

B.Tech III Year I Semester (R09) Supplementary Examinations, May 2012

ELECTRICAL AND ELECTRONIC MEASUREMENTS

(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) Describe the construction details of an attraction type moving iron instrument with the help of a diagram. Derive the equation for deflection of spring control used.

(b) Describe the construction details and working of electrodynamometer type instrument. Derive the equation for deflection under a.c operation.

2 (a) Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors.

(b) Describe the errors in electrodynamometer type wattmeter.

3 (a) Derive the expression for deflecting torque in single phase induction type meters.

(b) Describe a current for testing of a single phase induction type energy meter at different loads and power factors.

4 (a) Describe the basic principle of operation of a d.c potentiometer. Explain why potentiometer does not load the voltage source whose voltage is being determined.

(b) Explain how true zero is obtained Crompton's potentiometer.

5 (a) Draw the circuit of a Kelvin double bridge used for measurement of low resistance. Derive the condition for balance.

(b) Derive the equations for balance in the case of Maxwell's bridge.

6 (a) Describe a method of experimental determination of flux density in a specimen of magnetic material using Ballistic galvanometer.

(b) Describe the method of determining B-H curve of a magnetic material using method of reversals.

7 (a) Describe how the following parameters can be made with the use of a CRO.
(i) Frequency. (ii) Phase angle.

(b) Describe the details of vertical amplifier used in a CRO.

8 (a) Explain in detail about successive approximation type DVM.

(b) Describe in detail about digital tachometer.

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Code: 9A02502

R09

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

TRANSMISSION OF ELECTRIC POWER

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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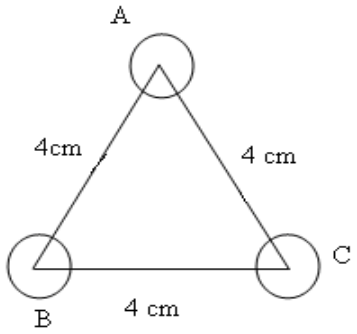
1 (a) Show that the inductance of single-phase two wire transmission line is $4x10^{-7}$ ln(d/r') H/m, where d is the distance between the conductors and r' is the geometric mean radius of the conductor.

(b) A single circuit, 50 Hz, 3- ø transmission line consists of three conductors arranged as shown in the figure has conductor diameter of 1.8 cm each, the conductor being spaced as shown in the figure. The line is transposed. Find the inductance of the line per km per phase.



2 Derive the expressions for A, B, C, D parameters of a nominal –T and π of a medium length transmission lines.

3 Derive the expressions for voltage and current distributions over a long line. Explain the significance of characteristic impedance loading in connection with the long lines.

4 A cable of surge impedance of 100 ohms is terminated in two parallel-connected, open-wire lines having surge impedances of 600 and 1000 ohms respectively. If a steep-fronted voltage wave of 1000 V travels along the cable, find from the first principles the voltage and current in the cable and the open-wire lines immediately after the travelling wave has reached the transition point. The line may be assumed o be of infinite length.

5 Determine the corona characteristics of a 3-phase line 160 km long, conductor diameter 1.036 cm, 2.44 m delta spacing, air temperature 26.67^0 C, altitude 2440 m, corresponding to an approximate barometric pressure of 73.15 cm of Mercury, operating voltage 110kv at 50 Hz.
Note: Assume the data if required (irregularity factors etc.).

6 Write and explain different types of insulators used for over head lines with neat diagrams.

7 (a) Write short notes on stringing charts.

(b) A 110kv transmission line has the following data: Weight of conductor =750 kg/km; length of span=250 m, ultimate strength=3000 kg, safety factor=2. Calculate the height above the ground at which the conductor should be supported. Ground clearance required is 10 meters.

8 (a) Briefly explain what is meant my capacitance grading of a cable.

(b) The capacitance per kilometer of a 3-phase belted cable is 0.18 μF between two cores with the third core connected to sheath. Calculate the KVA taken by 20 km long cable when connected to 3- phase, 3300 V supply.

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Code: 9A02503

R09

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

CONTROL SYSTEMS

(Common to EEE, E.Con.E, EIE & ECE)

Time: 3 hours Max Marks: 70

Answer any FIVE questions

All questions carry equal marks

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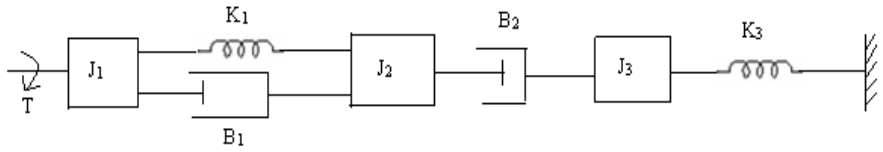
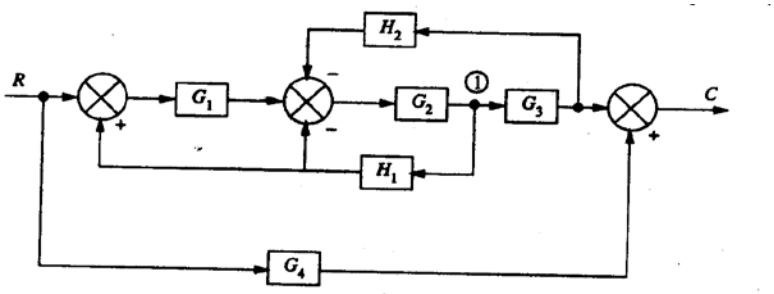
1 Write the differential equations governing the mechanical rotational systems shown in figure. Draw the torque-voltage and torque-current electrical analogous circuits and verify by writing mesh and node equations:



2 Find the transfer function shown in figure using block diagram algebra.



3 (a) Draw the transient response of a second order system and define all the specifications for under damped case?

(b) For a unity feedback control system the open loop transfer function G(s) = 10(s+2)/ s^2(s+1), find the steady state error when the input R(s) = (3/s)-(2/ s^2) + (1/3 s^3).

4 (a) What are the necessary and sufficient conditions to investigate the stability of the system using Routh-Hurwitz criterion?

(b) Factorize the given polynomial using Routh– Hurwitz criterion:
F(s) = s^6 + 2s^5 + 8s^4 + 12s^3 + 20s^2 + 16s + 16=0.

5 (a) Given G(s) = (s-5) / (s+5) Determine the Phase angle at 0, 5 & infinite frequencies.

(b) Draw the Bode phase plot for the system having the following transfer function:
G(s) = 5 (1+2s) / [(1+4s) (1+0.25s)].

6 Sketch the polar plot for following transfer function and from the plot determine the phase margin and gain margin: G(s) = [(1+0.2s) (1+0.025s)] / [s^3 (1+0.005s) (1+0.001s)].

7 Explain the different steps to be followed for the design of a lag compensator using Bode plot.

8 Find the transfer function from the A, B, C matrices of a state model.

$$A=\begin{bmatrix} -2 & 1 & 0 \\ 0 & -3 & 1 \\ -3 & -4 & -5 \end{bmatrix} \quad B=\begin{bmatrix} 0 \\ 0 \\ 1 \end{bmatrix} \quad C=\begin{bmatrix} 0 & 1 & 0 \end{bmatrix}$$

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Code: 9A02504

R09

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

POWER ELECTRONICS

(Common to Electrical & Electronics Engineering & Electronics & Control Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 (a) Explain the operation of SCR using schematic diagram and explain the importance of junctions.
(b) Discuss the conditions which must be satisfied for turning on an SCR with a gate signal.

2 Explain the R-C triggering circuit with suitable waveforms.

3 (a) Explain, the half-waving effect in a single-phase symmetrical half controlled converters.
(b) A voltage source e=100 sin 377 t supplies a resistive load of 100 ohm through a thyristor, which performs half-wave controlled rectification. Calculate the average power in the load, if the firing angle is fired at 45 deg. With respect to the supply voltage waveform.

4 (a) Explain the effect of freewheeling diode in detail. Also justify the statement “Freewheeling diode improves the power factor of the system”.
(b) A single phase fully controlled bridge is connected to an a.c supply of 230 V and 50 Hz is used for the speed control of dc motor with separate field excitation. The full load average armature current is 10 A and the converter operates at a firing angle $\alpha=\pi/4$. Neglecting the inductance and resistance of both armature and source, calculate the minimum value of series inductance, Ld required in the armature circuit to provide for continuous current conduction.

5 (a) Describe the working principle of continuous mode of three phase 3-pulse converters with associate waveforms at firing angle 60^{o}.
(b) What are the advantages of freewheeling diode?

6 (a) List the advantages and disadvantages of Triac over SCR.
(b) List the main features of Triac.

7 (a) Describe the Morgan chopper with associated voltage and current waveforms.
(b) Enumerate the merits of Morgan chopper compared to Jones chopper.

8 (a) Explain the operation of 1-phase modified Mc Murray half bridge inverter with neat diagram.
(b) The 1-phase modified Mc Murray half bridge inverter is fed by a dc source of 230 V. The dc source voltage may fluctuate by $\pm$10%. The current during commutation may vary from 30 to 120 A. Determine the values of the commutating components if the thyristor turn off time is 10 μs. Also compute the values of R.

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Code: 9A02505

R09

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

ELECTRICAL MACHINES III

(Electrical & Electronics Engineering)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 Explain the stationary armature and rotating armature. What are the advantages of rotating armature over stationary armature?

2 (a) Explain the sources of harmonics. What are the various effects of harmonics on generated emf in an alternator?
(b) Determine the breadth and pitch factors for a 3-phase winding with 2 slots per pole per phase. The coil span is 5 slot-pitches. If the flux density wave of the fundamental and a 24% third harmonic, calculate the percentage increase in the phase voltage due to the harmonic.

3 (a) Describe the slip test method for the measurement of X_d and X_q of synchronous machines.
(b) The no load excitation of an alternator required to give rated voltage is 1p.u. in a short circuit test with full current flowing in the armature, the field excitation was 0.75p.u. determine the approximate excitation that will be required to give full-load current at 0.866p.f. lagging at the rated terminal voltage.

4 (a) Discuss load sharing between two alternators.
(b) The speed regulation of two 500 kW alternators A and B running in parallel are 100% to 105% from full load to no load respectively. How will the two alternators share a load of 800 kW and also find the load at which one machine ceases to supply any portion of the load?

5 (a) A sub-station operating at full load of 1000kVA supplies a load at 0.75 power factor lagging. Calculate the permissible additional load at this power factor and the rating of synchronous condenser to raise the substation power to 0.9 lagging.
(b) Derive the expression for the maximum power developed by a synchronous motor.

6 (a) What is meant by power circle? Illustrate the locus of armature current variation with constant mechanical power developed.
(b) Explain the methods of starting the synchronous motor against the light loads and high load torques.

7 Compare the various types of single-phase induction motors in terms of construction and performance.

8 With neat diagram explain the construction and working of variable reluctance stepper motor. Also explain its static and dynamic characteristics.

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Code: 9AHS401

R09

III B. Tech I Semester (R09) Supplementary Examinations, May 2012

MANAGERIAL ECONOMICS & FINANCIAL ANALYSIS

(Common to CE, BT, ME, EEE & ECC)

Time: 3 hours Max Marks: 70

Answer any FIVE questions
All questions carry equal marks
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1 What are the contributions and limitations of managerial economics to business managers?

2 How do you measure elasticity of demand? Illustrate graphically.

3 What is production function? How is it useful to the manufacturer?

4 How does an individual firm behave under perfect completion? Also explain the firm and industry equilibrium under perfect competition.

5 Discuss about the short-comings of the public sector enterprises in India and what is their future.

6 (a) What is the importance of capital?
(b) What factors determine the working capital requirements of a company?

7 (a) What is 'Journal Entry' and describes its importance in account books?
(b) Explain the basic accounting concepts and convention. Give examples.

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

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