[Total No. of Questions: *6*] **[Total No. of Printed Pages: *2*]**

UNIVERSITY OF PUNE

[4362]-184

S. E. (Printing) Examination - 2013

Technology of Printing Materials (2008 Course)

[Time: *3* Hours] **[Max. Marks: 100]**

Instructions:

1 *All questions are compulsory*

2 *Assume suitable data, if necessary.*

3 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*

4 *Neat diagrams must be drawn wherever necessary.*

5 *Black figures to the right indicate full marks.*

SECTION -I

Q.1	Explain the role of Aluminum as a image carrier in the Lithography	16
	OR	
Q.1	Explain the role of Copper in printing	16
Q. 2	Explain the role of various ingredients used in photographic emulsion	16
	OR	
Q. 2	Explain the procedure of preparing the screen by photographic method	16
Q. 3	Explain the type of ink used in Gravure printing process with properties.	18
	OR	
Q. 3	Explain the different types of pigments used in printing inks	18

SECTION II

Q. 4	Differentiate between Process inks and Spot/ Special inks	16
	OR	
Q. 4	Write the importance of thickness of the paper with reference to the procedure of thickness gauge	16

Q. 5		Draw a neat diagram of Fourdrinier machine and name the parts	16
		OR	
Q. 5		Describe in detail the theory of internal sizing in the paper	16
Q. 6	A	Write in detail the procedure of determining the grammage of paper	18
		OR	
Q. 6		Comment on any two i) Tensile strength ii) Dimensional stability iii) Opacity	18

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *5*]

UNIVERSITY OF PUNE
[4362]-185
S. E. (*Printing*) Examination - 2013
Electrical Machines & Utilization (2008 Course)
[Time: *3* **Hours]** **[Max. Marks: 100]**

Instructions:

1 *Answer any 3 questions from each section.*
2 *Answer 3 question from section I and 3 question from section II*
3 *Answers to the* ***two sections*** *should be written in* ***separate answer-books****.*
4 *Neat diagrams must be drawn wherever necessary.*
5 *Black figures to the right indicate full marks.*
6 *Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.*
7 *Assume suitable data, if necessary.*

SECTION -I

Q.1 A Explain demagnetisation and cross-magnitisation in dc generator. 8

B A 220v, 500A, 600rpm separately excited motor has armature & field resistance of 0.02 Ω & 10Ω respectively the load torque T_L=2000-2N N-m where N is the speed in rpm. Calculate 8

i. Motor terminal voltage & armature current when the speed is 450rpm.
ii. Field winding voltage & armature current when the speed is 750 rpm.

OR

Q.2 A Explain the material used & the application of the parts 8

i. Interpoles
ii. Commutator Riser
iii. Brush and
iv. Compensating winding.

B A 2 pole separately excited dc motor has the ratings of 220v, 100A & 750rpm. Resistance of the armature is 0.1Ω. the expression for load torque is T_L=500-0.3N 8

Where N is the motor speed in rpm. Calculate

i. Motor armature current & speed when the armature voltage is reduced to 110v
ii. Motor speed & current when field coils are connected in series.

Q. 3 A Derive the expression for rotating magnetic field for 3-phase induction motor. 8

B An induction motor is rated as 5kw at 1440 rpm, 50Hz, 400v line to line. The rotational losses due to friction & windage are 279w. If the maximum torque is found at 900 rpm. Calculate the maximum torque developed. 8

OR

Q. 4	A	Explain double revolving theory for 1-phase induction motor.	8
	B	A 6pole, 50Hz, 3-phase induction motor running on fuel load develops a useful torque of 163 N-M & the rotor emf makes go complete cycle per minute. If the mechanical torque lost in friction be 14 Nm, final the copper loss in the rotor winding, the input to the motor & the efficiency. Stator losses total 750w.	8
Q. 5	A	Explain with neat diagram and working of 1-phase universal motor	8
	B	A 20KVA, 220V, star connected, 3-phase, salient pole synchronous generator supplies rated load at 0.707 lagging power factor. The reactance per phase are $x_d=2\times q=4\Omega$. Neglecting the armature resistance, Calculate i. The power angle and ii. The percent voltage regulation.	10

OR

Q. 6	A	Explain torque slip characteristics of servo motors.	8
	B	A 3-phase, 1500KWA, star connected, 50Hz, 2300v alternator has a resistance between each pair of terminals as measured by direct current is 0.16Ω. Assume that the effect of resistance is 1.5 times the ohmic resistance. A field current of 70A produces a short circuit current equal to fuel load current of 376 A in each line. The same field current produces an emf of 700V on open circuit. Determine the synchronous reactance of the machine & its full load regulation at 0.8 p.f. lagging.	10

SECTION II

Q. 7	A	Explain electrical encoders & micro switches in details	8
	B	A balanced 3-phase supply of $100\sqrt{3}\angle o°$ be applied to terminals R, y and B. The three phase star connected balanced load consists of a per phase impedance of (10+j10) Ω. Determine the wattmeter readings of two wattmeter. Then find the total 3-pahse real & reactive powers delivered to the loads. Also calculate load p.f.	8

OR

Q. 8	A	Explain need of reactive power & how it is measured by single wattmeter method	8
	B	Calculate the readings of the two wattmeters connected to measure total power for a balanced star connected loaded from three phase, 400v balanced supply. The load impedance per phase is (20+j15) Ω. Also find the line & phase currents, power factor total power, total reactive VA & total VA.	8
Q. 9	A	Explain vertical core type induction heating furnace	8
	B	A 27KW, 3-phase, 4oov resistance oven is to employ nickel-chrome strip	8

0.25mm thick for the three star connected heating elements. If the temperature of the strip is to be 1000°C & that of the charge be 600°C Estimate a suitable width for the strip. Assume emissivity =0.9 & radiating efficiency to be 0.5 & resistivity of the strip material is $101.6 \times 10^{-8}\Omega$m.

OR

Q. 10 A Explain 3-phase direct are heating furnace in detail. 8

B The following data relate to a 4-phase electric arc furnace 8

Current down=4000A, Arc voltage =60v, Resistance of transformer reffered to secondary=0.0025Ω and

Reactance of transformer reffered to secondary =0.005 Ω

Calculate

i. Power factor and KW drawn from the supply

ii. If the overall efficiency of the furnace is 70%,find the time required to melt 2.5 tonnes of steel if latent neat of steel=37.2kJ/kg, specific heat of steel=0.5 kJ/kg k, melting point of steel=1370°C & initial temperature of steel=15°C

Q. 11 A Explain flood lighting scheme in details 8

B A small light source with intensity uniform in all directions is mounted at a height of 8m above horizontal surface. Two points A & B both lie on the surface with point A directly beneath the source how far is B from A if the illumination at B is only $1/12^{th}$ as great as at A 10

OR

Q. 12 A Explain maintenance procedure carried on electrical machines used in printing industry 8

B A drawing hall 40m×25m×6m is to be illuminated with metal filament of gas filled lamps to an average illumination of 90 lm/m^2 on a working plane 1m above the floor. Estimate suitable number, size & mounting height of lamps. Sketch the spacing layout. Assume coefficient of utilization of 0.5depreciation factor of 1.2 & space height ratio of 1.2 10

Size of lamps	200w	300w	500w
Luminous efficiency(lm/w)	16	18	20

UNIVERSITY OF PUNE

[4362]-181

S. E. (Printing) (I Sem) Examination 2013

STRENGTH OF MACHINE ELEMENTS

(2008 Pattern)

[Total No. of Questions:12] **[Total No. of Printed pages :4]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any three** questions from each section.*

(2) Net diagrams must be drawn wherever necessary.

(3) Figures to right indicate full marks.

(4) Use of logarithmic tables, slide rule, Mollier charts, electronic pocket calculator and steam tables is allowed.

(5) Assume suitable data, if necessary.

SECTION I

Q1.a) Define and Explain following terms: [10]

i)Allowable Stress

ii)Thermal Stress

iii)Bulk Modulus

iv) Lateral Strain

v) Hooke's Law

b) A bar of 30 mm diameter is subjected to pull of 60 kN. The measured extension of gauge length of 200 mm is 0.1 mm and change in diameter is 0.004 mm calculate [6]

i) Young's Modulus

ii) Poisson's Ratio

iii)Bulk Modulus

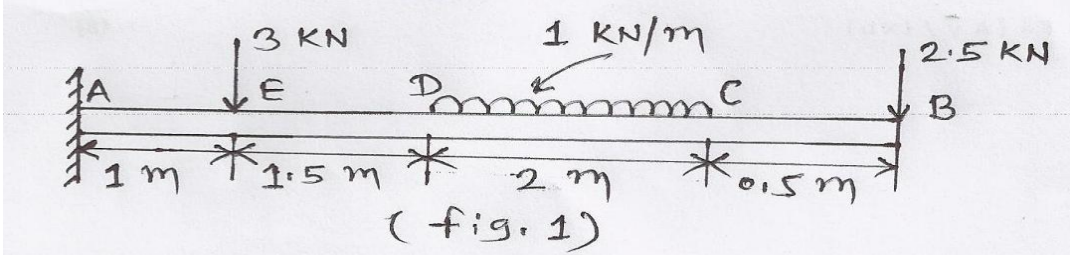
OR

Q2.a) Draw and Explain Stress- Strain diagram for the ductile materials [8]

b) A steel rod 5m long and 30 mm in diameter is subjected to an axial tensile load of 50kN. Determine the change in length, diameter and volume of the rod. Take $E=2\times10^5$ N/mm^2 and Poisson's ratio =0.25 [8]

Q3. A Cantilever of length 5.0 meter is loaded as shown in figure (1). [18]

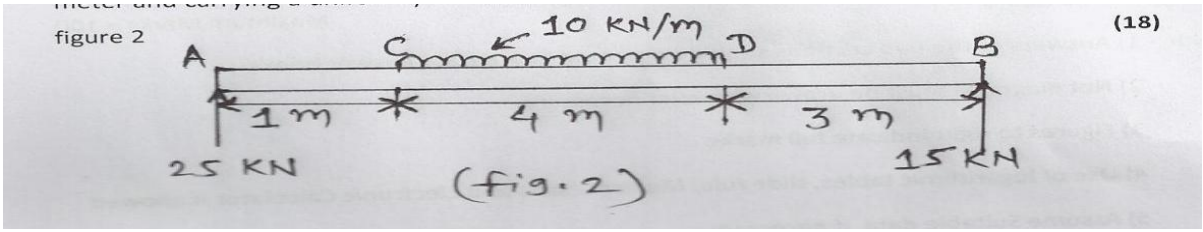
Draw the S. F. And B.M. diagrams of the cantilever



(fig. 1)

OR

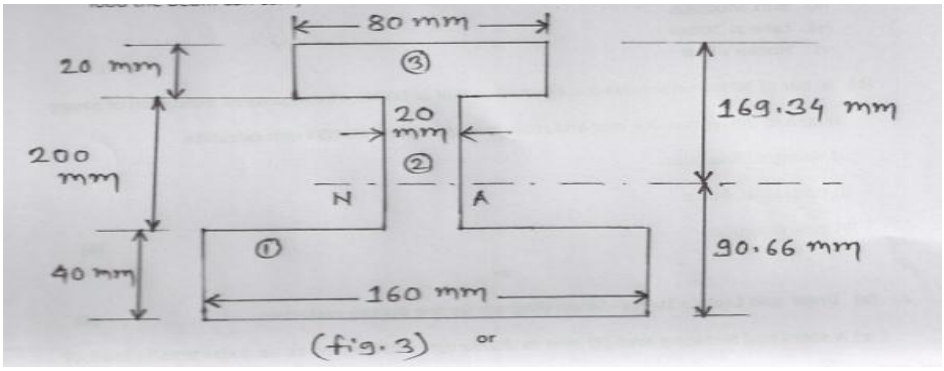
Q4. Draw Shear force and Bending Moment diagrams for the simply supported beam [18]
of length 8 meter and carrying a uniformly distributed load of 10 kN/m for a distance of 4 m as shown in figure2



Q5.a) With usual notation prove that [8]

$M/I = \sigma/Y = E/R$

b) A cast Iron beam of I- Section is shown in figure 3. The beam is [8]
simply supported on a span of 5 meters. If the tensile stress is not exceeds $20N/mm^2$. Find the safe uniformly load the beam can carry. Find also the maximum compressive stress.



Q6.a) A timber beam of rectangular section is simply supported at the [8]
ends and carries a point load at the centre of the beam. The maximum bending stress is 12 N/mm^2 and maximum shearing stress is $1N/mm^2$. Find the ratio of span to the depth.

b) Prove that with usual notations [8]

$\tau = F \times (A\bar{y}/I \times b)$

SECTION II

Q7.a) A Solid circular shaft and a hollow circular shaft whose inside [8]
diameter is $(3/4)$ of outside diameter are of the same material of equal length are required to transmit a given torque. Compare the weights of these two shafts if the maximum shear stress developed in the two shafts are equal

b) A hollow circular shaft 20mm thick transmits 300 kw power at [8]
200 rpm. Determine the maximum internal diameter of the shaft if the shear strain due to torsion is not to exceed 0.00086. Take Modulus of rigidity $=0.8\times10^5$ N/mm^2

OR

Q8.a) Derive an Expression for crippling load when both the ends of [8]
the column are hinged.

b) A solid round bar 4 m long and 5 cm in diameter was found to [8]
extend 4.6 mm under a tensile load of 50kN. This bar is used as a strut with both ends is hinged. Determine the buckling load for the bar and also the safe load taking factor of safety 4.0.

Q9.a) At a certain point in a strained material, the intensities of stresses [8]
on two planes at right angles to each another are 20N/ mm^2 and 10M/mm^2 both tensile. They are accompanied by a shear stress of magnitude 10N/mm^2 . Find graphically the location of principal planes and evaluate the principal stresses

b) Explain the procedure for Mohr's circle for determining principals [8]
planes and principal Stresses

OR

Q10.a) Explain theories of failure [8]

b) A load of 100 N falls through a height of 2 cm onto a collar rigidly [8]
attached to the lower end of a vertical bar 1.5 m long of 1.5 cm^2 cross sectional area. The upper end of the bar is fixed.

Determine i) Maximum instantaneous stress induced in the vertical bar
ii)maximum instantaneous elongation and
iii)strain energy stored in the vertical rod
Take $E=2\times10^5$ N/mm^2

Q11.a) Derive and Expression for deflection at any section of a simply supported beam with eccentric point load using Macaulay's Method [8]

b) A cantilever of length 3m carries a uniformly distributed load of 10kN/m over a length of 2 m. from the free end if $I=10^8\ mm^4$ and $E= 2\times10^5\ N/mm^2$ find [10]

i) Slope at the free end.

ii) Deflection at the free end.

OR

Q12.a) Derive the expression, [8]

$M= E\times I \times d^2y / dx^2$

b) A beam of length 8m is simply supported at its ends. It carries a uniformly distributed load of 40 kN/m. Determine the deflection of the beam at its midpoint and also the position of maximum deflection and maximum deflection. [10]

Take $E= 2\times10^5\ N/mm^2$ and $I = 4.3\times10^8\ mm^4$

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UNIVERSITY OF PUNE

[4362]-182

S. E. (Printing) Examination 2013

Basic Elements of Printing Technology

(2008 Pattern)

[Total No. of Questions:6] **[Total No. of Printed pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any three** questions from each section.*

Section-I

Q.1 a) Explain the 2D and 3D type faces. [18]

OR

a) Write short note on DTP technology. [18]

Q.2 a) Explain the Screen Printing process. State the screen preparation methods. [16]

OR

a) Explain the offset printing process with suitable diagram. [16]

Q.3 a) Write short note on following finishing techniques. (any3) [16]

a. Punching b. Embossing

c. Foiling d. lamination

e. Varnishing

OR

a) Explain the following binding techniques. (any 3) [16]

a. Hard Binding b. Paperback binding

c. Mechanical loose leaf binding

Section-II

Q.4 a) Explain the following division of design. [18]

a. Natural design b. Conventional design

c. decorative design d. Geometric design

e. Abstract design

OR

a) What is graphic design? Explain the fundamentals of design. [18]

Q.5 a) Explain in details the stages of layout. [16]

a) Thumbnails b) Rough Layout

c) Comprehensive layout d) Artwork

OR

a) Define color. Explain additive and subtractive theory of color. [8]

b) Explain the dimension of color, color schemes and color symbolism. [8]

Q.6 a) Write short note on following (any 2). [16]

a) Vector images and Raster images

b) Software's for print designing

c) Digital Input Devices

d) Image Resolution

e) Screen angle

OR

a) Explain the advertising agency as per the following points. [16]

a) Advertising agency structure

b) Function of Advertising agency

c) Services offered by advertising agency

[Total No. of Questions: 12] **[Total No. Of Printed Pages: 2]**

UNIVERSITY OF PUNE
[4362]-186
S. E. (Printing) Examination - 2013
REPRODUCTION TECHNIQUES
(2008 Pattern)

[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

*(1) Answer any **three** from each section.*

SECTION-I

Q1 Discuss advantages of Digital original over Conventional original. [16]

OR

Q1 Discuss ideal properties of originals. [16]

Q2 Discuss FM screening. Also state what is hybrid screening? [16]

OR

Q2 Explain why halftone process in necessary in detail. [16]

Q3 Explain color separation and black generation. [18]

OR

Q3 Explain in detail. 1) UCR 2) GCR [18]

SECTION-II

Q4 Describe applications of a Densitometer in quality control. [18]

OR

Q4 Explain Dot value. How is banana curve useful in quality control? [18]

Q5 Write in detail structure and working of flatbed scanner. [16]

OR

Q5 Discuss structure and working of autoplate processor. [16]

Q6 Discuss in detail use of Control strip and it's elements. [16]

OR

Q6 What is Imposition? Explain work and tumble system. [16]

University of Pune
S.E. (Printing)
4362-187
Examination - 2013
Print Finishing
(2008 Pattern)

Total No. of Questions : 06 **[Total No. of Printed Pages :3]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions:

*(1) Answer **three** questions from each section-I and **three** questions from section-II.*
*(2) Answers to the **two sections** should be written in **separate answer-books**.*
(3) Black figures to the right indicate full marks.
(4) Neat diagrams must be drawn wherever necessary.
(6) Assume suitable data, if necessary.

Section I

Q1.

1. Draw neat diagram of constructional parts of book and label the parts. [8]
2. What are the different covering methods are used in book binding.
   What are the difference between half bound over to quarter bound style? [8]
3. Define Print Finishing. [2]

OR

1. Explain the binding equipments in detail. [9]
2. Explain binding tools in detail. [9]

Q2.

a) Describe the various reinforcing material and explain its purpose. [4]
b) Write eight advantages of ISO paper sizes. [4]
c) Specify purpose of RAO and SRAO sizes paper. [8]

OR

a) Describe the use of various Adhesive in Binding. Also state the requirement of adhesive in Binding. [8]
b) List down types of paper and specify use of each paper. [4]
c) Write eight disadvantages of British paper sizes. [4]

Q3.

a) What is the function of end paper? What are the essential qualities must it process? [4]
b) List down the pre forwarding operation step by step and explain the automation in respective operations. [8]
c) Explain the various wire binding methods used in book binding. [4]

OR

a) Explain step by step the forwarding operation also explain the automation in respective operations. [8]
b) What is mean by index cutting? What are the various types of index cutting and what are the applications of index cutting? [8]

Section II

Q4.

a) Define imposition scheme. Explain the half sheet and full sheet work and write down its advantages over to each other. [8]
b) Explain the following folding style with its advantages. [6]
   a) Folding to paper
   b) Folding to print
   c) Lump folding
c) List down the advantage of hand folding. [4]

OR

a) Explain the buckle folding principle with suitable diagram. [8]
b) List down the advantages of machine folding. [4]
c) Draw layout plan for medium size binding unit. Draw a block diagram only. [6]

Q5.

a) Calculate the cloth and boards required for making 5000 full bound books in A4 size having 10mm thickness and cloth rolls of 100cm wide and 15meter long in

45Dkg. also calculate the weight of end paper in RA1 size with 110 gsm for A4 size books. [16]

OR

a) Find out number of 45 Dkg boards in 21'X24" size required for A4 cut flush 5000 books. [4]
b) Calculate cost of for endpaper in 2RAO size with 80gsm @ Rs. 75/-kg for 10000 books in A5 size also calculate the maximum number of pieces for A5 size book from a board of 30"X42" size. [12]

Q6.

a) Draw a sketch of wire stitching machine and label the parts. [4]
b) Draw a sketch of sheet fed case making machine with detailed labels. [4]
c) Write short note on following (any2) [8]
   a) Wet lamination
   b) Dry lamination
   c) Ruling machine
   d) Foil Stamping

OR

a) Draw neat labeled sketch of gathering machine. [8]
b) Explain the types of material handling equipment. [8]

[Total No. of Questions: *12*] **[Total No. of Printed Pages:** *3*]

UNIVERSITY OF PUNE

[4362]-188

S. E. (*Printing*) Examination - 2013

Microprocessor and Microcontroller Techniques in Printing

(2008 Course)(208290)

[Time: *3* **Hours]** **[Max. Marks: 100]**

SECTION -I

Q.1	A	Explain the following pins of 8085 microprocessor 1. ALE 2. Reset 3. IO/$\bar{M}$ 4. Ready 5. S1 and S0	10
	B	Explain 3:8 decoder IC 74138 in detail with diagram.	08

OR

Q.2	A	Draw and explain the block diagram of 8085 in detail. Explain Flag register in detail with examples.	12
	B	Explain the difference between I/O mapped I/O and memory mapped I/O.	06
Q. 3	A	Assume register B holds 93H and the accumulator A holds 15H. Explain result of 1. ORA B 2. XRA B 3. CMA 4. ADD B	08
	B	Draw and explain the timing diagram for the instruction MVI A, 32.	08

OR

Q. 4	A	Explain following instructions in microprocessor 8085 1. MVI A,32 2. IN 36 3. LXI H,2000 4. MOV A, B	10

		5. JNZ	
	B	Write a program for UP and binary counting.	06
Q. 5	A	Draw pin diagram of 8051 microcontroller and explain different pins in detail.	10
	B	Explain TMOD (Timer/Counter mode control register) and TCON (Timer/Counter Control/Status register) in 8051 microcontroller.	06
		OR	
Q. 6	A	Explain SFR i.e. special function register in 8051 microcontroller.	10
	B	Explain program status word (PSW) in 8051 microcontroller.	06
		SECTION II	
Q. 7	A	Explain different addressing modes in 8051 microcontroller with example.	12
	B	Explain following instructions in 8051 microcontroller 1. MOV A,12 2. MOV A,#12 3. MOV A,@R1	6
		OR	
Q. 8	A	Explain following instructions in 8051 1. ADD A, @Rn 2. MUL AB 3. DIV AB 4. SWAP A	08
	B	Explain difference between 8085 microprocessor and 8051 microcontroller.	10
Q. 9	A	Explain all the interrupts available in microprocessor 8085.	10
	B	Explain all the events taking place when ‘CALL’ instruction is executed in microprocessor 8085.	06
		OR	
Q. 10	A	Draw and explain block diagram of 8255 Programmable peripheral interface IC.	10
	B	Explain mode 2 i.e. rate generator clock of 8253 programmable interval timer IC in detail.	06

Q. 11	A	Explain concept of PLC	08
	B	Explain printer interfacing with 8085	08
		OR	
Q. 12	A	Explain application of microprocessor in field of printing in detail.	08
	B	Write program for stepper motor interface with 8085 microprocessor.	08

[Total No. of Questions:12] **[Total No. of Printed Pages: *4*]**

UNIVERSITY OF PUNE
[4362]-189
S. E. (*Printing*) Examination - 2013
(Theory of Printing Machines)(2008 Course)
[Time: *4*Hours] **[Max. Marks: 100]**

Instructions:

1. *Answers to the **two sections** should be written in **separate answer-books**.*
2. *Neat diagrams must be drawn wherever necessary.*
3. *Assume suitable data, if necessary.*
4. *Use of logarithmic tables, slide rule, Mollier charts, electronics pocket calculator is allowed*
5. *Black figures to the right indicate **full marks**.*
6. *All dimensions in mm.*

SECTION –I

UNIT-I

Q.1 A Explain the following with neat diagrams 8
1. Spatial Mechanism
2. Crank and slotted lever quick return mechanism
3. Scotch Yoke Mechanism
4. Degree of freedom of a unconstrained rigid body

B Explain inversions of double slider crank chain. How elliptical trammel is used to draw the circle 8

OR

Q.2 A Explain the following with neat diagrams 8
1. Completely Constrained Motion
2. Crank and slotted lever quick return mechanism
3. Scotch Yoke Mechanism
4. Band link

B Explain the inversion of quadric cycle crank chain with neat sketches 8

Q.3 In the mechanism shown in the **fig. 1.** the crank OA rotates at 60 RPM. Determine 16
a. Linear acceleration of the slider at B
b. The angular acceleration of the links AC,CQD and BD.

l(OA)=150 mm; l(AC)=600 mm; l(QC)=l(DC)=l(QD)=145mm; l(DB)=500mm; l(OQ)=625 mm; angle AOQ=45°

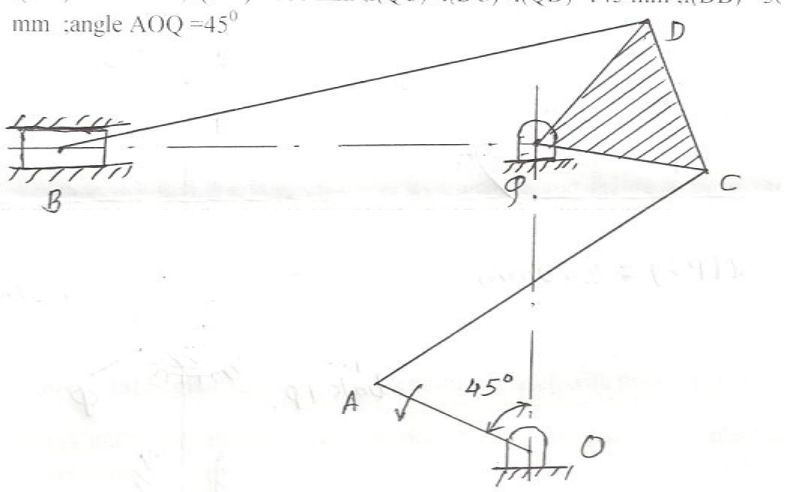

Figure 01

OR

Q.4 The dimensions of the differential stroke engine mechanism are shown in **fig. 2.** OA=90mm QB=42mm AC=BC=180 mm, CP=120mm OA and QB are geared together so that QB turns at twice the speed of OA and in opposite direction of OA. Find for the given configuration velocity acceleration of piston & angular velocity, angular acceleration of CP if OA turns with a speed of 720 rpm in clockwise direction 16

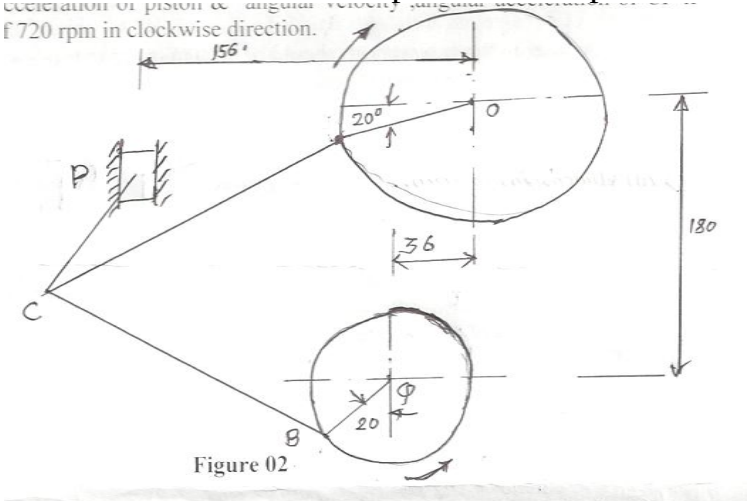

Figure 02

Q.5 In the mechanism shown in **fig.3.** the link PQ is free to turn about the end P at the same time it freely slides in a slotted trunnion R. The slotted trunnion is carried on the second link ST which freely slides vertically in the guides. Draw the velocity and acceleration diagram at the instant when PQ makes an angle of 45° to the horizontal and is rotating with angular velocity of 50 rad/sec in anticlockwise direction. Hence determine the velocity and acceleration of the link ST. 18

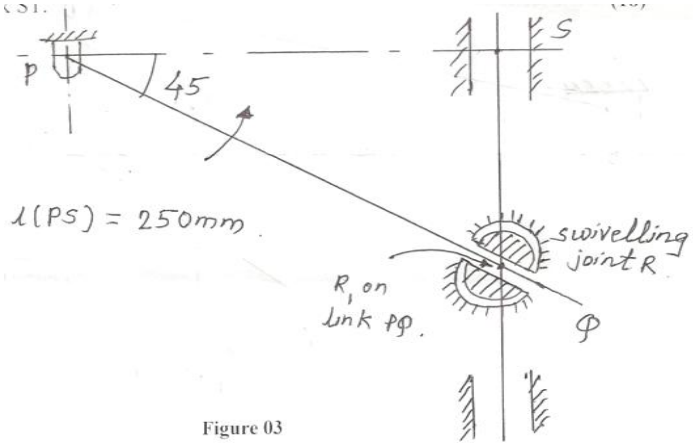

Figure 03

OR

Q.6 A The following **fig.4.** shows a quick return mechanism in which the driving crank OA rotates at 120 rpm in clockwise direction. For the position shown determine the magnitude & direction of: 1. The velocity and acceleration of the block D 2. The angular velocity and angular acceleration of slotted bar QB. Take OA=200mm, CD=500mm, QC=150m, QE=165mm 18

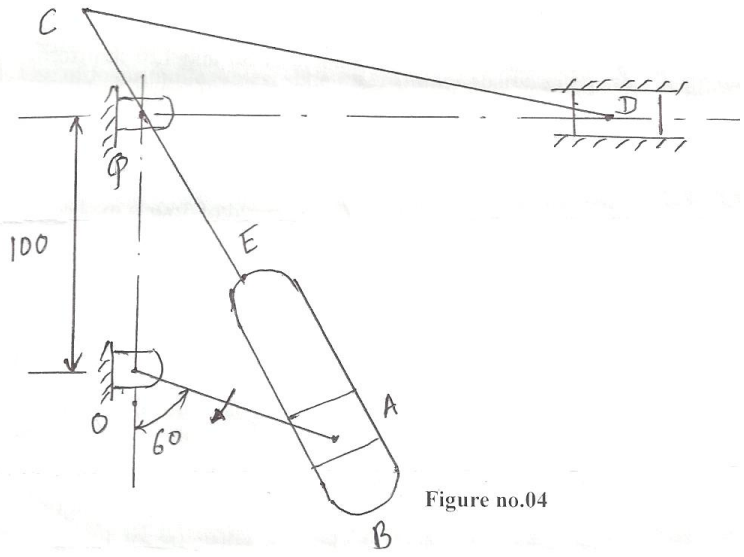

Figure no.04

SECTION II

Q.7 A Derive an expression for the torque transmitted by a cone clutch assuming i) uniform pressure ii) uniform wear. Which one will give safe design? 8

B A single plate clutch (both side effective) is required to transmit 26kW at 1600 rpm. The outer diameter of the plate is not to exceed 0.07N/mm^2. Assuming wear and coefficient of friction 0.3 find the inner diameter of the plate and the axial force necessary to engage the clutch 8

OR

Q.8 A Explain the working of centrifugal clutch with the help of neat sketch. 8

	B	A multiplate friction clutch transmit 75 kW at 3600 rpm. The plate are alternately made of steel and phosphor bronze and they run in oil. The coefficient of friction is 0.07, the axial pressure is 0.140 N/m^2. The external radius is 125mm and the internal radius is 0.8 of external radius. Find the number of plates required.	8
Q.9	A	Explain pivoted block brake and double block brake	8
	B	A band and block brake having 14 blocks each of which substends an angle of 15 degrees at the center is applied to the drum of 1 m effective diameter. The drum and flywheel mounted on same shaft weigh 20 KN and combined radius of gyration is 0.5 m. The two ends of the bands are attached to pins on opposite side of brake lever at a distance of 30 and 120 mm form the fulcrum. If the force of 200N is applied at the distance of 750mm from the fulcrum find, 1. Maximum braking torque 2. Angular retardation of the drum 3. Time taken by system to come to rest from the rated speed of 360 r.p.m. The coefficient of friction between the block & the drum is 25.	10
		OR	
Q.10	A	Write short note on Internal expanding shoe brake.	8
	B	A band and black brake is lined with 12 equal blocks each subtending an angle 15 degree at the center of the break drum of 480 mm diameter. The radial thickness of the blocks is 60 mm. The coefficient of friction between the block and the drum is 0.4 and the two ends of the band are attached to the pins on opposite sides of the fulcrum of the brake lever at 200 mm and 50 mm. Find the least force to be applied at the end of the brake lever at a distance of 400 mm form fulcrum to absorb 200kW at 25rad/s	10
Q.11	A	Explain the terms slip and creep as referred to belt	8
	B	Write short notes on 1. Centrifugal tension in belt 2. Crowning of pulleys	8
		OR	
Q.12	A	Derive an expression for limiting tension ratio for ‘V’ belt drive	8
	B	Write short notes on i. Length of flat belt ii. Types of belts and belt Materials	8

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S.E Engineering Examinations 2013

MATHAEMATICS – III

(2008 COURSE)

[Total No. of Question=12] **[Total no. of printed pages= 7]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

(i) Attempt q. No. 1 or q. no2, Q. No. 2, Q. No. 3 or Q. No. 4, Q. No. 5 or Q. No. 6 from Section I and Q No. 7 or Q. No. 8, Q. No. 9 or Q. No. 10. Q. No. 11 or Q No. 12 from section II.

ii) Answer to the two Sections should be written in separate answer-books.

iii) Figures to the right indicates full marks.

iv) Use of electronic pocket calculator is allowed.

v) Assume suitable data, if necessary.

Q.1 a) Solve any three [12]

1) $(D^2+3D+2)y = sine^x$

2) $(D^2+2D+1)y = 2cosx+3x+2+3e^x$

3) $(D^4 - 1)y = coshx$ Sinhx

4) $(1+x)^2 \frac{d^2y}{dx^2} + (1+x)\frac{dy}{dx} + y = 4\cos[\log(1+x)]$

5) $(D^2 - 4D + 4)y = e^{2x}sec^2x$ (by method of variation of parameter.)

b) Solve

$$\frac{dx}{x^2-y^2-z^2} = \frac{dy}{2xy} = \frac{dz}{2xZ}$$ [5]

Q. 2 a) Solve any three [12]

1) $\frac{d^2y}{dx^2} - \frac{dy}{dx} - 2y = 2logx + \frac{1}{x} + \frac{1}{x^2}$

2) $\frac{d^2y}{dx^2} - y = \frac{2}{1+e^x}$

3) $\frac{d^2y}{dx^2} + 4y = x \sin x$

4) $(D^2 - 4D + 4)y = e^x cos^2 x$

5) $x^2 \frac{d^2y}{dx^2} - 2x \frac{dy}{dx} - 4y = x^2 + 2 \log x$

Q.2 b) Solve [5]

$\frac{dx}{dt} + y = e^t$

$-\frac{dy}{dt} + x = \bar{e}^t$

Q. 3 a) A body weighing 4.9 is hung from a spring. A pull of 10 N will stretch the spring to 5 cm. The body is pulled down 6 cm below the static equilibrium position and then released. Find the displacement of the body from its equilibrium position in time 't' seconds, the maximum velocity and period of oscillation [8]

b) A string is stretched and fastened to two points 'λ' apart. Motion is started by displacing the string in the from u= a sin $\frac{\pi x}{\lambda}$ from which it is released at time t=0^{λ}. Find the displacement u(x, t) from one end. [8]

OR

Q.4 a) In a heat exchange the temperatures x and y of two liquids satisfy the equations

$$\frac{dx}{dt} + 5x - 2y = t$$

$$\frac{dy}{dt} + 2x + y = 0$$

Find the temperatures x & y as a function of time, given that x=0 and y=0 at time t = 0

b) Solve the equation $\frac{\partial u}{\partial t} = a^2 \frac{\partial^2 u}{\partial x^2}$ [8]

Where u(x, t) satisfies the following conditions

i) u (0,t) = 0
ii) u (λ, t) = 0 $\forall\, t$
iii) u (x, 0) = x in $0 < x < \lambda$
iv) u(x, ∞) is finite

Q.5 a) Find the Fourier transform of [7]

$$f(x) = \begin{cases} 1 - x^2\,, & 1x1 \le 1 \\ 0\quad, & 1x1 > 1 \end{cases}$$

and hence evaluate

$$\int_0^\infty \left(\frac{xcosx - sinx}{x^3}\right) \frac{cos3x}{2}\, dx$$

b) Show that the Fourier transform of f(x) = $e^{-x^2/2}$ is $\bar{e}^{\lambda 2/2}$ [5]

c) Solve the integral equation [5]

$$\int_0^\infty f(x) sin\ \lambda\, x\, dx = \begin{cases} 1\,,\ 0 \le \lambda < 1 \\ 2\,,\ 1 \le \lambda < 2 \\ 0\,,\ \lambda \ge 2 \end{cases}$$

OR

Q.6 a) Using Fourier integral equation show that [7]

$$\int_0^{\infty} \frac{cos\lambda x + \lambda sin\lambda x}{1+\lambda^2} d\lambda = \begin{cases} 0, & x < 0 \\ \pi/2\ , & x = 0 \\ \pi\bar{e}^{x}, & x > 0 \end{cases}$$

b) Find the Fourier sine transform of [5]

$$\frac{e^{-ax}}{x}$$

C) Find Fourier integral representation of [5]

$$f(x) = \begin{cases} \frac{\pi}{2} cosx\ , & |x| \leq \pi \\ 0, & |x| > \pi \end{cases}$$

Section-II

Q.7 a) Obtain Laplace transform of (any three): [12]

i) $\frac{\bar{e}^{at} - \bar{e}^{bt}}{t}$

ii) $e^{-4t} \int_0^t t \sin 3t \, dt$

iii) $(1+ 2t - 3t^2 + 4t^3)$ U (t-2)

iv) $\int_0^t erf\sqrt{u} \, du$

b) Using Laplace transform, evaluate: [4]

$$\int_0^\infty t^2 \, \bar{e}^t sint \, dt$$

OR

Q.8 a) Obtain inverse Laplace transform of (any three): [12]

i) $\frac{s}{(s^2+a^2)^2}$

ii) $\frac{1}{s}\log(\frac{s^2+a^2}{s^2+b^2})$

ii) $\frac{2s^2-6s+5}{s^3-6s^2+11s-6}$

iv) $\frac{\bar{e}^{3s}}{s^2+8s+25}$

Q.8 b) Find the Laplace transform of the periodic function: [4]

f (t) = $\begin{cases} t, & 0 < t < \pi \\ \pi - t, & \pi < t < 2\pi \end{cases}$

and f (t+2 π) = f (t)

Q.9 a) Find the directional derivative of [5]

$\emptyset = 4 \text{ x } z^3 - 3x^2y^2z \; at \; (2,-1,2)$ along tangent to the curve $x=e^t \cos t$,

$y = e^t \sin t$, $z = e^t$ at t = 0

b) If the vector field [6]

$\bar{F} = (x + 2y + z)\,\bar{\imath} + (bx - 3y - z)\,\bar{\jmath} + (4x + cy + 2z)\,\bar{k}$ is irrotational, find a, b, c and determine Ø such that $\bar{F} = \nabla\emptyset$.

c) Evaluate $\iint_S (\nabla \text{ X } \bar{F}).\overline{ds}$, where $\bar{F} = (x^3 - y^3)\,\bar{\imath} - xyz\,\bar{\jmath} + y^3\,\bar{k}$ and S is the surface $x^2 + 4y^2 + z^2 - 2x = 4$ above the Y0z - plane. [6]

OR

Q.10 a) Evaluate $\iint_S \frac{x\bar{\imath}+y\bar{\jmath}+z\bar{k}}{r^2} . \overline{ds}$ Where S is the surface of the sphere [6]

$x^2 + y^2 + z^2 = a^2$

b) With usual notations prove that (any two**)** **[6]**

i) $\nabla^4 (r^2 \log r) = \frac{6}{r^2}$

ii) $\nabla.\left[r \nabla \frac{1}{r^n}\right] = \frac{n(n-2)}{r^{n+1}}$

iii) $\nabla \text{ X } \left[\frac{\bar{a} \text{ X } \bar{r}}{r^3}\right] = \frac{3(\bar{a}.\bar{r})}{r^5}\bar{r} - \frac{\bar{a}}{r^3}$

C) Find the work done by the force

$\bar{F} = (x^2 - yz)\bar{\imath} + (y^2 - zx)\bar{\jmath} + (z^2 - xy)\,\bar{k}$ in taking a particle from

(1,1,1) to (3, -5,7) [5]

Q.11 a) Solve $\frac{dy}{dt} + 2y(t) + \int_0^t y(t)dt = sint$, given y(0) =1 using Laplace transform. [5]

Q.11 b) The transfer function of a second order system is given as [6]

G(s) = $\frac{6}{s^2+1.8s+1}$. Determine its properties such as overshoot, period of oscillation and $y(t)_{max.}$

C) Find the equations of stream line passing through the point (1,1,2) in case of steady motion of fluid defined by : $\bar{q} = -x\bar{\imath} + 2y\bar{\jmath} + (3 - z)\bar{k}$. [6]

OR

Q.12 a) Using the Laplace transform, solve the D.E. [5]

y″+2y′+y = 6t$\bar{e}^t$; y(0) =2, y′(0) =5.

b) Find the surface of equipressure in case of steady motion of a liquid which has velocity potential [6]

Ø = xy + yz + zx and is under the action of force

$\bar{F} = (mz + ny)\bar{\imath} + (nx + lz)\bar{\jmath} + (ly + mx)\bar{k}$

c) Is the motion represented by $(x^2-yz)\bar{\imath} + (y^2 - zx)\bar{\jmath} + (z^2 - xy)\bar{k}$ irrotational? If so, find the corresponding velocity potential. [6]

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T. E.(Electronics & Telecomm-Semester-I) Examination - 2013

NETWORK SYNTHESIS & FILTER DESIGN(304183)

(2008 Pattern)

[Total No. of Questions :] **[Total No. of Printed Pages :4]**

[Time : 3 Hours] **[Max. Marks : 100]**

Instructions :

*(1) Answer **any three** from each Section.*

*(2) Answers to the **two sections** should be written in **separate answer-books**.*

(3) Black figures to the right indicate full marks.

(4) Neat diagrams must be drawn wherever necessary.

(5) Use of electronic pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION –I

Q.1 a)Define the terms causality & realizability state and explain the condition for stability of a network [6]

b) What is positive real function? State the necessary and sufficient condition for a function to be positive real. [6]

c) Test whether following polynomial are Hurwitz [6]

i) $S^4 + S^3 + 4S^2 + 2S + 3$

ii) $S^4 + S^3 + 5S^2 + 3S + 4$

OR

Q.2 a) Explain the following removal operations [6]

i) Removal of pole at s= ∞ from given function

ii) Removal of pole at s= o from given function

b) Test whether the following function are positive real [6]

i) F(s) = $\frac{S^2\ 2s+25}{s^2+5s+16}$

ii) F(s) = $\frac{3S^2+5}{s(s^2+1)}$

c) A network shown in **figure1** has driving point impedance Z(s) with the poles and zeros located at the following places. [6]

Poles at $-\frac{1}{2} \pm j\frac{\sqrt{3}}{2}$ and zero at -1. If Z(0) = 1 Ω Determine the values of component R, L and C.

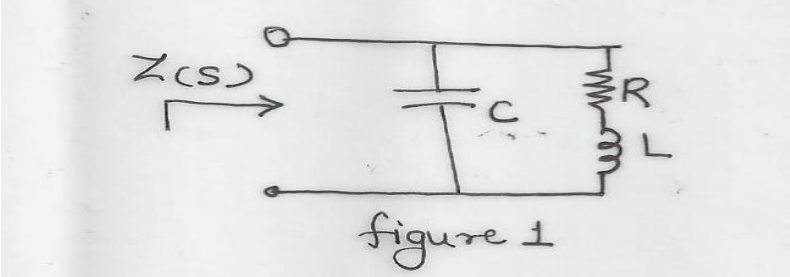


figure 1

Q. 3 a) State properties of L-C driving point impedance of admittance function [4]

b) Realize the following R-C driving point impedance function in [6]

i) Foster I form ii) Caner I from

$$Z(s) = \frac{S^2+6s+8}{s^2+4s+3}$$

c) Identify the following R-C network function and synthesize the same. [6]

$$Z(s) = \frac{S^{2+}\,2s+2}{s^2+s+1}$$

OR

Q.4 a) Identify the following network function with proper justification [6]

$F(s) = \frac{2(s+2)(s+4)}{(s+3)(s+6)}$ Synthesize the same using foster II form.

b) State properties of RL driving point impedance function. Draw and explain reactance curves for R-L network [4]

c) Synthesize the following L-C function using Cauer –I form [6]

$$Z(s) = \frac{S^2+10s^3+12s}{s^4+4S^2+3}$$

Q.5 a) What is meant by zeros of transmission? Determine ZOTs of the network shown in **figure 2** [4]

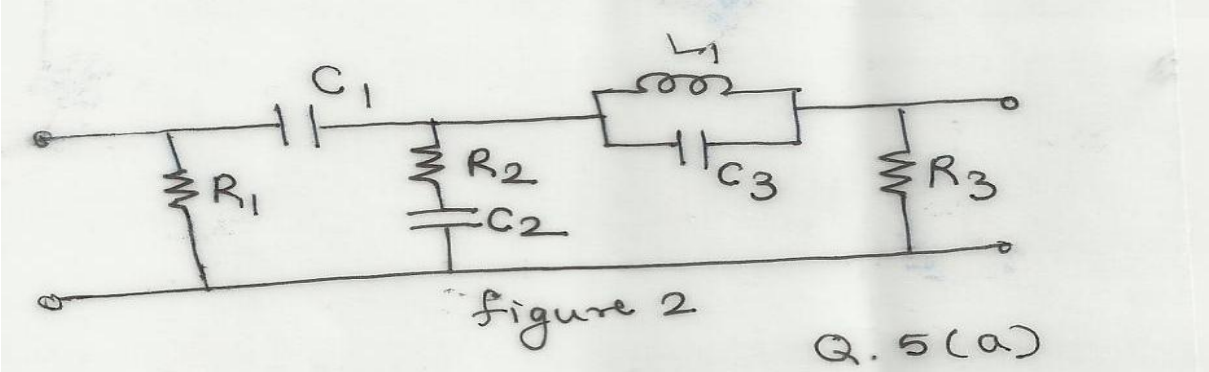


Figure 2

Q. 5(a)

b) Synthesize the voltage ratio $\frac{V_2}{V_1} = \frac{S^2+1}{S^2+2S+1}$ as a constant resistance bridged T network terminated in a 1 Ω resistor [6]

c) State properties of transfer function. Obtain transfer function of two part network in terms of z parameters [6]

OR

Q.6 a) State reside condition. Determine whether the reside condition holds for following network shown in **figure 3** [4]

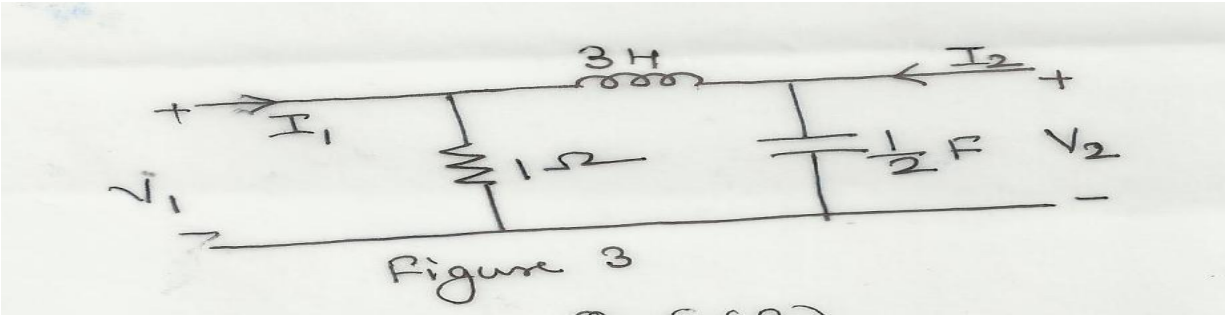


Figure 3

b) Synthesize $Z_{21}(s) = \frac{2}{S^3+3S^2+4s+2}$ into L-C ladder network with 1 Ω termination. [6]

c) Realize the following voltage ratio transfer function using a constant resistance lattice network with 1 Ω termination. [6]

$$\frac{V_2}{V_1} = \frac{4}{s+6}$$

SECTION – II

Q.7 a) State properties of a Buffer worth filter obtain transfer function and realize third order normalized LPF Butterworth filter convert if into LPF with out-off frequency $W_c = 10^4$ rad/see and load impedance of 500 Ω [12]

b) Write short note on frequency Transformation [6]

OR

Q.8 a) Synthesize a chebysher LPF to meet following specifications [18]

i) Load resistance 600 Ω

ii) $\frac{1}{2}$ db ripple with pass bond

iii) Cut-off frequently 5 x 10^5 rad/see

iv)At 1.5 x 10^6 rad/ see magnitude must be down 30 db.

Q.9 a) Explain with suitable example the coefficient matching technique for obtaining element values. [8]

b) Explain the position feedback topology used in active filter design and obtain it's transfer function. [8]

OR

Q.10 a) Synthesize the following HPF function using RC-CR transformation on sullen key LPR [8]

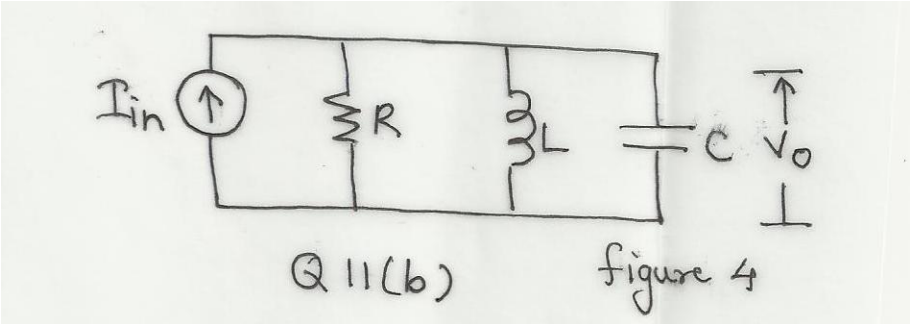
$$H_{HP}\ (s) = K\frac{S^2}{S^2+s+25}$$

b) Write short note on [8]

i) FDNR ii) Gyrator

Q.11 a) What is multi element deviation ? Define variability and device expression for per unit change in parameter p due to simultaneous variation in all element [8]

b) For the network shown in **figure 4** determine the transfer function Vo/I_{in} and compute sensitivity of Qp, Wp and k with respect to the passive element R, L, C. (8) [8]



Q 11(b) figure 4

OR

Q.12 a) Discuss the effect of parameter of OP-AMP on the performance of active filters. [8]

b) Explain the concept of gain sensitivity. Explain the various factors affecting gain sensitivity [8]