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

UNIVERSITY OF PUNE

[4362]-159A

S. E. (Electrical) Examination - 2013

Instrumentation (2003 Course)

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

SECTION -I

Q.1	A	What is meant by instrumentation? Draw a typical block diagram of instrumentation system	9
	B	Differentiate between deflection type and null type instruments.	9
		OR	
Q.2	A	Explain open loop and closed loop system with suitable block diagram	9
	B	Explain different control strategies	9
Q. 3	A	State advantages of electrical transducers	8
	B	Explain measurement of following quantities using CRO- i) Current ii) Frequency	8
		OR	
Q. 4	A	Draw a block diagram of dual trace CRO and explain its working	8
	B	Give detailed classification of transducers	8
Q. 5	A	With a suitable diagram explain construction and working of Bourdon tube	8
	B	With a suitable diagram explain construction and working of Pyrometer	8

OR

Q. 6	A	Explain nucleonic method for measurement of level	8
	B	Explain construction and working of thermistor	8

SECTION II

Q. 7	A	Explain construction and working of LVDT. Draw its output characteristics	9
	B	Explain construction and working of strain gauge with suitable diagram	9

OR

Q. 8	A	With a neat diagram explain flow measurement by ultrasonic flow meter	9
	B	Explain construction & working of electromagnetic flow meter	9
Q. 9	A	Explain construction & working of strip chart recorder with suitable diagram	8
	B	State the types of actuators and explain any one	8

OR

Q. 10	A	Explain working of solenoid valve with suitable diagram	8
	B	Explain construction & working of ultraviolet recorder	8
Q. 11	A	Draw block diagram of PLC and explain its working	8
	B	State applications of SCADA	8

OR

Q. 12	A	Explain MMI, HMI with suitable example	8
	B	State and explain various configurations of SCADA	8

UNIVERSITY OF PUNE

[4362]-220

Electrical/Instrumentation/Computer/I.T.

S. E. Examination - 2013

Engineering Mathematics - III

(2008 Pattern)

Total No. of Questions : 12 **[Total No. of Printed Pages :6]**

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

Instructions :

(1) Answer Q1 or Q2, Q3 OR Q4, Q5 OR Q6, From section I and Q7 OR Q8, Q9 OR Q10, Q11 OR Q12 From section II.

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

(3) Neat diagrams must be drawn wherever necessary.

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

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

(6) Assume suitable data, if necessary.

SECTION-I

Q1. (a) Solve (any three) [12]

1) $(D^2 - 1)y = cosx\ coshx$

2) $(D^2 + 2D + D)y = e^{-x} logx$

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

4) $\frac{dx}{xy^3 - 2x^4} = \frac{dy}{2y^4 - x^3y} = \frac{dz}{9z(x^3 - y^3)}$

Q.1 (b) An inductor of 0.25 henries is connected in series with a capacitor of 0.04 farads and a generator having alternative voltage given by 12sin10t. Find the charge and current at any time t. [5]

OR

Q2. (a) Solve: (any three) [12]

(1) $(D^2+1)y = xcos2x$

(2) $(D^2-2D+2)y = x^2+e^{-x}$

(3) $(D^2-2D)y = e^x sin^x$ (variation of parameters)

(4) $((2x+5)^2\frac{d^2y}{dx^2}+8y-4(2x+5)\frac{dy}{dx} = 5\log(2x+5)$

Q2. (b) Solve: [5]

$$\frac{dx}{dt}+\frac{dy}{dt}-3x-y = e^t; \frac{dx}{dt}+2x+y = 0$$

Q3. (a) If f(z) is analytic, prove that $(\frac{\partial^2}{\partial x^2}+\frac{\partial^2}{\partial y^2})\,|f(z)|^2 = 4\,|f^1(z)|^2$ [5]

(b) Show that the transformation w= z+$\frac{1}{z}-2i$ maps the circle |z|=2 an ellipse. [5]

(c) Evaluate: $\oint_c \frac{z+4}{z^2+2z+5}dz$ where c: |z+2i| = $\frac{3}{2}$ [6]

OR

Q4. (a) If f(z) = u+iv is analytic function, find f(z) if u+v=$3(x+y)+\frac{x-y}{x^2+y^2}$ [5]

(b) Find the bilinear transformation which maps the points 0,1,2 of z-plane to the points 1,$\frac{1}{2},\frac{1}{3}$ of w plane respectively.

(c) Evaluate:

$$\int_o^{2\pi}\frac{d\theta}{5-3cos\theta}$$ [6]

Q5. (a) Find fourier transform of

f(x)=$\begin{cases} cosx+sinx & |x|\le\pi \\ o & |x|>\pi \end{cases}$ [5]

(b) using fourier integral representation, show that :

$\frac{2}{\pi}\int_o^\infty \frac{(\lambda^2+2)cos\lambda x}{\lambda^4+4} d\lambda = e^{-x}cosx, x > 0$ [6]

(c) find z-transform of (any two) [6]

1) f(k)= $\frac{sinak}{k}, k \geq ,0$

2) f(k)= $k^2, k \geq 0$

3) f(k)= $\begin{cases} 7^k & k < 0 \\ 5^k & k \geq 0 \end{cases}$

OR

Q6. (a) Find inverse Z-transform of: (Any two) [8]

1) $\frac{2z^2-10z+13}{(z-3)^2(z-2)}$ $2 < |z| < 3$

2) $\frac{z(z+1)}{z^2-2z+1}$ |z| >1

3) $\frac{z^2}{z^2+4}$ inversion integral method

b) Solve:

f(k)-4f(k-2)=$\left(\frac{1}{2}\right)^k$, 4≥ 0 [4]

c) Solve integral equation:

$\int_0^\infty f(x)sin\lambda x dx = \frac{e^{-a\lambda}}{\lambda}, \lambda > 0$ [5]

SECTION II

Q.7 (a) Following are the marks of ten students in math's- III and strength of material (SOM) calculate the coefficient of correlation. [8]

M-III	23	28	42	17	26	35	29	37	16	46
SOM	25	22	38	21	27	39	24	32	18	44

(b) Calculate the first four central moments and β_1, β_2 for the following distribution. [9]

x	0	1	2	3	4	5	6	7	8
F	1	8	28	56	70	56	28	8	1

OR

Q8. (a) The mean and varience of Binomial distribution are 6 and 2 respectively

Find: 1) $p(r \leq 1)$ 2) $p(r \geq 2)$ [6]

(b) If the probability that an individual suffers a bad reaction from a certain injection is 0.001, then determine the probability that out of 2000 individuals

1) Exactly 3 will suffer a bad reaction

2) More than 2 will suffer a bad reaction [6]

(c) A manufacturer of envelops knows that the weight of envelope is normally distributed with mean 1.9 gm and varience 0.01gm. find how many envelopes weighing

1) 2 grams or more

2) 2.1 grams or more

Can be expected in a given packet of 1000 envelopes (Given Area for z=1 is 0.3413 and Area for z=2 is 0.4772) [5]

Q.9 (a) If $\overline{r}(t) = t^2\overline{i} + t\overline{j} - 2t^3\overline{k}$ then [5]

Evaluate $\int_1^2 \overline{r} \times \frac{d^2\overline{r}}{dt^2} dt$

(b) Prove the following (any two) [6]

1) $\overline{b} \times \nabla[\overline{a} \cdot \nabla logr] = \frac{\overline{b}\times\overline{a}}{r^2} - 2\frac{(\overline{a}.\overline{r})(\overline{b}\overline{r})}{r^4}$

2) $\nabla^2\left(\frac{\overline{a}\cdot\overline{b}}{r}\right) = 0$

3) $\nabla \times (\frac{\overline{a}\times\overline{r}}{r}) = \frac{\overline{a}}{r} + \frac{(\overline{a}\cdot\overline{r})\overline{r}}{r^3}$

Q9. (c) Find the directional derivative of $\phi = 4xz^3 - 3x^2y^2z$ at (2,-1,2) in direction towards the point (2,-2,4) [5]

OR

Q10. (a) Verify whether $\overline{F} = (ysinz - sinx)\overline{i} + (xsinz + 2yz)\overline{j} + (xycosz + y^2)\overline{k}$ is irrotational and if so find the scalar ϕ such that $\overline{F} = \nabla\phi$ [5]

(b) If $\overline{u}$ and $\overline{v}$ are irrotational vectors then prove that $\overline{u} \times \overline{v}$ is solenoidal vector. [5]

(c) If directional derivate of $\phi = ax^2y + by^2z + cz^2x$. at (1,1,1) has maximum magnitude 15 in the direction parallel to $\frac{x-1}{2} = \frac{y-3}{-2} = \frac{z}{1}$
Then find values of a,b,c. [6]

Q11. (a) Find the work done in moving the particle long the curve $x = acos\theta$, $y = asin\theta, z = b\theta$ from $\theta = \frac{\pi}{4}$ to $\theta = \frac{\pi}{2}$ under the field of force given by $\overline{F} = -3asin^2\theta\, cos\theta\overline{i} + a(2sin\theta - 3sin^3\theta)\overline{j} + bsin2\theta\overline{k}$ [5]

(b) Evaluate $\int\int_s (\nabla \times \overline{F}) \cdot \hat{n}\, ds$ where [6]

$\overline{F} = (x^3 - y^3)\overline{i} - xyz\,\overline{j} + y^3\overline{k}$ And S is the surface $x^2 + 4y^2 + z^2 - 2x = 4$ above the plane x=0.

(c) Evaluate $\int\int_s (x^3\overline{i} + y^3\overline{j} + z^3\overline{k}) \cdot\ d\overline{s}$ where S is the surface of the sphere $x^2 + y^2 + z^2 = 16$ [6]

Q.12 (a) Evaluate $\int\int_s \frac{\overline{r}}{r^3} \cdot \hat{n}\, ds$ by using Gauss Divergence theorem [5]

(b) Use Stoke's theorem to evaluate [6]

$\int_c (4y\bar{i} + 2z\bar{j} + 6y\bar{k}) \cdot d\overline{r}$ where 'c' is the curve of intersection of $x^2 + y^2 + z^2 = 2z$ and $x = z - 1$

(c) Two of the maxwell's equation are $\nabla \cdot \overline{B} = 0$, $\nabla \text{X}\, \overline{E} = -\frac{\partial \overline{B}}{\partial t}$. given $\overline{B}$ = curl $\overline{A}$ then deduce that $\overline{E} + \frac{\partial \overline{A}}{\partial t} = -$grad (v) where V is a scalar point function.

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S. E. Examination - 2013

Electrical Measurement & Instrumentation

(2008 Course)

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

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

Instructions:

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

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

(3) Neat diagrams must be drawn wherever necessary.

(4) Figures to the right indicate full marks.

(5) Use of logarithmic tables, slide rule, Molliercharts, electronic pocket calculator and steam tables is allowed.

(6) Assume suitable data, if necessary.

SECTION-1

Q. 1. A) Draw and explain Block diagram of generalized instrumentation system in brief. (6)

B) Describe construction and working of permanent Magnet Moving Coil (PMMC) instrument with suitable diagram. (6)

C) A moving coil milli- ammeter having a resistance of 10 ohms gives Full scale deflection when a current of 5mA is passed through it. Explain how this instrument can be used for measurement of (6)

i. Current upto 1A.

ii. Voltage upto 5V.

Q. 2.A) Explain : accuracy, drift, speed of response (6)

B) Which three forces are required for satisfactory operating of an (6)

Analog indicating instruments? State the function of each force.

C) A milli-ammeter of 2.5 ohams resistance reads upto 100 milliamperes (6)
Calculate the resistance the resistance which is necessary to enable it to
Be used as,

i. An voltmeter reading upto 10 V.

ii. An ammeter reading upto10 V.

Draw the connection diagram in each case.

Q. 3. A) With a neat schematic diagram, explain construction and working (8)
Of a Megger. What are the application of Megger.

B) A sheet of Bakelite 4.5 mm is tasted at 50 Hz between electrodes (8)
0.12m diameter. The schering employs a standred air capacitor C_2 of
106 pF capacitance, a non-reactive resistance R_4 of $1000/\pi$ ohms in
Parallel with a variable capacitor C_4, Balanced is obtained with
C_4=0.5 μF and R_3 = 260 ohm. Calculate :

1) Capacitance
2) Power factor
3) Relative permittivity of sheet.

OR

Q. 4. A) Draw circuit diagram of double bridge. Derive expression for (8)
Unknown resistance with using notation.

B) With a circuit diagram, derive the equation for an unknown self (8)
Inductance measurement using Maxwell's inductance-capacitance bridge.

Q. 5. A) Explain two wattmeter method for measuring power in a (R+L) load, (6)
Draw the phasor diagram.

B) Write a short note on Digital power factor meter. (6)

C) A 3 phase, 3 wire, 415 V system is a balanced load of 20 A at pf 0.8 (4)
Leg. The current coil of wattmeter 1 is in phase R and of wattmeter2 is
Phase B.

Calculate : i) Reading on wattmeter 1 when its voltage coil is across R and Y.
ii) Reading on wattmeter 2 when its voltage coil is across B and Y.

Q. 6. A) State and explain errors in dynamometer type wattmeter. also state (6)
The compensation for each type of error.

B) Write a short note on digital multimeter. (6)

C) In order to measure the power input and the power factor of an (4)
Overexcited synchronous motor two wattmeters are used. If the meters
-3.5 kW and +8 kW respectively.

Calculate :

i. Power factor of the motor
ii. Power input to the motor

SECTION-2

Q. 7. A) Explain construction and operation of a single phase induction type (6)
Energy meter with neat diagram.

B) Explain the terms: (6)
Transformation ratio
Turn ratio
Nominal ratio

C) A3-phase, 2element energy meter has a constant of 0.2 revolutions (6)
Of disc per kWh. The meter is being used with a P. T. of ratio 22kv/
220 V and C. T. of ratio 100/5 A. if the line voltage is 220V, current

Is 10 A, time to complete 10 revolutions is 30 seconds on unity power Factor, determine the error expressed as a percentage of the correct readings.

OR

Q. 8. A) Explain different types of errors in induction type energy meter. How These errors are compensated? (6)

B) Compare current transformer (CT) & potential transformer (PT). (6)

C) An energy meter is designed to make 3200 impulses of LED for one Unit of energy. Calculate the no. of impulses made by it when connected To a load carrying 20A,230V, 0.8 p.f. for an hour. If it actually makes 12000 impulses, find the % error. (6)

Q. 9.A) Explain the following terms associated with CRO: (6)

i. Volts/division

ii. Xy-mode

iii. Invert

B) What are the advantage of electric transducers? (4)

C)Explain measurement of pressure using Mcleod gauge. (6)

Q.10. A)Explain Measurement of voltage ,current, frequency using CRO.

B)Give detail classification of transducers.

C) Explain pirani guage for measurement of low pressure. Also state Advantage and disadvantages. (6)

Q. 11. A) Give type of flow. Explain construction and working of venturimeter. (5)

B) Explain level measurement by mechanical method. (5)

C) Explain construction and working of LVDT with neat diagram. (6)

OR

Q. 12. A) Explain ultrasonic flow meter with neat diagram. (5)

B) Explain nucleonic method for level measurement with a suitable (5)

C) Explain construction, working and application of load cell with a Neat diagram. (6)

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

SE Electrical

Examination - 2013

(2008 Pattern)

Electrical Machines-I

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

Instructions :

(1) Answer ***03 question from each section.***

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

(3)Figures to the right indicate full marks.

(4) Use of Mollier charts, Electronic packet calculator is allowed.

(5) Neat diagrams must be drawn whenever necessary.

(6) Assume suitable data, if necessary.

Section I

Q1.a) With neat circuit diagrams, explain open circuit and short circuit tests on a single phase transformer for voltage regulation and efficiency. Why do we get core losses on OC test and copper losses SC test? (08)

(b) A single phase, 50Hz 200/400V transformer gave the following data-

O.C. Test: 200V, 0.7A, 70W (H.V. side open)

S.C. Test: 15V, 10A, 85W (L.V. side shorted)

Determine the voltage regulation and efficiency at full load, when delivering 5kW at 0.8 lagging power factor (08)

OR

Q2. (a) What do you mean by polarity of 1-ph transformer? State its importance. Draw the neat circuit diagram to show additive and subtractive polarity. (08)

(b) Draw the exact and approximate equivalent circuits in case of single phase transformer. (08)

Q3. (a) With neat circuit diagram, explain the Scott connection of transformers to convert 3 phase supply into 2 phase supply. (08)

(b) With neat circuit diagram, explain the V-V connection of transformers. State its merits and demerits. (08)

OR

Q4. (a) Explain the necessity of parallel operation of 3-ph transformers. What are the conditions for satisfactory operation of 3ph transformer in parallel? (08)

(b) Two single phase transformers A and B are connected in parallel and supplying a common load of 1000kVA at 0.8 p.f. lagging. The transformer A is of 750kVA and has ohmic drop of 3% and inductive drop of 5% at full load. The transformer B is of 500kVA and has ohmic drop of 2% and inductive drop of 4%. Determine the loading of each transformer. (08)

Q.5 (a) A 6 pole, 250V wave connected D.C. shunt motor has 600 armature conductor and useful flux of 10m Wb. The resistances of armature and shunt field are 0.25Ω and 125Ω respectively. What will be the speed and gross torque developed by the motor, when it draws 10A from the supply? If the magnetic and mechanical losses are 450W, find- i) output in kW ii) efficiency of motor at this load. (08)

(b) Explain power flow diagram of DC motor. (06)

(c) derive the EMF equation in case of DC Generator. (04)

OR

Q6. (a) Sketch and label the construction of DC Machine. State the material used and function of each part. (10)

(b) A 500 V DC shunt motor has a armature resistance of 1.2Ω and field resistance of 500Ω. When running on No Load, it takes current of 4A from supply and the speed of 1000rpm. Calculate the speed, when the motor is fully loaded and the total current drawn from the supply is 26 A, if – (i) a resistance of 2.3Ωis connected in series with the armature and (ii) the shunt field flux is reduced by 15%. (08)

Section II

Q7. (a) Draw the diagram of three point starter used in DC motor and explain the function of starting resistance, NVC and OLR. (08)

(b) A 220V, dc series motor is running at a speed of 800 r.p.m. and draws 100A. Calculate at what speed motor will run when developing half the torque. Total resistance of the armature and field is 0.1Ω. Assume that the magnetic circuit is unsaturated. (08)

OR

Q8. (a) Draw and explain all three characteristics of dc shunt motors and state it's any two applications. (08)

(b) Write short note on:

(a) Interpoles

(b) Compensating Windings (08)

Q9. (a) Derive the expression for the torque of 3-ph induction motor and obtain condition for maximum torque & hence, the expression of maximum torque. (08)

(b) A 3-ph induction motor having a 6 poles, star- connection stator windingruns on 240V, 50 Hz supply. The rotor impedance per phase at standstill is (0.12+j 0.85)Ω. The ratio of stator to rotor turns is 1.8. Full load slip is 4%. Calculate:

i) Full – load torque

ii) maximum torque

iii) speed at maximum torque (08)

OR

Q10. (a) Explain with neat labeled sketch

i) torque- slip characteristic of an induction motor

ii) effect of rotor resistance on torque- slip characteristic. (08)

(b) A 3-ph, 50 Hz, 6poles induction motor running on full load develops a useful torque of 150 Nm at a rotor frequency of 1.5 Hz. Calculate the shaft power output. If the mechanical torque lost in friction be 10 Nm, determine: rotor copper losses, input to the motor and the efficiency. The total stator loss is 700W. (08)

Q11. (a) Why starter are necessary for starting 3-ph induction motor? Name different types of starters used for starting 3-ph squirrel cage induction motors. Describe the operation of DOL starter with neat diagram and also related equations. (10)

(b) Draw and explain the exact and approximate equivalent circuit diagram of an induction motor (08)

OR

Q12. State the different methods of speed control of a 3-ph induction motor. Explain any two with its merits and demerits. (10)

(b) A3-ph squirrel cage induction motor has a short circuit current equal to 5 times full load current. Find the starting torque in terms of full load torque if the motor is started by (8)

i) direct switching to the supply,
ii) star – delta starter takes,
iii) an autotransformer.
The starting current in iii) is limited to 2.5 times the full load current and full load slip is 4%

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S.E.(Electrical) Examination - 2013

Network Analysis

(2008 Course)

Total No. Of Questions: 12 **[Total No. Of Printed Pages: 9]**

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

Instructions:

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

(2) *Answer 3 question from section 1 and 3 question from section 2*

*(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 logarithmic tables, electronic pocket calculator is allowed.

(6) Assume suitable data, if necessary.

SECTION-1

Q. 1. A) Explain (8)

i. Dependent and independent sources

ii. Active and passive networks

iii. Unilateral and Bilateral networks

iv. Lumped and distributed networks

B) Find $\frac{VL}{VS}$ for circuit (fig.1) using KVL (10)

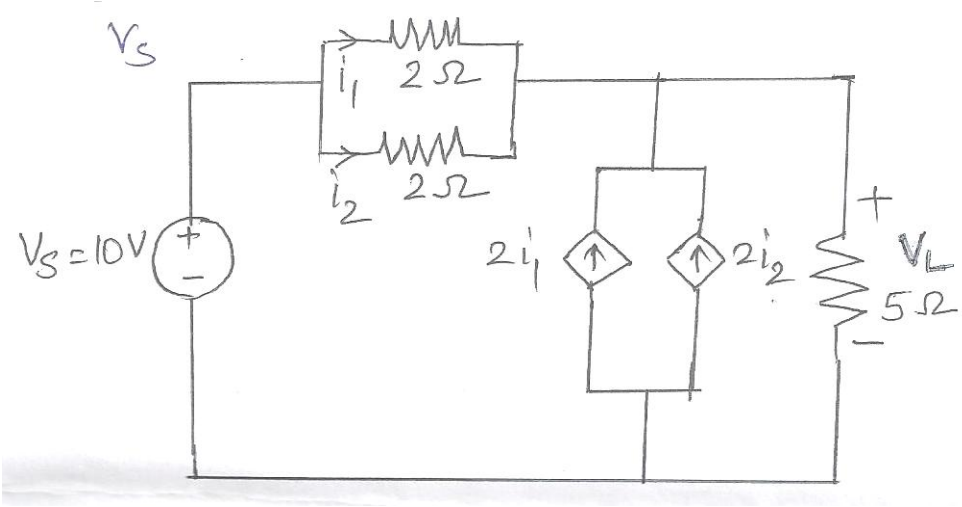


Figure 1

OR

Q. 2. A)

i. Explain principle of duality with suitable example. (8)

ii. Explain with neat circuit diagram dot convention.

B) Using Mesh Analysis, find the magnitude of dependent source and Current through 2Ω resister (fig.2) (10)

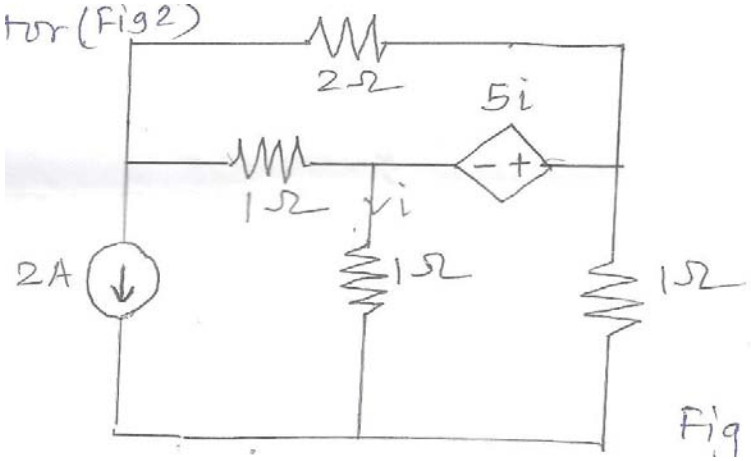


Figure 2

Q. 3. A) In the circuit shown, find the current I, using superposition theorem. (8)

(fig.3)

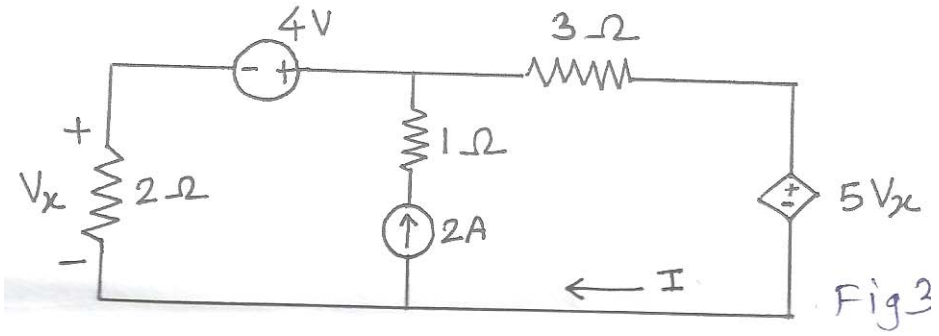


Figure 3

B) Find current through 8Ω resistance by Norton's theorem. (Ref.fig.4) (8)

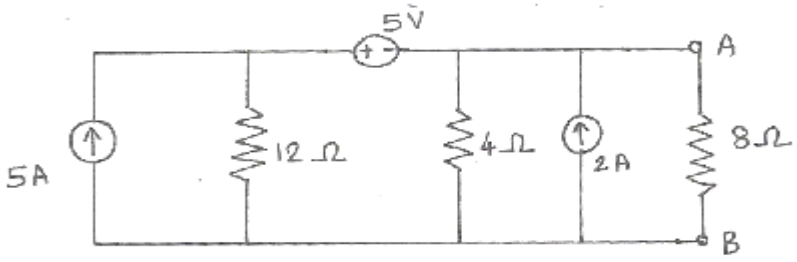


Figure 4

OR

Q. 4. A) Obtain the current Ix, By thevenin's theorem . (fig.5) (8)

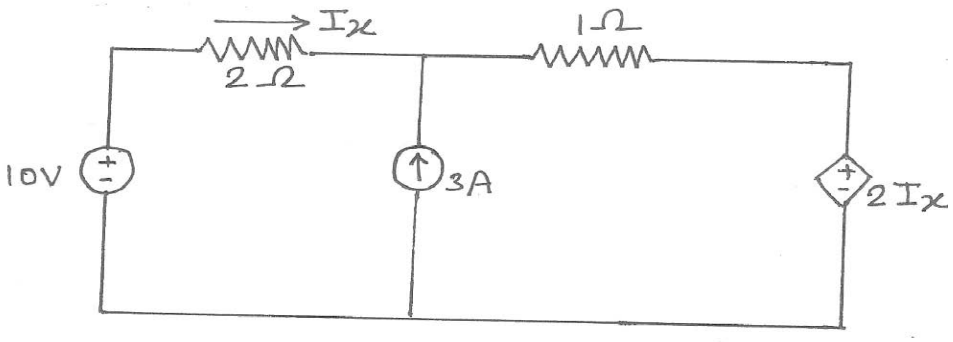


Figure 5

B) Verify Reciprocity theorem for voltage V and current I as show in the Circuit.(fig.6) (8)

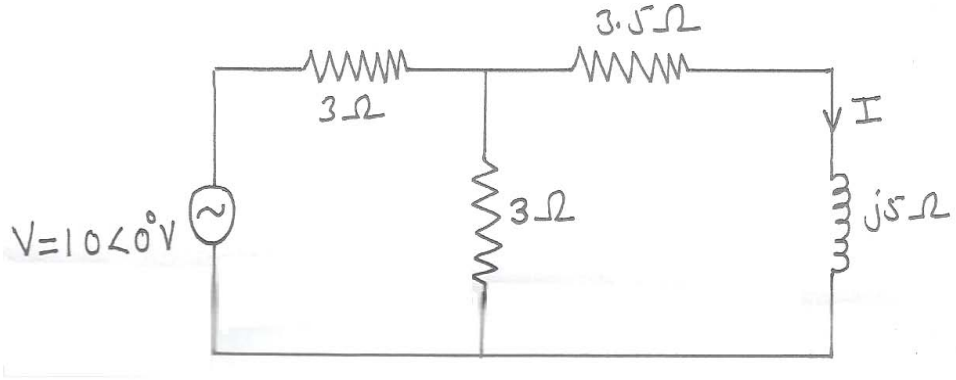


Figure 6

Q. 5. A) In the given circuit, switch K is changed from position 1 to position 2 at time t=0, steady state condition having reached before switching. (8)

Find $i, \frac{di}{dt}, \frac{d^2i}{dt^2}$ at $\boxed{t = o^t}$. (fig.7)

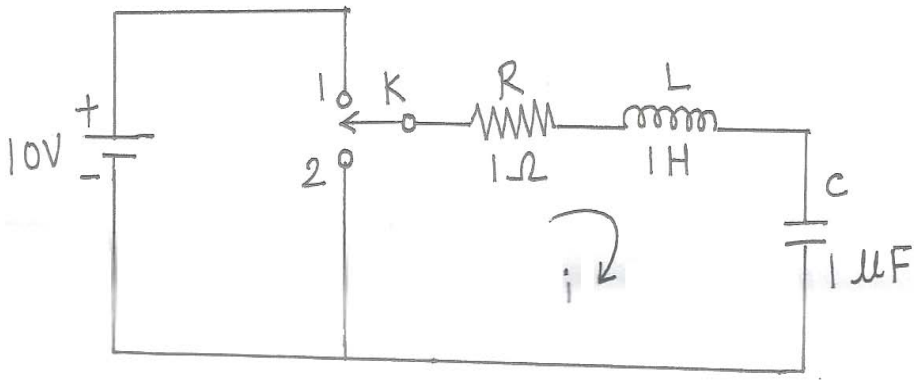


Figure 7

B) state all the properties of Laplace transform. (8)

OR

Q. 6.A) In the series RL circuit shown, the source voltage is v(t)=50 sin 250t V. (8)

Determine the resulting current if the switch is closed at t=0.(fig.8)

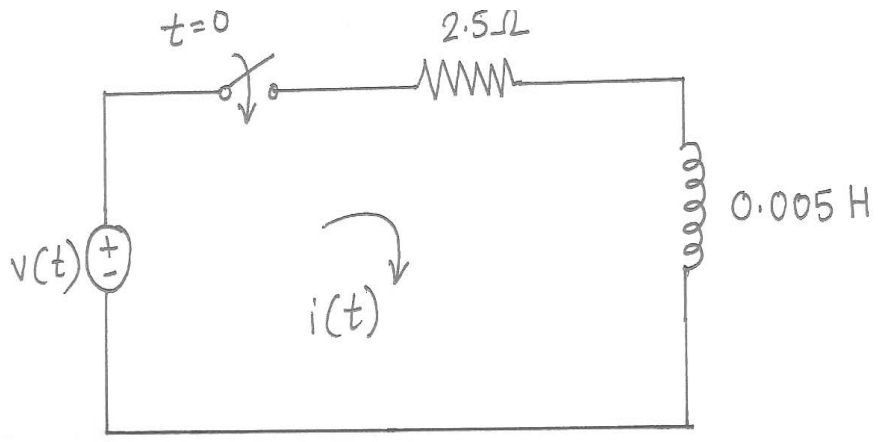


Figure 8

B) find the inverse laplace transform of (8)

1) $$F(s) = \frac{1}{s^3(s^{2-1})}$$

2) $$F(s) = \frac{s+1}{s^3 + 4s^2 + 4s}$$

SECTION-2

Q. 7. A) Derive interrelation between (8)

i. Z and Y parameters

ii. Z and Y transmission parameters

B) A π network has been shown in fig.9 where ($0.5I_3$) is the controlled (8)

Current source. Obtain Z parameters for this π circuit model.

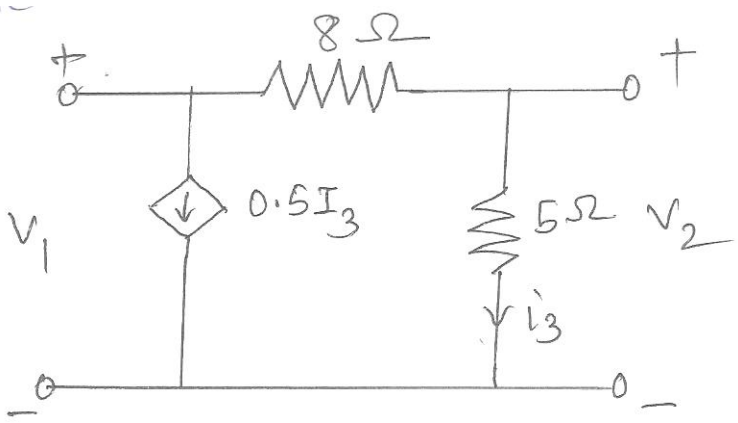


Figure 9

OR

Q. 8. A) State and explain maximum power transfer theorem for AC (8)

Network, also verify the condition .

B) what is the power loss in 5Ω resister? (fig.10)

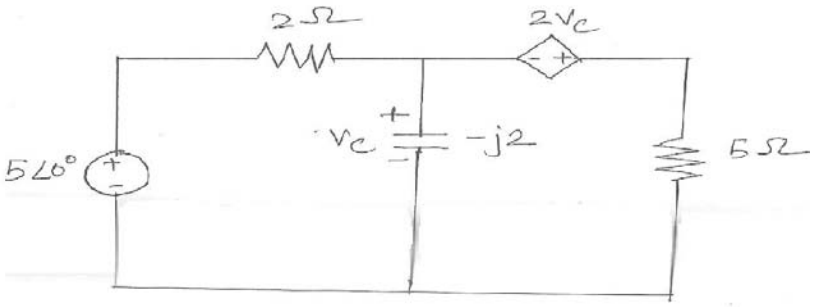


Figure 10

Q. 9. A) Obtain fourier series expansion of the periodic triadic triangular (8)

As shown in fig,11.

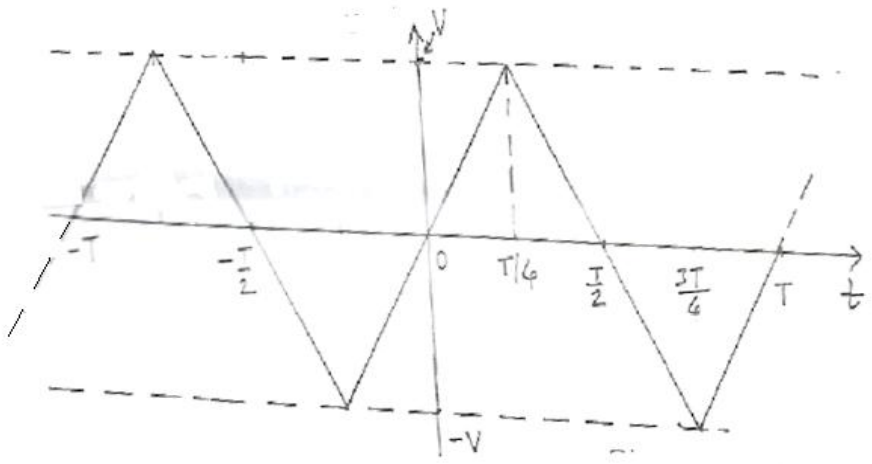


Figure 11

B) Explain (8)

i. Even symmetry

ii. Odd symmetry

iii. Half wave symmetry

iv. Quarter wave symmetry

OR

Q. 10. A) Explain the following terms in relation with filter and give significance of each : (8)

i. Pass bond

ii. Stop bond

iii. Cut-off frequency

B) what is high pass filter? Derive the relation for cut-off frequency (8)

Frequency for high pass filter in terms of L and C.

Q. 11. A) find the diving point impedance and admittance for the network (8)

Shown in fig.12

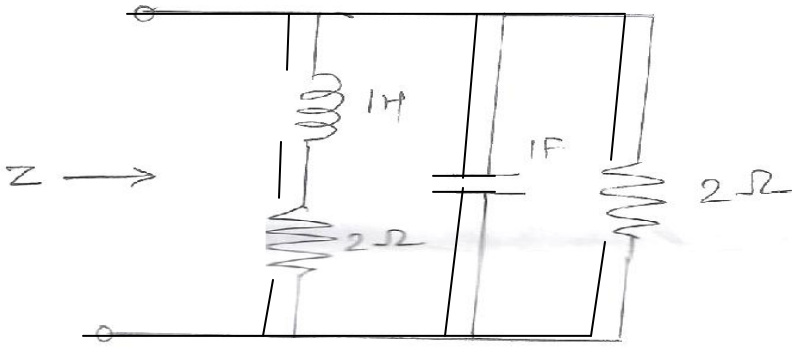


Figure 12

B) find the expression of voltage transfer ratio for n/w shown in fig.13. (10)

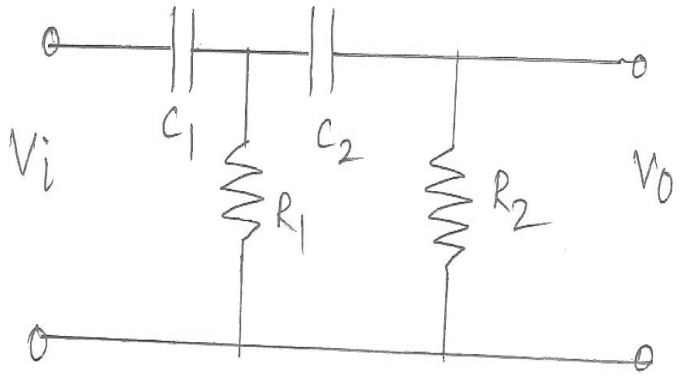


Figure 13

OR

Q. 12. A) Explain the significance of poles and zeros. Explain pole-zero plot (10)
With suitable example.

B) obtain pole-zero plot in the s-plane of the driving point impedance (8)
Function for the n/w show in fig.14.

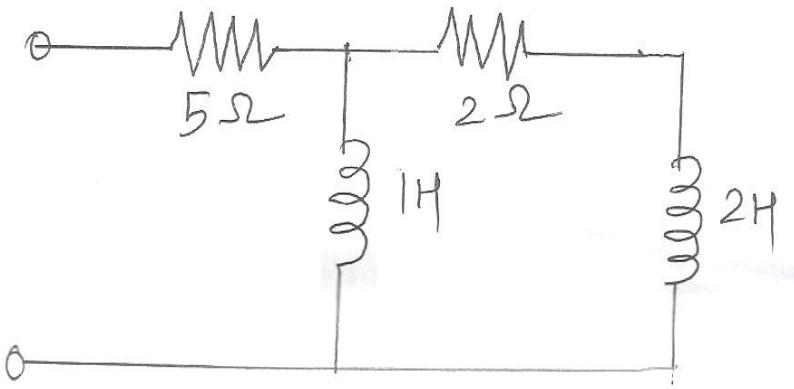


Figure 14

UNIVERSITY OF PUNE

[4362-151]

S.E.(Electrical)Examination-2013

Power Plant Engineering

(2008 pattern)

Time-Three hours **Maximum Marks-100**

[Total No. of Question=12] **[Total no. of printed pages= 4]**

Instructions:

(1)Answer three questions from Section-I and three questions from Section-II.

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

(3)Neat diagram must be drawn necessary.

(4)Figures to the right indicate full marks.

(5)Your answer will be valued as a whole.

(6)Use of logarithmic tables,slide-rule,Molleir charts,calculator and steam tables is allowed.

(7)Assume suitable data wherever necessary.

SECTION-I

UNIT-I

Q.1 (a)Explain Bomb calorimeter with a neat sketch. (6)

(b)How will you find out minimum air required for complete conbustion of solid fuel? (6)

(c)Write a short note on :FBC (6)

OR

Q.2 (a)Write a short note on flue gas analyzer. (6)

(b)Compare Carnot and Rankine cycle with T-S diagram. (4)

(c)Write a short note on Boy's gas calorimeter. (8)

UNIT-II

Q.3 (a)Classify boilers and explain any one high pressure boiler with a neat sketch. (8)

(b)Comment on :Prospectus and development of thermal plants in India. (8)

OR

Q.4 (a)Explain-Boiler draught. (6)

(b)Explain Thermal Power Plant with a neat sketch. (6)

(c)Classify steam turbine and explain reaction turbine. (4)

UNIT-III

Q.5 (a)Write a short note on :Selection of turbines. (4)

(b)What do you understand by Water hammer? (4)

(c)Explain Pelton wheel with a neat sketch. (8)

OR

Q.6 (a)Explain hydro power plant with a neat sketch. (8)

(b)Compare Fruncis and Kaplan turbine. (4)

(c)What do you mean by cavitation? What are its effects? (4)

SECTION-II

UNIT-IV

Q.7 (a)Explain advantages and disadvantages of nuclear power plant. (6)

(b)Explain with a neat sketch working of CANDU REACTOR. (10)

OR

Q.8 (a)Explain with a neat sketch ' wet sump lubrication system'. (8)

(b)Explain with a neat sketch working of Bosch fuel pump. (8)

UNIT-V

Q.9 (a)Explain closed cycle gas turbine plant with sketch. (8)

(b)What is the role of

(i)Intercooling

(ii)Reheating

for performance improvement of gas turbine power plant. (8)

OR

Q.10 (a)Explain Geothermal power plant with a neat sketch. (8)

(b)Explain with a neat sketch working of open cycle MHD system. (8)

UNIT-VI

Q.11 (a)Write a short note on: Base Load and Peak Load Plants. (8)

(b)Explain: (10)

(i)Demand Factor

(ii)Load factor

(iii)Maximum Demand

(iv)Average Demand

(v)Diversity Factor

OR

Q.12 (a)Write a short note on: Heat Rate and incremental heat rate curves. (6)

(b)Determine the power generating cost per unit of 80 MW power station with following data: (12)

(i)Capital Cost : $Rs\,106\times10^7$

(ii)Annual cost of fuel: $Rs\,32\times10^7$

(iii)Annual wages & taxes: $Rs\,36\times10^6$

(iv)Interest & Depreciation:10 % capital cost

(v)Annual load factor:0.45

UNIVERSITY OF PUNE
[4362]-152
S.E Electrical (2008 Course)

MATERIAL SCIENCE

[Total No. Of Questions: 12] **[Total No. Of Printed Pages: 2]**
[Time : 3 Hours] **[Max. Marks:100]**

Instructions :

1) Answer ***any three*** *questions from each I and three questions from section II*

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

3) *Neat diagrams must be drawn wherever necessary.*

4) *Black figures to the right indicate full marks.*

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

6) Assume suitable data, if necessary.

SECTION –I

Q.1a) Explain with a neat sketch principle and applications of photo emissive cells. **[10]**

b) Define following and give their units- **[8]**

i) Dipole moment ii) Dielectric constant iii) Polarization iv) Polarizability

OR

Q.2 a) What are ferroelectric materials? How they are different than Pizo materials? **[8]**

b) With neat sketch write down materials used, construction, equivalent circuit, working and application of Photo – Voltaic cells. **[10]**

Q.3 a) How insulating materials are classified? Give detail Classification **[8]**

b) Define following and give their units –

i) Breakdown Voltage ii) Breakdown Strength iii) Primary ionization **[8]**
iv) Secondary ionizatin.

OR

Q.4 a) Describe properties of insulating materials used for Line Insulators and Switchgears. **[8]**

b) Differentiate between liquid and solid insulating materials on the basis of properties, applications, applicable breakdown theories , factors affecting on breakdown & examples. **[8]**

Q.5 a) Describe ferromagnetisms & Ferro-magnetic behavior below Critical Temperature. **[8]**

b) State & explain Curie- Weiss law. **[4]**

c) The core of a transformer has in iron loss of 100W at 40 Hz & 70 at 30 Hz. Find Hysteresis losses at 50 Hz. **[4]**

OR

Q.6 a) Describe Magnetic materials used for Transformer Core. **[8]**

b) Write down properties and applications of ferrites. **[8]**

Section II

Q.7 a) Write properties and applications of – **[12]**

i) Tungsten ii) Nichrome iii) Eureka iv) Mangnin

b) The resistivity of copper at 300°K is $1.56 \times 10^{-8} \Omega m$. With 3 atomic percent nickel, the resistivity of alloy of copper – nickel becomes $4.06 \times 10^{-8} \Omega m$. With 3 atomic percent silver, the resistivity of alloy of copper – silver becomes $1.98 \times 10^{-8} \Omega m$. What will be the resistivity of alloy of copper for 0.4 atomic percent of nickel and 0.3 atomic percent of silver at $300^0 K$? **[6]**

OR

Q.8 a) What are thermocouples? Name some thermocouples with their applications. **[9]**

b) Write properties and applications of brass , Carbon and Copper **[9]**

Q.9 a) Describe with neat diagrams - **[8]**

i) Carbon Clusters

ii) Nano Wires.

b) Write a short note on molecular machines which use nanotechnology **[8]**

OR

Q.10 a) Write a short note on Carbon Nano-tubes and BN nano-tubes **[10]**

b) What do you mean by Single Electron Transistor (SET)? **[6]**

Q.11 a) Explain measurement of Dielectric Loss Angle (tan δ) by Schering Bridge as per IS 13585-1994. **[8]**

b) Describe measurement of dielectric strength of solid insulating material with reference to IS 2584. **[8]**

OR

Q.12 a) Explain the steps by steps method of finding dielectric strength of transformer oil with a neat diagram as per IS 16798. **[8]**

b) Describe various tests which are carried out on high voltage cables. **[8]**

UNIVERSITY OF PUNE

[4362]-153

S. E. (Electrical) Examination-2013

Analog & Digital Electronics

(2008 Pattern)

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

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

Instructions :

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

(2) Your answer will be valued as a whole.

(3) Neat diagrams must be drawn wherever necessary.

(4) Assume suitable data, if necessary.

SECTION I

Q.1 .a) Draw and explain input and output characteristics of CB & CC configuration BJT amplifier (9)

b) What is DC load time? Derive equation for DC load line and show Q point on Dc load line (9)

OR

Q.2.a) List & explain parameters of FET (9)

b) Define (9)

i) Pinch off voltage

ii) Cut off voltage

iii) IDSS

Q.3.a) Draw block diagram of OP-AMP and explain each block in details (8)

b)Explain OPAMP as a –1) differentiator 2)Precision rectifier (8)

OR

Q.4.a) Compare open loop & Closed loop configuration of OPAMP (8)

b) Explain OPAMP as –1) Instrumentation amplifier 2) Schmitt trigger (8)

Q .5.a) Draw neat diagram and explain OPAMP as a Sine wave generator (8)

b) Draw neat diagram and explain IC 555 as Monostable multi vibrator (8)

Q.6.a) Explain in details with frequency response curve first order active low pass filter (8)

b) Draw neat diagram & explain OPAMP as a peak detector (8)

SECTION -II

Q.7.a)State DeMorgan's theorem and using Boolean algebra prove the Following (10)

i) $\bar{A}$ B C $\bar{D}$ + BC$\bar{D}$ + B$\bar{C}$ $\bar{D}$+ B$\bar{C}D$ = B($\bar{D} + \bar{C}$)

ii) A + $\bar{A}$B + A. $\bar{B}$ = A+B

iii) (A+B) (A+C) = A+BC

b) Design a 1 bit comparator using k-map and realize using logic gates (8)

OR

Q.8.a)Simplify the following expression using k-map (8)

f(A,B,C,D)= $\sum m$ (0,1,2,3,5,7,8,9,11,14)

b) Explain binary number system in details give the different between binary number system and BCD (8)

c) Convert the following number (2)

i) 96.25 decimal to binary

Q.9 a) Draw circuit diagram and explain 4 bit universal shift register (8)

b) Explain twisted ring counter in detail with truth table and timing diagram (8)

OR

Q.10.a) Explain the working of SR and D flip flop (8)

b) Design and explain working of 3 bit synchronous up counter using JK flip flop (8)

Q.11.a) Write short note on (8)

i) Multiplexer

ii) Demultiplexer

b) Explain the Dual slop ADC in details (8)

OR

Q. 12.a) Give details classification of semiconductor memories and explain any 2 types of memories (8)

b) Explain binary weighted DAC in details (8)

UNIVERSITY OF PUNE

[4362]-155
S.E. (Electrical) Examination-2013
POWER SYSTEM-I
(2008 course)

Total No. of Questions: 12 **[Total No. of Printed Pages:6]**

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

Instructions:

(1) Answer three questions from each section.
(2) Answers to the two sections should be written in separate answer-books.
(3) Neat diagrams must be drawn wherever necessary.
(4) Figures to the right indicate full marks.
(5) Use of logarithmic table, slide rule, Mollier chart, electronic pocket calculator and steam tables is allowed.
(6) Assume suitable data if necessary.

SECTION I

Q.1) a**.** What are the advantages of interconnected operation of power generating stations? [06]

b. Define 'Tariff'. What are the objectives of tariff? [04]

c. The daily demands of three consumers are given below:

Time	Consumer 1	Consumer 2	Consumer 3
12 midnight to 8 am	No load	200 W	No load
8am to 2 pm	600 W	No load	200 W
2pm to 4 pm	200 W	1000 W	1200 W
4pm to 10pm	800 W	No load	No load
10pm to midnight	No load	200 W	200 W

Plot the load curve and find: [8]

1) Maximum demand of individual consumer.

2) Load factor of individual consumer.

3) Diversity factor.

OR

Q.2) a. Define the following factors associated with generating stations: [06]

i) Load factor.

ii) Diversity factor.

iii) Annual plant use factor.

b. Write a short note on H.T. and L.T. customers. [04]

c. The yearly load duration curve of a power plant is a straight line. [08]

The maximum load is 500 MW and the minimum load is 400 MW.

The capacity of the plant is 750MW.

Find, i) Plant capacity factor

ii) Load factor

iii) Utilization factor

iv) Reserve capacity

Q.3) a. Discuss the functions & principle of operation of atomic voltage regulator. [08]

Name different types of voltage regulators.

b. Define string efficiency. State different methods used for improving the string efficiency. Derive the expression for voltage distribution across the units of a string of suspension insulators. [08]

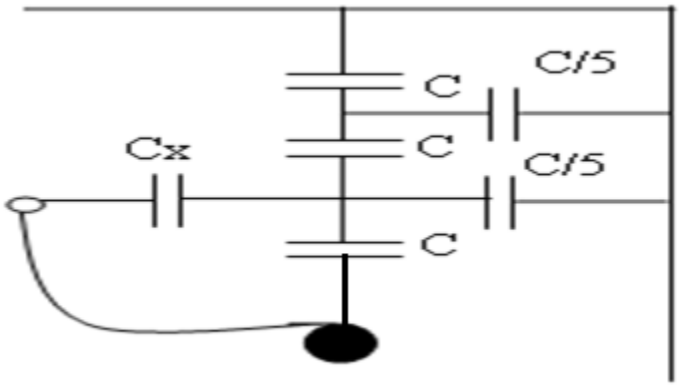
OR

Q.4) a. Discuss the necessity of excitation system used for alternators. Explain one of the types of excitation system used for alternators in brief. [08]

b. In a transmission line, each conductor is at 20 KV and supported by a string of 3-suspension insulators. The air capacitance between each cap-pin junction and tower is $1/5^{th}$ of the capacitance C of each insulator unit. A guard ring effectively only over the line end insulator unit is fitted so that the voltages on the two units nearest the line end are equal. [08]

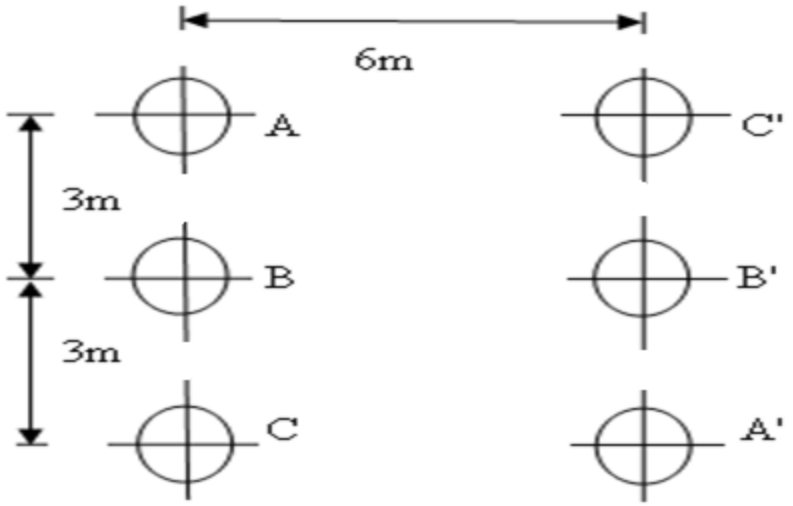
i) Calculate the voltage on the line end unit.

ii) Calculate the string efficiency.



Q.5) a. Derive an expression for the inductance of a three phase overhead transmission line when conductors are unsymmetrically spaced but transposed. [08]

b. Figure shows the spacing of a double circuit 3-phase overhead line. The phase sequence is ABC and the line is completely transposed. The conductor radius is 1.3 cm. Find the inductance per phase per kilometer. [08]



OR

Q.6) a. Derive the expression for internal and external flux linkages of a conductor carrying current I and thereafter derive the expression for inductance of a single phase line. [08]

b. A three phase 50Hz overhead transmission line consists of three conductors each of diameter 1.6 cm. The spacing between the conductors is as follows: A-B=4cm, B-C=9 cm, C-A=6cm. [08]

Find the inductance & inductive reactance per phase per km of the line

SECTION II

Q.7) A) Derive an expression for capacitance per phase of a three phase double circuit overhead transmission line with symmetrical spacing between conductors. [10]

B) A 50 Hz overhead transmission line consist of three conductors each of diameter 2cm and spaced 2.5m. calculate the capacitance per phase per km for the following arrangements between conductors. [08]

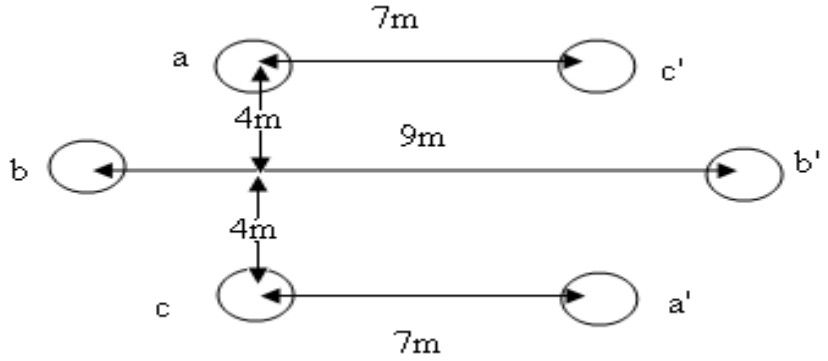
i) Equilateral Spacing ii) Horizontal Spacing with transposition.

OR

Q.8) A) What is the method of images? How can it be used to take into account [08]

the presence of ground in calculating the capacitance of a single phase line?

B) Determine the capacitance and charging current per phase per km for a 3 ph double circuit line as shown fig. The line operates at 132 kV and 50 Hz. The diameter of each conductor is 2.5 m. Assume that the line is completely transposed and neglect the effect of earth. [10]



Q.9) A) Obtain the relationship for the sending end voltage and current in terms of receiving end voltage and current for a medium length transmission line with Nominal 'T' method of representation. Evaluate the generalized circuit constants. Draw the phasor diagram. [09]

B) The following data refers to a 50 Hz, single phase transmission line: [07]

Length: 20km,

Load delivered at the receiving end: 4 MW at 0.80 p. f. lagging.

Resistance of each conductor: 0.025Ω/km., Inductance=0.7 mH/km

The voltage at the receiving end is required to be kept at 10kV. Find sending end voltage

OR

Q10) A) Derive the hyperbolic expression for sending end voltage and current in terms [10]

of receiving end voltage and current for a long transmission line.

B) Write a short note on Ferranti effect. [06]

Q11) A) Derive an expression for sag in case of overhead transmission line when the supports are at unequal level. Explain the meaning of every terms in the derivation [08]

B) A transmission line has a span of 150 m between level supports. The conductor has cross sectional area of 2 cm^2. The Tension in the conductor is 2000kg. The specific gravity of the conductor material is 9.9 gm/cm^3. If the wind pressure is 1.5 kg/m length of conductor. Calculate the sag. What is the vertical Sag? [08]

OR

Q12) A) Derive an expression for capacitance of a single core cable. [08]

B) Enlist the types of cable faults. What are the causes of failures of underground cables? Describe any one method of location of the cable fault. [08]

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

UNIVERSITY OF PUNE
[4362]-158
S. E. (Electrical) Examination - 2013
DIGITAL COMPUTIONAL TECHNIQUES (2008 Course)
[Time: 3 Hours] **[Max. Marks: 100]**

Instructions:

1 *Answer 3 questions from section-I and 3 questions from section-II.*
2 *Answers to the two sections should be written in separate answer-books.*
3 *Neat diagrams must be drawn wherever necessary.*
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

Q.1 A) Find the quadratic factor of $x^4 - 1.1x^2 + 2.3x^2 + 0.5x + 3.3 = 0$ after two iterations using Lin-Baristow's method. Use $\mathcal{P}_0$ =1 and q_0 = 1 [10]

B) Explain round –off error and truncation error with suitable example [8]

OR

Q.2 A) Explain absolute error and relative error with suitable example. [6]

B) Using Birge-Vieta method find root of $\mathcal{X}^4 + \mathcal{X}^3 + 5\mathcal{X}^2 + 4x + 4 = 0$ at the end of two iterations with initial value $x_0 = 1$. [6]

C) Explain floating point algebra and normalised floating point algebra with suitable examples. [6]

Q. 3 A) Find the real root of $2x - 3\sin x - 5 = 0$ correct to four decimal places with initial value $x_0 = 1$ using Newton Raphson's method. [8]

B) Explain false of position method for solution of transcendental equation. [8]

OR

Q. 4 A) Determine $\sqrt{29}$ using bisection method correct up to three decimal places. [8]

B) Explain Chebyshev's method to determine root of transcendental equation [8]

Q. 5 A) Explain Gauss elimination method for solution of linear simultaneous equation. [8]

B) Solve following system of equation using Gauss Seidal method [8]

$$10x - 2y + 3z = 23;$$
$$2x + 10y - 5z = -33;$$
$$3x - 4y + 10z = 41$$

OR

Q. 6 A) Solve following system of equation using Gauss Jordan method [8]

$$2x + y + 4z = 12;$$
$$8x - 3y + 2z = 23;$$
$$4x + 11y - z = 33$$

B) Explain Gauss Jacobi's method for solution of linear simultaneous equations. [8]

SECTION II

Q. 7 A) Explain least square method to fit the data into a straight line. $y = ax + b$. [8]

B) Find the interpolating polynomial using [10]

i) Lagrange's formula

ii) Newton's divided difference formula, for the following data and hence show that both the methods give raise to same polynomial

x	1	2	3	5
y	0	7	26	124

OR

Q. 8 A) Derive Lagrange's interpolation formula for unequally spaced data. [8]

B) For the following table of values, estimate $y(7.5)$ and $y(1.5)$ using appropriate interpolation formula [10]

x	1	2	3	4	5	6	7	8
y	1	8	27	64	125	216	343	512

Q. 9 A) Explain Taylor's series method for solution of ordinary differential equation [8]

B) Compute $y(0.3)$ with $h = 0.1$ from $\frac{dy}{dx} = y - \frac{2x}{y}$, [8]

y (0) = 1 by modified Euler's method.

OR

Q. 10 A) Given $\frac{dy}{dx} = \frac{1}{x+y}$ y (0) = 2. [8]
$If\ y\ (0.2)\ =\ 2.09, y(0.4)\ = 2.17, y(0.6)\ =\ 2.24,$
find $y(0.8)$ and $y(1.0)$ using Mile's method.

B) Explain modified Euler's method for solution of ordinary differential equation. [8]

Q.11 A) Derive formula of Simpson's $\left(\frac{1}{3}\right)^{rd}$ Rule as a special case of Netwon Cote's formula for numerical integration. [6]

B) Evaluate $\int_0^{0.9} log_e\ (1 + \sqrt{x})\ dx$ using trapezoidal rule of integration with 9 sub-intervals. [5]

C) Evaluate $\int_0^{\frac{\pi}{2}} e^{\sin x}\ dx$, using Simpon's $\left(\frac{3}{8}\right)^{th}$ rule [5]
With 6 sub-intervals.

OR

Q. 12 A) Derive formula of Trapezoidal Rule as a special case of Newton Cote's formula for numerical integration. [6]

B) Derive formula for $\frac{dy}{dx}\ and\ \frac{d^2y}{dx^2}$ at $x\ =\ x_n$ using Newton backward interpolation formula. [5]

C) Evaluate $\int_{1.0}^{1.8} \frac{e^x + e^{-x}}{2}.\ dx$ using Simpson's $\left(\frac{1}{3}\right)^{rd}$ rule by taking $h\ =\ 0.2$ [5]

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

UNIVERSITY OF PUNE
[4362]-159
S. E. ELECTRICAL Examination - 2013
MICROPROCESSOR FUNDAMENTAL & PROGRAMMING
(2008 Course)

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

Instructions:

1 *Answer **any three** questions from each section.*
2 *Answers three questions from **Sections I** and three questions from **Section II**.*
3 *Answers to the **two sections** should be written in **separate answer-books**.*
4 *Neat diagrams must be drawn wherever necessary.*

SECTION -I

Q.1	A	Explain with neat diagram demultiplexing of address & data base of 8085	8
	B	Explain requirement of PC, SP and status flags in the architecture of 8085	4
	C	Discuss the function of following pins. i) REDAY ii) RESET iii) HOLD iv) INTR	4
		OR	
Q.2	A	Explain the following instruction of 8085 with example i) PCHL ii) LHLD 8000 iii) XTHL iv) LDAX B	8
	B	Interface 8085 with 2k × 8 ROM chip & two 1k × 8 RAM chip such that following address map is realized, i) RDM chip 2k × 8 0800 H to OFFF H ii) RAM chip1 1k × 8 1000 H to 13 FF H ii) RAM chip2 1k × 8 4000 H to 43 FF	8
Q. 3	A	Draw & explain the timing diagram for the following instruction i) LDA 2000 ii) INR M	8

	B	Write a program to count from 0 to 20 H with a delay of 100ms between each count. After the count 20H, the counter should reset itself and repeat the sequence. Show calculate to set up the 100ms delay.	8
		OR	
Q. 4	A	With help of neat diagram explain interrupt organization of 8085. What is meant by vector interrupt? List the priorities of interrupts in 8085	8
	B	Explain the concept of look up table.	4
	C	Write a program for addition of two numbers. Specify the contents of accumulator & status of various flags of 8085.	4
Q. 5	A	Compare the transmission formats Interrupt driven & polling type.	6
	B	How the data can be transmitted serially from 8085 using SIM instruction? Explain with example.	6
	C	Explain asynchronous mode of PCI 825%	6
		OR	
Q. 6	A	What is measurement of data transmission?	5
	B	Explain the baud rate of social communication in details	5
	C	State the various Bus interface standards and explain in detail about RS 232.	8

SECTION II

Q. 7	A	Draw functional block diagram of 8254. Explain function of each block in detail	8
	B	List the operating modes of 8255. Give control word format of 8255 in I/O mode and BSR mode.	8
		OR	
Q. 8	A	Explain mode 0 and mode 1operation of 8254.	8
	B	Draw the functional block diagram of 8255 PPI and explain in detail.	8
Q. 9	A	Explain interface of ADC 0809 with 8085 with the help of interfacing diagram	10
	B	Explain application of 8085 for measurement of voltage and current.	8
		OR	
Q. 10	A	Draw interfacing diagram of DAC 0808 with 8085 microprocessor. Write an assembly language program to generate sawtooth wave using DAC.	10
	B	How power factor is measured using 8085 explain with	8

		block diagram.	
Q. 11	A	Draw the interfacing diagram & stepper motor with 8085 and explain direction and speed control of stepper motor.	8
	B	Explain application of 7 segment display using 8085	8
		OR	
Q. 12	A	With the help of interfacing diagram, explain flow measurement using 8085	8
	B	Explain D. C. motor control using 8085	8