M 23291

Reg. No. : .....

Name : .....

VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT2K6/2K6 CE/ME/EE 601 : ECONOMICS AND MANAGEMENT

Time: 3 Hours Max. Marks : 100

Instruction : *Answer* ***all*** *questions.*

I. a) What is the nature and scope of economics ?

b) Explain the concept of opportunity cost.

c) Distinguish between wants and demand.

d) List the methods of demand forecasting.

e) Explain the properties of ISOquants.

f) What is capital ? What are the stages of capital formation.

g) Explain the process by which a bank creates credit.

h) What are the factors determine price. **(8×5=40)**

II. a) What are the objectives of business firms ? How does a partnership firm differ from joint stock company ?

OR

b) Explain any three definitions of economics ? What is the nature and status of economics ? **15**

III. a) State and illustrate the law of supply. Why supply curve assumes different shapes in different markets ? What is extension and contraction of supply ?

OR

b) What do you mean by elasticity ? What are the factors determining elasticity ? What is its significance in Economics ? **15**

P.T.O.

IV. a) What are the factors of production? Explain Cobb-Douglas production function ? Explain the concept of division of labour.

OR

b) How do you calculate efficiency ? What are the ways to enhance efficiency ? Differentiate technical and economic efficiency ? **15**

V. a) What are the nature and functions of money ? How does money market differ from capital market ?

OR

b) What are the features and functions of central banks ? What are the functions of Commercial banks ? Explain the methods of credit control. **15**

M 23305

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VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EE 602 : POWER ELECTRONICS

Time : 3 Hours Max. Marks : 100

Instruction : *Answer* ***all*** *questions.*

1. a) Explain the structure of a thyristor.
   b) Describe the operation of UJT triggering circuit.
   c) Explain the operation of a fully controlled converter with constant current.
   d) Draw and explain the circuit of a parallel inverter.
   e) Describe the principle of operation of a chopper.
   f) Explain the operation of a sequence controlled ac regulator.
   g) Explain the continuous conduction mode of operation of a Boost regulator.
   h) Explain the operation of an uninterruptible power supply. **(8×5=40)**

2. a) Describe the structure and characteristics of power MOSFET. **15**

   OR

   b) Explain the structure and characteristics of TRIAC. **10**
   c) Draw and explain the V-I characteristics of a power diode. **5**

3. a) With circuit diagram and wave forms explain the operation of a half controlled converter with continuous and constant current. **15**

   OR

   b) With circuit diagrams explain the working of series and bridge inverters. **15**

P.T.O.

4. a) What are the different types of choppers ? Explain them. **15**

OR

b) Explain the principle of operation of a cyclo converter. **5**

c) With circuit and wave forms explain the working of an ac regulator with resistance load. **10**

5. a) Discuss about the principle of operation and analysis of switched mode power supply. Compare it with linear power supply. **15**

OR

b) Discuss the various modes of operation of a Buck-Boost regulator. **15**

M 23306

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VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EE 603 : POWER SYSTEMS – II

Time : 3 Hours Max. Marks : 100

***Instruction** : Answer **all** Questions.*

1. a) Choosing a simple power system illustrate the procedure for obtaining per unit impedance diagram.
   b) Discuss the effect of off nominal transformers on Y bus.
   c) Explain the positive sequence network of a synchronous machine.
   d) Draw and explain the connection of sequence network for a line-to-line fault.
   e) Draw the block diagram of speed governor system and explain.
   f) Write a note on automatic voltage regulation.
   g) Discuss the effect of clearing time on stability.
   h) Explain equal area criterion for stability. **(8×5=40)**

2. a) Explain the formation of YBW by singular transformation. **5**
   b) With a flow chart explain fast decoupled method. **10**

   OR

   c) With a flow chart explain load flow analysis by Gauss Siedel method using YBW. **15**

3. a) Describe Z bus building algorithm and fault analysis using Z bus. **15**

   OR

   b) Determine the fault current in each phase following a double line to ground short circuit at the terminals of a star connected synchronous generator operating initially on an open circuit voltage of 1.0 pu. The positive, negative and zero sequence reactance of the generator are j0.35, j0.25 and j0.2 respectively and its star point is isolated from ground. **7**
   c) Discuss about sequence impedances and networks of transmission lines. **8**

P.T.O.

4. a) Derive the transmission loss formula. **8**

   b) Explain the load frequency control of a single area case. **7**

   OR

   c) Explain in detail, the optimal load flow problem and its solution. **15**

5. a) Describe the computational algorithm for obtaining swing curves using modified Euler's method. **8**

   b) Explain the features of HVDC transmission. **7**

   OR

   c) Explain transient and steady state stability. **7**

   d) Discuss about multimachine stability. **8**

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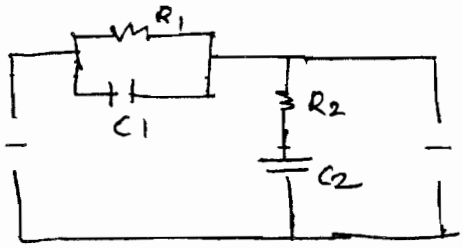
VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013
(2007 Admn. Onwards)
PT 2K6/2K6 EE 604 : CONTROL SYSTEMS – I

Time : 3 Hours Max. Marks : 100

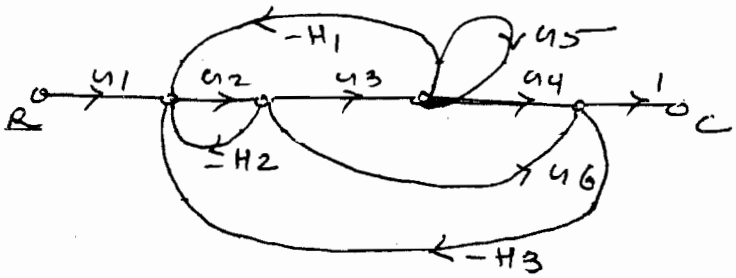
***Instruction** : Answer **all** questions.*

1. a) State and explain Mason's gain formula.
   b) Obtain the transfer function of the following network.



   c) Explain the principle of operation of synchros.
   d) Discuss the effects of addition of poles and zeros on root locus.
   e) Explain Nyquist stability criterion.
   f) Differentiate between minimum and nonminimum phase systems.
   g) Derive the transfer function of a ZOH.
   h) Explain the application of Routh's test for the analysis of stability of sampled data system. **(8×5=40)**

2. a) Find the over all gain of the signal graph shown below. **15**



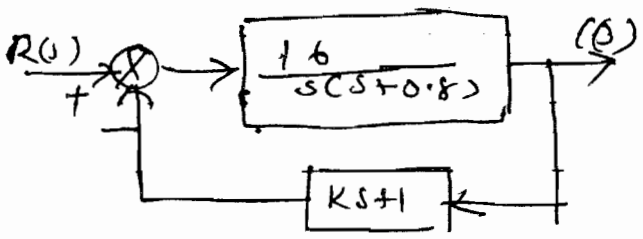
OR

P.T.O.

b) Derive the transfer function of an armature controlled d.c. motor. **10**

c) Write a note on force-current analogue. **5**

3. a) The damping ratio of the following system is 0.5. Find an expression for unit step response. Also calculate the rise time, peak time, maximum over shoot and settling time. **15**



OR

b) Sketch the root locus for a system with open loop transfer function

$$\frac{K(S^2+6S+25)}{S(S+1)(S+2)}.$$ **15**

4. a) Using Nyquist stability test find range of values of K for the system with open loop transfer function $\frac{K(1+S)^3}{S^3}$ is stable.

OR

b) Sketch the Bode plots for the system with transfer function $\frac{KS^2}{(1+0.2S)(1+0.2S)}$.

Also find the value of K for a gain cross over frequency of 5 rad/sec. **15**

5. a) Find the inverse z transform of $F(z) = \frac{z-4}{(z-1)(z-2)^2}$. **5**

b) Describe, in detail, the Jury's stability test. **10**

OR

c) Find the z transform of $e^{-at}\cos\omega t$. **5**

d) Test the stability of the system with characteristic equation $z^4 - 1.7z^3 + 1.04z^2 - .268z + .024 = 0$. **10**

M 23308

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VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013

PT2K6/2K6 EE 605 : ELECTRICAL ENGINEERING DRAWING

(2007 Admn. Onwards)

Time: 3 Hours Max. Marks : 100

Instruction : *Answer* ***all*** *questions.*

1. a) Draw the developed winding diagram of a six pole, eighteen armature slots, double layer, full pitch lap wound DC generator fix the poles. Draw the sequence diagram. Fix the position and polarity of brushes. Mark the direction of rotation of armature. **20**

   b) Draw the single line diagram of 33 kV substation showing all the necessary equipments. **10**

OR

2. a) Design and draw the developed winding diagram for an alternator with following details : **15**

   No. of poles = 2 ; No. of phase = 3 ; No. of slots = 24 ; Winding = single layer, lap short pitched by one slot.

   b) Draw the single line diagram of a 66/11 kV substation with the following details :

      i) 66 kV incoming line – 2 Nos.

      ii) Line OCB's 66 kV – 2 Nos.

      iii) Step down transformer 66 kV/11 kV – 2 Nos.

      iv) Bus coupler for HT side only.

      v) Feeders 11 kV radiating from L_T bus - 4 Nos.

      vi) L.T. circuit breakers for feeders – 4 Nos.

      vii) Duplicate bus bar for H.T. and L.T. to be provided

      viii) Position of lightning arresters, CT's and PT's. **15**

3. a) Draw neatly to a convenient scale the front elevation and plain in full section of a 3 phase core type poneer transformer as per the main dimensions given below :

Diameter of the core circum circle, d = 23 cm

3 – step core construction,

Window height = 47 cm

Overall width = overall height of core = 98 cm.

Secondary winding (LT) :

Inside dia. = 25 cm.

Outside dia. = 27.1 cm.

Winding in 2 layers

No. of turns per layer = 21

Secondary conductor = 6 strips in parallel each of 9.55 mm × 3.2 mm.

Primary Winding (HT) :

Inside dia. of winding = 32 cm

Outside dia. of winding = 37 cm

No. of turns = 750

8 coils of 83 turns each, arranged in 7 layers, height 3.75 cm, 2 coils of 43 turns each, height 2.35 cm.

Primary conductor = 2.64 mm dia; 33 mm dia with insulation. **20**

b) Draw to half scale sectional end elevation and sectional front elevation of a main pole of DC machine with the following dimensions :

Width of the pole = 168 mm ; Pole arc = 240 mm

Radius of pole arc = 336 mm

Height of pole with shoe = 228 mm

Height of the pole core = 192 mm

Diameter of rivet used = 9 mm

Axial length of pole arc = 216 mm

Thickness of yoke = 114 mm

Show the arrangement of fixing pole to yoke. **15**

OR

4. a) Draw the half sectional elevation and full sectional plan of a single phase shell type transformer for the dimensions given below :

Core = 38 cm ; Core length = 54 cm ;

Core depth = 37 cm ; Core width = 14 cm ;

Window size = 23 cm × 24 cm ;

No. of LV coil = 4 ; No. of turns per coil = 10

No. of layers of LV coil = 5 ;

No. of turns per layer of LV coil = 2

Cross section of the LV conductor 125 sq. mm

No. of HV coils = 4

No. of turns per coil in HV = 40 ;

No. of layers of HV coil = 10 ;

No. of turns per layer in HV = 4 ;

Cross section of the HV conductor = 28 sq. mm.

Average height of one turn = 1.8 cm. **15**

b) Draw to suitable scale :

i) End view and

ii) Longitudinal view.

Both top half in section for a DC motor.

Details of Yoke – Outer diameter = 49.6 cm

Inner diameter = 40 cm

Length = 16 cm.

Details of Main pole – Number = 4

Width = 6.08 cm

Height = 9.6 cm

Length = 12.8 cm

Air gap length = 1.6 mm

Details of Inter pole – Number = 4

Width = 9.5 cm

Height = 11

Air gap = 2.5 mm. **20**

5. a) The rotor of an alternator consists of a shaft, a spider and poles. Draw the half sectional end view of the rotor assembly with the following dimensions. Scale = $^1/_2$ full size.

i) Shaft – it is made of mild steel and solid circular radius of the shaft = 3 cms.

ii) Spider – it is made of cast steel and has four dovetail slots at its outer surface. The angle between the centre line of the slots is 90. The spider is a square of sides 20 cms.

Distance between the centre of the shaft and bottom of the dovetail slot = 8 cms.

Height of the dovetail size of slot plate = 6 × 2 cm.

Width of the dovetail slot at the bottom = 5 cms.

Width of the dovetail slot at the top = 2.5 cms.

On both the sides of the dovetail slot there is a hole of diameter = 0.5 cm for fixing the retaining plate to the spider.

iii) Pole Core – It is made of sheet steel lamination and they are fixed rigidly by suitable bolts and nuts at regular intervals.

Height of the dovetail in the pole core = 2 cm.

Height of the core above dovetail = 8 cm

Width of pole core = 10 cms.

Width of pole face = 5 cms.

Radius of the pole arc at the top of the pole face from the centre of shaft = 20 cms.

iv) Pole winding – Made of enamelled wire and suitably insulated. Height of pole winding = 8 cms. Width of pole winding = 15 cms.

Insulation between core and winding = 0.2 cms. **15**

b) Draw the half sectional elevation and half sectional end view of a three phase slip-ring induction motor with the following dimensions :

Inside dia of stator = 32 cm

External dia of stator= 48 cm

Stator length = 22 cm

Stator overhang of each side = 10 cm

Length of stator frame = 40 cm

Air gap length = 0.2 cm

No. of slots in stator = 45

Size of stator slot = 1.2 cm × 6 cm, Open type

No. of slots in rotor = 36

Size of rotor slot = 0.85 cm × 5.5. cm, open type

Shaft dia. = 7.5 cm

Total length of motor at foot step = 48 cm

Height of base upto eye bolt = 72 cm.

Width of foot step = 78 cm

Foot thickness = 5 cm

Length of foot = 10 cm. **20**

OR

6. a) The stator of an alternator is supported by a cast iron frame. The armature conductors are placed in the slots on the inner surface of the stator. The armature core is built of laminations which are held tightly together by end clamping rings. The rotor poles which are made of steel laminations riveted together are attached to the periphery of the rotor by studs inserted from the underside of the rim.

Diameter of shaft = 7.6 cm

Diameter of rotor = 46 cm

Height of pole = 7.6 cm

Outer dia. of stator = 76 cm

External dia. of the supporting frame = 92 cm

No. of poles = 10

Length of stator = 16 cm

Stator coil overhang on each side = 10 cm

Length of yoke = 22 cm

Overall distance of the base plate from the centre line of the alternator to the ground level = 50 cm.

Draw to the scale

i) Half sectional end view of the alternator showing all essential parts.

ii) Half sectional longitudinal view showing the stator core, air ducts, rotor etc. **18**

b) The details of a 10 hp 3 phase 50 cycles 4 pole squirrel case induction motor are as follows :

Stator :

Internal dia. of stator = 18 cm

Outside dia. of stator = 32 cm

Gross length of stator core = 13.5 cm

(it has one ventilating duct of 1.3 cm width)

No. of slots = 36

Slot width = 0.77 cm

Slot depth = 3.4 cm

Length of air gap = 0.1 cm

Rotor :

No. of slots = 31

Rotor bars = 0.51 cm × 1.52 cm

End ring area = 1.69 sq. cm

Shaft dia. = 5.1 cm

The rotor is of squirrel cage type mounted directly on the shaft.

Overall height of the motor = 47.5 cm

Assuming suitable dimensions and shapes of the motor frame and other parts, draw choosing a suitable scale :

i) Half sectional longitudinal view

ii) Half sectional end view. **17**

M 23310

Reg. No. : .....

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VI Semester B.Tech. Degree (Reg./Sup./Imp. – Including Part Time) Examination, May 2013

(2007 Admn. Onwards)

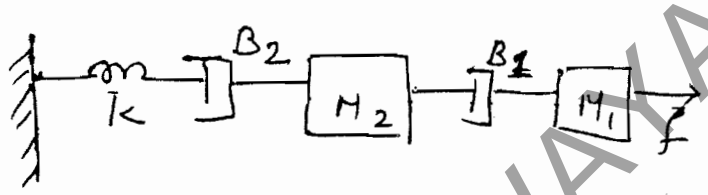
PT 2K6/2K6 EE 606 (C) : LINEAR SYSTEM ANALYSIS

Time: 3 Hours Max. Marks : 100

Instruction : *Answer* ***all*** *questions.*

1. a) Differentiate between stochastic and deterministic systems.

   b) Obtian the differentiation equations describing the following system



   c) Derive the transfer function of the following network.

   d) Give any five properties of Fourier transforms.

   e) Explain rise time, settling time, delay time and peck overshoot.

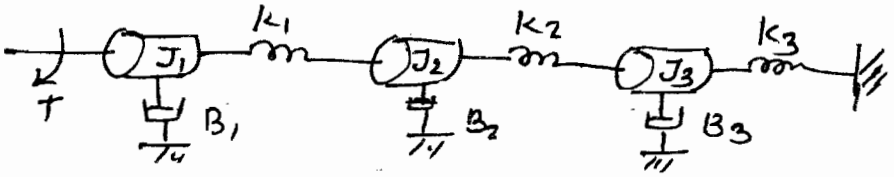
   f) Explain the concept of bounded input – bounded output stability.

   g) Define and explain observability.

   h) What is meant by zero input state response ? How it is determined. **(8×5=40)**

P.T.O.

2. a) For the mechanical rotational system identify the veriables and obtain the differential equations governing the dynamics. **10**

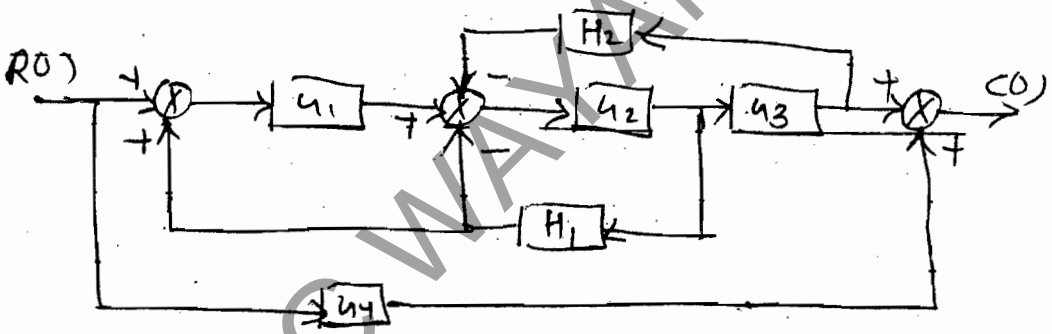


b) Explain D'Alembert's principle. **5**

OR

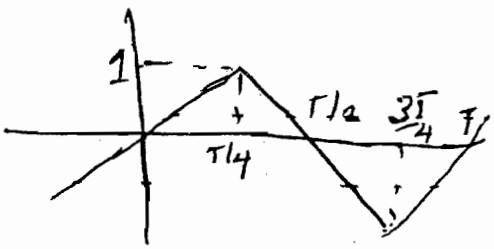
c) Choosing suitable example explain the modelling of hydraulic and thermal systems. **15**

3. a) Draw the signal flow graph of the system with block diagram shown below and hence obtain the transfer function. **15**

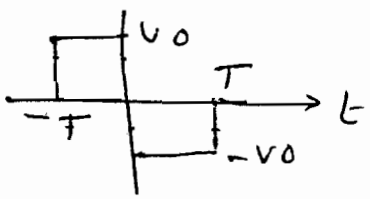


OR

b) Find the Fourier series expansion of the function shown below. **7**



c) Find the Fourier transform of the function shown below. **8**

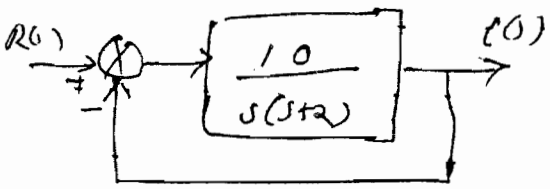


4. a) The characteristic polynomial of a system is $s^7 + 9s^6 + 24s^5 + 24s^4 + 24s^3 + 24s^2 + 23s + 15 = 0$. Determine the location of roots and comment on stability. **10**

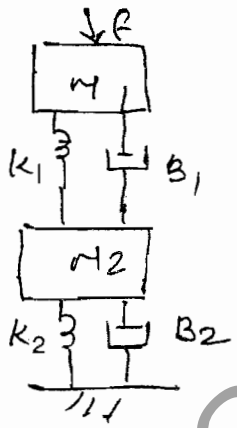
   b) Explain the steady state error coefficients. **5**

   OR

   c) For the system shown below find rise time, peak time and peak over shoot. Derive the relations used. **15**



5. a) Constract a state model for the system shown below : **10**



   b) Derive the relation between state model and tranfer function. **5**

   OR

   c) Compute the solution of the system given by

$$\dot{X} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -6 & -11 & -6 \end{bmatrix} X + \begin{bmatrix} 0 \\ 0 \\ -1 \end{bmatrix} u$$

$$X(0) = [1 \quad 0 \quad 0]^T$$ **15**