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10EE61

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Power System Analysis & Stability

Time: 3 hrs. Max. Marks:100

Note: *1. Answer any FIVE full questions, selecting atleast TWO questions from each part.*
2. Assume missing data, if any suitably.

PART – A

1 a. What is per unit quantity? Mention the advantages of per unit quantities. **(06 Marks)**

b. What is single line diagram? Explain how to obtain impedance and reactance diagrams from single line diagram of a power system. **(06 Marks)**

c. Draw a per unit reactance diagram for the power system shown in Fig.Q1(c).

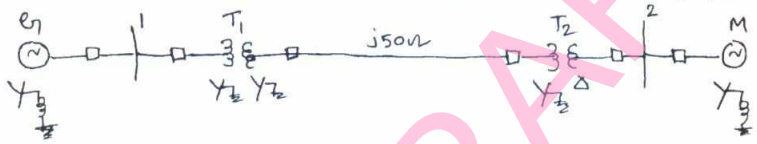

Fig.Q1(c)

Use a base of 100 MVA, 220 kV in 50Ω line.
The ratings of the generator, motor and transformers are
Generator : 40 MVA, 25 kV, X″ = 20%
Motor : 50 MVA, 11 kV, X″ = 30%
Y – Y Transformer : 40 MVA, 33Y / 220Y kV, X = 15%
Y – Δ Transformer : 30 MVA, 11Δ / 220Y kV, X = 15% **(08 Marks)**

2 a. Discuss the different types of faults in Power system. **(04 Marks)**

b. Explain clearly, how circuit breakers are rated? **(08 Marks)**

c. A generator is connected to a synchronous motor through transformer. Reduced to a common base, the per unit subtransient reactances of generator and motor are 0.15 and 0. 35 pu respectively. The leakage reactance of the transformer is 0.1 pu. A 3ϕ short circuit fault occurs at terminals of the motor when terminal voltage of generator is 0.9 pu and output current of generator is 1 pu at 0.8 p.f. leading. Find the subtransient current in the fault, generator and motor. **(08 Marks)**

3 a. What are symmetrical components? How they are useful in solution of power system? **(04 Marks)**

b. Derive an expression for the 3ϕ complex power in terms of symmetrical components. **(08 Marks)**

c. A delta connected balanced resistive load is connected across a balanced 3ϕ supply as shown in Fig.Q3(c). With currents in lines A & B specified. Find the symmetrical components of the currents. **(08 Marks)**

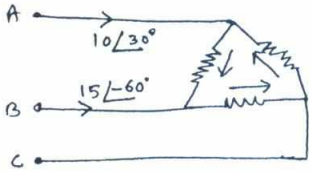

Fig.Q3(c)

4 a. With the help of relevant vector diagrams for voltages and currents establish the phase-shift of symmetrical components in Y-Δ transformer. **(12 Marks)**

b. What are sequence impedances and sequence network? Draw the zero sequence networks for different combinations of 3ϕ transformer bank. **(08 Marks)**

PART – B

5 a. Mention the different types of faults occurring in electrical power system and their probability of occurrence. **(04 Marks)**

b. A double line to ground fault occurs at the terminals of an unloaded generator. Derive an expression for the fault currents. Also draw connection of sequence networks. **(10 Marks)**

c. Discuss briefly about the open-conductor faults in power system. **(06 Marks)**

6 A single line to ground fault occurs at mid point F of transmission line in power system shown in Fig.Q6(a). Determine the fault current in pu and in amperes from generator if the system were on no load and at a voltage of 100 kV at the fault point.

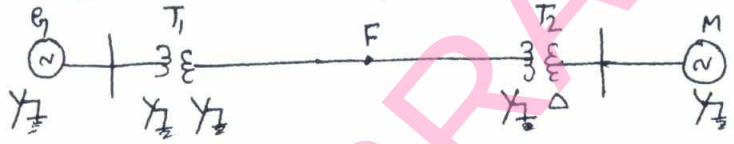

Fig.Q6(a)

The ratings are
Generator : 11.5 kV, 500 MVA, $X_1 = 0.3$ pu, $X_2 = 0.2$ pu, $X_0 = 0.1$ pu
Transformer – T_1 : 11/110 kV, 45 MVA, $X = 0.1$ pu
Transformer – T_2 : Consists of 3 single phase units each rated 20 MVA, 66/6.6 kV, $X = 10\%$
Motor : 6 kV, 55 MVA, $X_1 = 0.4$ pu, $X_2 = 0.3$ pu, $X_0 = 0.2$ pu
Line : $X_1 = X_2 = 48.5\ \Omega$, $X_0 = 90\ \Omega$
Choose a base of 60 MVA, 110 kV in transmission line. **(20 Marks)**

7 a. Differentiate between steady state and transient state stability of a power system. Can these stability limits have multiple values? **(06 Marks)**

b. Derive swing equation with usual notation. **(08 Marks)**

c. Explain the equal area criterion for investigating the stability of power system. **(06 Marks)**

8 a. An ac generator is delivering 50% of maximum power to an infinite bus. Due to a sudden short circuit, the reactance between generator and infinite bus increases to 500% of the value before fault. The maximum power that can be delivered after clearance of the fault is 75% of the original value. Calculate the critical clearing angle to maintain the stability of the system. **(08 Marks)**

b. Explain the analysis of 3ϕ induction motor with one line open. **(06 Marks)**

c. Explain the analysis of 3ϕ induction motor with unbalanced voltage. **(06 Marks)**

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10EE62

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Switch Gear and Protection

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. State and explain fuse law. With a neat sketch explain the time–current and cut–off characteristics of HRC fuse. **(10 Marks)**

b. Draw and explain a line diagram of substation with use of isolating switches. Mention operating instructions and applications of isolating switches. **(10 Marks)**

2 a. What are Slepian's and Cassie's theorem of arc interruption? Explain with neat sketches. Also explain low resistance or zero point extinction. **(10 Marks)**

b. How interruption of capacitive currents takes place in AC circuit breakers? Explain. **(10 Marks)**

3 a. With a neat sketch explain the construction and working of air break circuit breaker. **(10 Marks)**

b. Describe the working principle of SF_6 circuit breaker with the help of a neat sketch. mention the advantages over other type of circuit breakers. **(10 Marks)**

4 a. Explain the construction and working of a vacuum circuit breaker. **(10 Marks)**

b. Describe : i) unit testing ii) synthetic testing of a circuit breaker. **(10 Marks)**

PART – B

5 a. What are the requirements of protective relaying? And discuss i) zones of protection ii) primary and back–up protection. **(10 Marks)**

b. Briefly explain the essential qualities and classification of protective relays. **(10 Marks)**

6 a. Explain in detail with the help of a neat figure the working of non–directional induction type over–current relay. **(10 Marks)**

b. Explain the principle of working and operating characteristics of a percentage biased differential relay. **(10 Marks)**

7 a. What are the important faults that can occur in an alternator during operation? Explain in detail. **(10 Marks)**

b. A generator is protected by restricted earth fault protection. The generators ratings 13.2 KV, 10 MVA. The percentage of winding protected against phase to ground fault is 85%. The relay setting is such that it trips for 20% out of balance. Calculate the resistance to be added in the neutral to ground connection. **(10 Marks)**

8 a. With a neat sketch explain the working of a Buchholz relay for transformer protection and state its limitations. **(10 Marks)**

b. A three phase power transformer having a line voltage ratio of 400 V to 33 KV is connected in star–delta. The CTs on 400 V side have current ratio as 1000/5. What must be the CT ratio on 33 KV side? Show the star–delta arrangement with CT connections. Assume current on 400 V side of transformer to be 1000 A. **(10 Marks)**

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10EE63

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Electrical Machine Design

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. What are the limitations in the design of electrical machines? Explain. **(06 Marks)**

b. Derive the output equation of a D.C machine. **(06 Marks)**

c. Determine the main dimensions and number of poles of a 1000kW, 500 volts, 450 RPM D.C generator. Assume the air gap density as 0.62 Tesla and ampere conductors per meter as 40,000. The ratios of pole arc to pole pitch is 0.65. The ratio of length to pole pitch is 0.75. Assume efficiency as 90% current per brush arm not to exceed 400 amperes and frequency of the reversals in the armature not to exceed 50Hz. **(08 Marks)**

2 a. The field coils of a D.C machine are wound with a single layer winding of bare copper strip 3 cm deep with a separating insulation 0.15mm thick. Determine a suitable winding length, number of turns and thickness of conductor to develop an mmf of 12000 ampere-turns with a potential difference of 5V/coil and with a loss of 1200 Watts /m^2 of total coil surface. The mean length of turn is 1.2m. **(10 Marks)**

b. Estimate the ampere turns per pole required for the air-gap of a 500V, 6 pole, 300 rpm, lap connected D.C machine. The armature core having 90 slots is 30cm long. The pole pitch is 50cm while pole arc is 33cm. The air gap length may be taken as 5mm. There are 16 conductors per slot of width 1.3cm. Assume 5 ventilating ducts, each 1cm wide. The carter's co-efficient is 0.66 and 0.72 for slot width/gap of 2.6 and 2.0 respectively. **(10 Marks)**

3 a. With neat sketch derive the expression for leakage reactance of core type transformer with respect to primary side. State the assumption made. **(12 Marks)**

b. A 100KVA, 200/400V, 50Hz, 1ϕ shell type transformer has the following particular; B_{max} = 1.1wb/m^2, current density = 2.2 A/mm^2, window area constant = 0.33, volt/turn =11, core is rectangular and stampings are 7cm wide. Height of window = 2 * width of window. Obtain :

i) Net iron area and Area of window

ii) Dimensions and weight of core. Specific gravity of Iron = 7.8 gm/cm^2. **(08 Marks)**

4 a. Derive output equation for a 3 phase transformer. **(10 Marks)**

b. A 15000KVA, 33/6.6kV, 3-phase, Y -Δ core type transformer has the following data : Area of cross section of core limb = 0.16m, Area of cross section of yoke = 0.17m. length of flux path in each limb 2.3m in each yoke is 1.6m ; number of turns in h.v winding = 450. AT/m in core leg is 540 AT/m and in yoke is 260 AT/m as obtained from magnetization curves. Loss per kg in iron is 2.6 Watts/kg in limb and 1.5 watts/kg in yoke. Density of iron is 7.8 g/c.c. Estimate the No-Load current/phase. **(10 Marks)**

PART – B

5 a. Explain the factors which influence the length of air gap of 3 – phase induction motor. **(08 Marks)**

b. Calculate : i) Diameter ii) Length iii) Number of turns per phase iv) Full load current and cross – section of conductors and v) Total I^2R loss of stator of 3ϕ, 120kW 2200 volts, 50Hz, 750rpm [synchronous speed], star connected slip ring Induction motor from the following data :
B_{ar} = 0.48 Tesla, (ac) = 26000 ampere/mt, efficiency = 92%, power factor = 0.88. Assume $L = 1.25T_p$, winding factor =0.95, current density = 5A/mm^2 mean length of stator conductors = 0.75m, resistivity of copper $\rho = 0.021\Omega$/mt and mm^2. **(12 Marks)**

6 a. Explain crawling an cogging of induction motor. **(10 Marks)**

b. A 120 HP, 500V, 3ϕ, 50Hz, 8 pole induction motor has a star connected stator winding accommodated in 63 slots with 6 conductors per slot. If the slip ring voltage on open circuit is to be about 400V, find a suitable rotor winding stating
i) Number of slots ii) Number of conductors per slot iii) Coil span
iv) Slip ring voltage on open circuit v) Approximate full load current per phase in rotor. Assume efficiency = 0.9 and power factor = 0.86. **(10 Marks)**

7 a. From first principles derive the output equation of a 3 phase alternator. **(06 Marks)**

b. Define short circuit ratio in connection with 3 phase alternator. Explain the factors affecting the SCR. **(06 Marks)**

c. A 1250 KVA, 3phase, 50Hz, 3300V, start connected 300rpm salient pole alternator has the following data : Diameter = 1.9 mt ; length = 0.335 mt ; pole arc/pole pitch = 0.66, turns/phase = 150. Single layer winding with full pitched coils having 5 conductors per slot is used SCR = 1.2. Assume the distribution of gap flux is rectangular under the pole arc with zero value at inter-poler region. Determine :
i) Specific magnetic loading ii) Armature mmf per pole iii) Gap flux density over pole arc iv) current per phase v) length of air gap.
Assume gap contraction factor = 1.15 and Air gap mmf = 88% of no load field mmf.
(08 Marks)

8 a. Explain the design procedure for designing the field winding of a salient pole alternator. **(10 Marks)**

b. A 2500KVA, 225 rpm, 3 phase, 60Hz, 2400V, Star connected salient pole alternator has the following data :
Stator bore diameter = 250cm, Core length = 44cm, Slots/pole/phase = $3\frac{1}{2}$, Conductors per slot = 4, Circuits per phase = 2, Leakage factor = 1.2, Winding factor = 0.95. The flux density in pole core is 1.5 wb/m^2, the winding depth is 3cm. the ratio of full load field mmf to armature mmf is 2, field winding space factor is 0.84 and the field winding dissipates 1800 Watts/m^2 of inner and outer surface without the temperature rise exceeding the limits. Leave 3cm for insulation, flanges and height of pole shoe along the height of pole.
Find :
i) The flux per pole
ii) Length and width of pole
iii) Winding height and
iv) Pole height **(10 Marks)**

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10EE64

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Digital Signal Processing

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. If X(k) is N – point DFT of N-length sequence x(n), and if $x_1(n)$ is DFT of X(k), then determine $x_1(n)$ interms of x(n). **(05 Marks)**

b. Compute 8 – point DFT of the sequence x(n) = {1, 2, 2, 1, 2, 2} and verify conjugate symmetry about k = N/2. **(10 Marks)**

c. If X(k) represent 6-point DFT of sequence. X(n) = {2, –1, 3, 4, 0, 5}, then find y(n) of same length as x(n) such that its DFT $Y(k) = W_3^{2k} X(k)$. **(05 Marks)**

2 a. Using Stockham's method find circular convolution of the sequences :
$g(n) = \delta(n) + 2\delta(n-1) + 3\delta(n-2) + 4\delta(n-3)$ and $h(n) = n$ for $0 \le n \le 3$. **(07 Marks)**

b. Obtain output of the system having impulse response $h(n) = \cos\left(\frac{2\pi n}{N}\right)$ and input $x(n) = \sin\left(\frac{2\pi n}{N}\right)$, through N – point circular convolution. **(06 Marks)**

c. Use sectional convolution approach to find the response of filter having impulse response h(n) = {1, 2} and input x(n) = {1, 2, –1, 2, 3, –2, –3, –1, 1, 1, 2, –1}. Use 5-point circular convolution use overlap and add method. **(07 Marks)**

3 a. Develop DIF FFT algorithm for N = 8 from basic principles of decomposition of radix–2. **(10 Marks)**

b. Using time decomposition approach find the DFT of sequence for N point such that $N = 2^M$ and M = 3, the given sequence is y(n) = {1, 1, 1, 1 1}. **(10 Marks)**

4 a. The first five points of DFT of a sequence are given as {7, –0.707–j0.707, –j, 0.707–j0.707, 1}. Obtain the corresponding time domain sequence of length–8 using DIF FFT algorithm. **(10 Marks)**

b. Develop a N–composite DIT FFT algorithm for evaluating 9 point DFT. **(10 Marks)**

PART – B

5 a. A lowpass Butterworth filter has to meet the following specifications :
Passband gain, $K_p = -1$dB at $\Omega_p = 4$ rad/sec
Stopband attenuation greater than or equal to 20 dB at $\Omega_S = 8$ rad/sec.
Determine the transfer function $H_a(s)$ of the lowest order Butterworth filter to meet the above specifications. **(10 Marks)**

b. Design a Chebyshev – I filter to meet the following specifications :

Passband ripple	: ≤ 2dB
Passband edge	: 1 rad/sec
Stopband attenuation	: ≥ 20 dB
Stopband edge	: 1.3 rad/sec.

(10 Marks)

6 a. Using impulse invariant transformation, design a digital Chebyshev I filter that satisfies the following constraints. $0.8 \le |H(\omega)| \le 1, \quad 0 \le \omega \le 0.2\pi$

$|H(\omega)| \le 0.2, \quad 0.6\pi \le \omega \le \pi.$ **(12 Marks)**

b. Define the following windows along with their impulse response :

i) Rectangular window

ii) Hamming window

iii) Hanning window. **(08 Marks)**

7 a. The desired frequency response of a lowpass FIR filter is given by :

$$H_d(\omega) = \begin{cases} e^{-j3\omega}, & |\omega| < \frac{3\pi}{4} \\ 0, & \frac{3\pi}{4} < |\omega| < \pi \end{cases}$$

Determine the frequency response of the filter using Hamming window for N =7. **(10 Marks)**

b. Determine the filter coefficients h(n) obtained by sampling $H_d(\omega)$ given by :

$$H_d(\omega) = \begin{cases} e^{-j3\omega}, & 0 < \omega \le \frac{\pi}{2} \\ 0, & \frac{\pi}{2} < \omega < \pi \end{cases}$$

Also obtain frequency response taking N = 7. **(10 Marks)**

8 a. For a LTI system described by following input-output relation :

$2y(n) - y(n-2) - 4y(n-3) = 3x(n-2)$

Realize the system in following forms :

i) Direct form – I

ii) Direct form – II transposed realization. **(10 Marks)**

b. Obtain cascade realization for the system function given below :

$$H(z) = \frac{(1+z^{-1})^3}{\left(1-\frac{1}{4}z^{-1}\right)\left(1-z^{-1}+\frac{1}{2}z^{-2}\right)}.$$ **(06 Marks)**

c. Compare direct from – I and II realizations. **(04 Marks)**

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10EE661

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Operation Research

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Define : i) Slack variable ii) Surplus variable iii) Feasible region iv) Basic Feasible solution. **(04 Marks)**

b. Solve the LPP using Graphical Method

Max $Z = 5x_1 + 4x_2$

Subjected to : $6x_1 + 4x_2 \le 24$

$x_1 + 2x_2 \le 6$

$-x_1 + x_2 \le 1$

$x_2 \le 2$ and $x_1, x_2 \ge 0$. **(06 Marks)**

c. Solve the LPP using simplex method

Min $Z = 5x_1 - 4x_2 + 6x_3 - 8x_4$

Subjected to : $x_1 + 2x_2 + 2x_3 + 4x_4 \le 40$

$2x_1 - x_2 + x_3 + 2x_4 \le 8$

$4x_1 - 2x_2 + x_3 - x_4 \le 10$ and $x_1, x_2, x_3, x_4 \ge 0$. **(10 Marks)**

2 a. Solve the LPP using Big M technique

Max $Z = 3x_1 + 2x_2$

Subjected to $2x_1 + x_2 \le 2$

$3x_1 + 4x_2 \ge 12$ and $x_1, x_2 \ge 0$ **(06 Marks)**

b. Using simplex method solve the LPP

Max $Z = 3x_1 + 9x_2$

Subjected to $x_1 + 4x_2 \le 8$

$x_1 + 2x_2 \le 4$ and $x_1, x_2 \ge 0$. **(10 Marks)**

c. Solve the LPP using simplex method and comment on the nature of solution. Minimize 'z' given

$Z = 8x_1 - 4x_2$

Subjected to : $3x_1 - 4x_2 \le 12$

$2x_1 - 5x_2 \le 15$

$3x_1 - x_2 \le 4$ and $x_1, x_2 \ge 0$ **(04 Marks)**

3 a. Construct the dual from the primal

Max $Z = 5x_1 + 6x_2$

Subjected to : $x_1 + 2x_2 = 5$

$-x_1 + 5x_2 \ge 3$

$4x_1 + 7x_2 \le 8$

x_1 is unrestricted and $x_2 \ge 0$ **(05 Marks)**

b. What are the advantages and disadvantages of revised simplex method over the original simplex method? **(05 Marks)**

c. Solve the LPP using Dual simplex method.

Max $Z = -2x_1 - x_2$

Subjected to : $-3x_1 - x_2 \le -3$

$-4x_1 - 3x_2 \le -6$

$-x_1 - 2x_2 \le -3$ and $x_1, x_2 \ge 0$. **(10 Marks)**

4 a. For a transformer manufacturing company, the setup times are as below. Using Hungarian method minimize the total setup time required to complete the four jobs. **(06 Marks)**

Time (in Hours)				
Machine	Job 1	Job 2	Job 3	Job 4
1	14	5	8	7
2	2	12	6	5
3	7	8	3	9
4	2	4	6	10

b. List the differences between Assignment and transportation problems **(04 Marks)**

c. Solve the following Travelling salesman problem **(10 Marks)**

		To				
		1	2	3	4	5
From	1	∞	20	4	10	∞
	2	20	∞	5	∞	10
	3	4	5	∞	6	6
	4	10	∞	6	∞	20
	5	∞	10	6	20	∞

PART – B

5 a. For the following transportation problem, find the initial basic feasible solution using Row minima method. Conduct optimality test using stepping stone method. **(09 Marks)**

	City →				↓ Production (in M_w)
	1	2	3	4	
Power plant → 1	12	10	14	15	50
2	7	11	8	14	30
3	6	16	11	7	20
Demand (in Mw) →	18	15	35	32	

b. For the following cost matrix, find the Initial Basic Feasible solution using Vogel's Approximation method and employ u – V method for optimality test **(08 Marks)**

	To			
	A	B	C	Supply ↓
From P	5	1	7	10
Q	6	4	6	80
R	3	2	5	15
Demand →	75	20	50	

c. Define : i) Transportation problem (TP)
ii) Basic Feasible solution applied to a TP
iii) Degeneracy applied to a TP. **(03 Marks)**

6 a. Define : i) Pure strategy ii) Payoff. **(02 Marks)**

b. Find the value of the Game. **(03 Marks)**

	B_1	B_2	B_3	B_4
A_1	8	−2	9	−3
A_2	6	5	6	8
A_3	−2	4	−9	5

c. Using dominance property, solve the game **(05 Marks)**

Player B →	I	II	III	IV	V
Player A ↓ 1	2	4	3	8	4
2	5	6	3	7	8
3	6	7	9	8	7
4	4	2	8	4	3

d. Solve the game graphically; given the payoff matrix for player A. **(10 Marks)**

A \ B	I	II
I	4	8
II	4	6
III	6	4
IV	−4	12

7 a. Define: i) Concurrent activity ii) Critical activity iii) Optimistic time. **(03 Marks)**

b. The following table shows the jobs of a network along their estimates in days.

Job (i – j)		(1–2)	(1–6)	(2–3)	(2–4)	(3–5)	(4–5)	(6–7)	(5–8)	(7–8)
Duration (in day)	Optimistic (to)	3	2	6	2	5	3	3	1	4
	Most likely (tm)	6	5	12	5	11	6	9	4	19
	Pessimistic (tp)	15	14	30	8	17	15	27	7	28

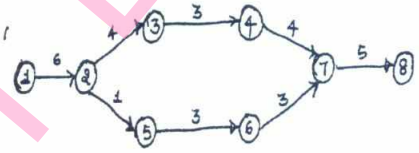
i) Draw the project network ii) Calculate the length and variance of the critical path

iii) What is the approximate probability that the jobs on the critical path will be completed in 41 days?

Given : For Di = 1 ; $P(z \leq Di) = 0.84$ from the standard normal curve. **(10 Marks)**

c. Define Resource Leveling. For the following information and resource table suggest some appropriate allocation schedule. **(07 Marks)**

Fig Q7(c)



Critical Activity			Non-Critical Activity		
Activity	Men/day	Men	Activity	Men/day	Men
1 – 2	48	8	2 – 5	2	2
2 – 3	16	4	5 – 6	9	3
3 – 4	18	6	6 – 7	12	4
4 – 7	16	4			
7 – 8	20	4			

8 a. Define : i) Money value i) Present worth factor iii) Progressive failure iv) Gradual failure v) Depreciation value. **(10 Marks)**

b. A circuit contains 2,800 resistors. When any one of the resistor fails, it is replaced. The cost of replacing a single resistor is Rs 5 only. If all the resistors are replaced at the same time, the cost per resistor would be Rs 0.5 only. Following is the percent survival of resistors by the end of the month't'.

Month (t)	0	1	2	3	4
% survival	100	82	60	25	0

What is the optimal plan? **(10 Marks)**

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10EE664

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Object Oriented Programming using C++

Time: 3 hrs. Max. Marks:100

Note: ***Answer any FIVE full questions, selecting atleast TWO questions from each part.***

PART – A

1 a. What are the basic concepts of object oriented programming? Explain any four concepts briefly. **(10 Marks)**

b. List a few areas of applications of OOPS technology. **(04 Marks)**

c. Find errors, if any, in the following C++ statements and write correct statement.

i)
```
cout<< "Enter n:";
cin >>n
if(n < 0)
cout<< "n is negative.Try again";
cin >>n;
else
cout<< "o.k =" <<n;
```

ii)
```
#include < iostream>
using namespace standard :
int main
{ //prints "Hello, world!" :
  cout<< "Hello, world !\n"
  return 0;
}
```

(06 Marks)

2 a. What is a data type? List the various data types available in C++. **(05 Marks)**

b. Explain briefly the pointer variables with example. **(05 Marks)**

c. What is the need for constant qualifier? Explain briefly the constant qualifier. **(05 Marks)**

d. Explain the new and delete operators with examples. **(05 Marks)**

3 a. What is function overloading? Explain with an example. **(07 Marks)**

b. What is an inline function? Explain its syntax. Discuss the situation, where, inline function may not work. **(07 Marks)**

c. Write a C++ program to read integers and prints their cubes until the user inputs the value 0. Pass the each integer read value to the function "cube" to find cube of a number. **(06 Marks)**

4 a. Explain the different class member access specifier. **(06 Marks)**

b. What are static data members? List the characteristics of static data member. **(06 Marks)**

c. Create a class with member functions that read two integers, find largest among them and display the largest integer. Write a main program to test the class. **(08 Marks)**

PART – B

5 a. What are constructors and destructors? List some characteristics of both. **(12 Marks)**

b. Explain the copy constructor, with an example. **(04 Marks)**

c. List the operators, which cannot be overloaded. **(04 Marks)**

6 a. What is an operator overloading? Discuss the rules for overloading operators. **(10 Marks)**

b. Write a C++ program to overload binary operator '+' to add two complex numbers and display the result. **(10 Marks)**

7 a. What is inheritance? Explain different types of inheritance with the help of a block diagram. **(12 Marks)**

b. What is a virtual base class? Explain necessity of class virtual. **(08 Marks)**

8 a. What is 'this' pointer? Explain its significance. **(05 Marks)**

b. List the rules for virtual functions. **(05 Marks)**

c. Enumerate various manipulators in C++ along with their meaning. **(05 Marks)**

d. Describe the various file mode options available. **(05 Marks)**

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10EE666

Sixth Semester B.E. Degree Examination, Dec.2016/Jan.2017
Electrical Engineering Materials

Time: 3 hrs. Max. Marks:100

Note: ***Answer FIVE full questions, selecting at least TWO questions from each part.***

PART – A

1 a. Explain the effect of temperature on resistance and hence desire an expression for temperature co-efficient of a resistance. **(08 Marks)**

b. Explain Fermi Cirac Distribtuion. **(06 Marks)**

c. Explain Briefly the uses of the following in electrical Industry
i) Silver ii) Copper iii) Tungsten **(06 Marks)**

2 a. Define and explain Hall effect? **(08 Marks)**

b. A mild steel ring having a cross sectional area of $5cm^2$ and a mean circumference of 40cm is wound with 200 turns. For an exciting current of 6.4A through the coil, the total flux produced was found to be 0.8 milli-webers.
Find : i) Flux density in wb/m^2 ii) Field intensity in AT/m
iii) Relative permeability of steel. **(06 Marks)**

c. Write the difference between hard and soft magnetic materials. **(06 Marks)**

3 a. Explain properties and applications of below materials.
i) Natural Rubber ii) Cotton iii) Synthetic rubber
iv) Wood v) Bakelite vi) Paper. **(12 Marks)**

b. Explain the following : i) Ionic polarization ii) Dispolar polarization. **(08 Marks)**

4 a. Explain the procedure for testing the dielectric strength of transformer oil. **(07 Marks)**

b. The capacitance of condenser formed of two metal sheets, each $100cm^2$ in area separated by dielectric 2mm thick is 0.0002μF. A potential difference of 20,000 volts is applied across condenser.
Calculate:
i) Charge m each plate and ii) Potential gradient in Kv/mm in the dielectric. **(06 Marks)**

c. Discuss in details about dipolar relaxation. **(07 Marks)**

PART – B

5 a. Explain with diagram: i) Flatbed plate collector ii) Concentrating collectors. **(10 Marks)**

b. Explain different semiconductor materials for solar cells. **(10 Marks)**

6 a. Explain in detail about atomic absorption spectroscopy. **(10 Marks)**

b. Explain pulsed Fourier transform NMR spectrometer, with a block diagram. **(10 Marks)**

7 a. Define Piezoelectricity? Explain the uses of any three Piezoelectric materials. **(10 Marks)**

b. Define ferromagnetic curie temperature. Explain properties of any tow ferromagnetic materials. **(10 Marks)**

8 a. What is ceramic? Explain in details the classification of ceramic capacitor? **(10 Marks)**

b. Explain the following: i) Thermoplastic ii) Thermostats iii) Rubber. **(10 Marks)**

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