Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)
Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester - May 2019 Examinations

Program: T.Y. B.Tech.(Electrical) | **Duration: Three Hour**

Course Code: PC-BTE601 | **Maximum Points: 100**

Course Name: Power System II | **Semester: VI**

Notes:
1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

Q. No.	Questions	Points
1.	a. For a single machine connected to the infinite justify equal area criterion method for analysis of stability studies.	08
	b. Describe the DC excitation system for Automatic Voltage Regulation at generator terminal.	08
	c. Derive the generator model in context of load frequency control.	04
2.	a. With proper descriptions of variables used derive of Static Load Flow Equations (SLFE) explaining the meaning of SLFE. Also classify the buses for load flow studies.	10
	b. Prove that travelling waves on transmission lines travels with the speed of light and find the expression for surge impedance of the line.	10
3.	a. Write *Algorithm* **OR** *Flow Chart* for Solution of Static Load Flow Equation using Gauss-Siedel Method. (Proper steps need to be executed indicating final solution of equation is expected.)	10
	b. A unit-step voltage surge is travelling on a long line of surge impedance Z_1 It reaches the junction with a cable of finite length whose far end is open. The cable has a surge impedance of Z_2 and the time of one-way wave travel on it is T. Draw the Bewley lattice diagram and find from it the value of voltage at the junction at time 4T after the surge reaches the line cable junction. **Given** $Z_1 / Z_2 = 9$.	10

4.	Develop the mathematical model of Automatic Voltage Regulator loop, in the sense of block diagram, by developing mathematical models of individual components, in the sense of block diagram, Comparator, Amplifier, Exciter and Generator.	20
5.	a. Develop the Automatic Generation Control model for two area systems showing only primary Load Frequency Control. b. In network model $I_{BUS}=Y_{BUS}V_{BUS}$, describe the meaning of following parameters. I_i, Y_{ij} and V_i. Write down the dimensions of Y_{BUS} and I_{BUS}.	15 05
6.	a. Assume that initially a power system is in normal state and describe the state transitions till it reaches extremis state, if a sudden disturbance occurs in the system. b. What is vertically integrated utility? Discuss its characteristics. c. Discuss reasons for Restructuring / Deregulation of Power Industry.	10 05 05
7.	a. What is demand side management? Discuss the common DSM implementation strategies. b. Describe the effect of clearing time on stability using equal area criterion. Also derive the relations for critical clearing time and angle for the same.	10 10

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ENDSEM MAY 2019

Program: Electrical Engg **Date: MAY 2019**

Duration: 1 hrs. **Course code: PC BTE-602**

Maximum Marks: 100 **Semester: VI**

Name of the Course: SWITCH GEAR AND PROTECTION

- **Instructions:**
- Question 1 is compulsory, attempt any FOUR questions out of remaining 6 questions
- Answers to all sub questions should be grouped together
- Brief answers expected

Sn	Questions	Points	CO	BL	PI
Q1) A)	What is tower footing resistance? Why is it required to have this resistance as economically low as possible? What are the methods to reduce this resistance?	6	1	2	1.3.1
B)	In what way distance protection is superior to over current protection of transmission line?	2	2	3	1.3.1
C)	With the help of differential current verses fault current characteristics explain the term "through fault stability limit" and "stability ratio".	6	1	2	1.3.1
D)	With the help of relay characteristic, discuss the protection employed for loss of excitation of alternator.	6	2	3	1.3.1
Q2) A)	A three phase 132 kV/ 33 kV star /delta connected power transformer is protected by differential protection scheme. The CT on LV side has current ratio of 300/5. How are the CT secondaries connected?	6	2	5	1.3.1
B)	Draw neat connection diagram of differential protection scheme of three phase delta/star connected transformer, line to ground fault occurs on secondary side of transformer on phase 'a' within differential protection zone. Show the fault current path on both the sides and show the tripped phase/ phases relay.	14			
Q3) A)	With the help of neat sketch, discuss the differential scheme for busbar protection.	8	2	2	1.3.1
B)	Explain why mho characteristic is preferred for the protection of long lines against phase faults whereas reactance relay is preferred	6	1	3	1.3.1

	for ground faults.				
C)	Write short note on HRC fuse using following points Cut section diagram, current –time characteristics and applications	6	2	2	1.3.1
Q4) A)	With the help of connection diagram explain carrier acceleration scheme for distance protection of line.	10	3	2	1.3.1
B)	Why the generator–step up transformer requires special restricted earth fault relay? With the help of neat connection diagram explain restricted earth fault relay of three phase transformer.	10	2	2	1.3.1
Q5) A)	The total impedance of the secondary winding, leads and burden of a 5 A CT is 0.01 ohm. If fault current is 20 times the rated primary current of the CT, then how much will be the CT VA output?	10	1	5	1.3.1
B)	Explain time and current graded over current protection scheme for distribution line.	10	1	2	1.3.1
Q6) A)	With the help of voltage time curve explain insulation coordination of station and line.	8	2	3	1.3.1
B)	Write a short note on 'Vacuum Circuit breaker' using following points Arc formation, material for C.B. contacts, voltage level and schematic diagram	12	4	2	1.3.1
Q7) A)	With the help of voltage and current waveforms during contacts opening of C.B., derive restriking voltage and RRRV.	12	4	2	1.3.1
B)	A circuit breaker interrupts the magnetizing current of a 100MVA transformer at 220kV. The magnetizing current of transformer is 5% of its full load current. Determine the maximum voltage which may appear across the gap of the breaker when magnetizing current interrupted at 53% of its peak value. The stray capacitance is 2500μF. The inductance is 30 H.	8	4	5	2.2.3

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End Semester –May 2019 Examinations

Program: Electrical Engineering. **Duration: 03 Hr.**

Course Code:PE-BTE601 **Maximum Points:100**

Course Name:ELECTRICAL MACHINE DESIGN **Semester: VI**

Notes: Answer any five questions (Qs.1 to Qs.7)
Draw neat circuit diagrams wherever necessary to support your answer.
Assume suitable data if necessary.

Qs.No.	Questions	Points	CO	BL	PI
Qs.1	a. State the factors for consideration in electrical machine design.	05	01	02	3.1.6
	b. What are the desirable properties of the materials selected for the following purpose and also state its effect on overall size of the machine (with reference to transformer) :- i) Winding Conductors. ii) Core.	10	02	03	3.1.6
	c. State the effect of choice of specific magnetic loading & specific electric loading on performance of induction motor.	05	02	03	3.1.6
Qs.1I	a. A 250 kVA, 2.0kV/400V, 50Hz, Single phase core type, oil immersed, self-cooled, power transformer is having the following data:- Volt / turn = 15.0; Flux density in the core = 1.25 T; Current density = 2.75 A/mm2; Window space factor = 0.30; type of core: three stepped; core material CRGO; height of the window = 3 times window width. Determine:- (i) Overall dimensions of the core (ii) Number of turns in hv and lv windings (iii) Cross-sectional area of the conductors used for the hv and lv windings. (iv) Drawthe view of core showing the dimensions obtained. For 3-stepped core largest stamping size = 0.9d; Net iron area $A_i = 0.6d^2$. where d = diameter of the circumscribing circle.	15	03	03	3.2.1
	b. Write the procedure to estimate no-load current of a 3-Φ core type transformer.	05	03	03	3.2.1

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End Semester –May 2019 Examinations

<table>
<tr><td></td><td></td><td></td><td></td><td></td><td></td></tr>
<tr><td>Qs.1II</td><td>a. Design an adequate cooling arrangement for a 250 kVA, 6600 / 400 V, 3-phase, Δ/Y, core type oil immersed natural cooled transformer with the following particulars:
i) winding temperature rise not to exceed 50°C.
(ii) Total losses = 5.0 kW.
(iii) Tank dimensions: height × length × width = 125×100×50 (all in cm.)
(iv) Oil level = 115 cm height.
The specific heat dissipation due to radiation and convection is respectively 6 & 6.5 watts/m² - °C. Assume that convection is improved by 35% due to provision of tubes. Sketch diagram to show the arrangement.</td><td>10</td><td>03</td><td>04</td><td>3.2.2</td></tr>
<tr><td></td><td>b. Select dimensions from the following range for a 2.2 kW, 400 Volts, 3-phase, 4-pole, 50Hz induction motor. The mean gap density is not to exceed 0.44 wb/m² and specific electric loading is not to exceed 21000 ac/m. calculate also the turns per phase for the stator winding. The product of efficiency and power factor may be taken as 0.66 and the motor must be suitable for star-delta starting.
<table>
<tr><td>Stator bore m</td><td>0.08</td><td>0.10</td><td>0.16</td></tr>
<tr><td>Core length m</td><td>0.10
0.12</td><td>0.125
0.10</td><td>0.15
0.14</td></tr>
</table></td><td>10</td><td>03</td><td>05</td><td>3.2.3</td></tr>
<tr><td>Qs.1V</td><td>a. A 3.7kW, 400V, 3-phase, 4pole, 50 Hz squirrel cage induction motor with star delta starter is to be designed for minimum cost. Determine the main dimensions, number of stator slots and the number of turns per phase of the motor if it has to work with an efficiency &</td><td>15</td><td>03</td><td>03</td><td>3.2.1</td></tr>
</table>

Qs.1V	power factor of 0.85 & 0.84 respectively at full load. The specific magnetic loading = 0.45 wb/m^2 and specific electric loading =23000. b. State the steps involved in designing a squirrel cage induction motor rotor bar conductor and end ring size. **OR** Mention the basic concept of traditional FEM & how is it applied in the analysis of electromagnetic devices.	05 04	03 03	03 03	3.2.1 3.2.1
Qs.V	Determine the main dimensions, size & number of conductors and number of slots for a 15MVA, 11kV, 50Hz,, 2pole, star connected cylindrical rotor alternator, with the armature winding having 60° phase spread. The distribution of winding should be such that 5th harmonic is eliminated. Assume Bav = 0.55 wb/m^2 and ac = 36000 A/m. current density = 5A/mm^2; peripheral speed = 160 m/sec.	20	03	03	3.2.1
Qs.VI	Answer any two questions from the following: a. Effect of Short Circuit Ratio (SCR) on synchronous machine performance b. A 3-phase 2 pole ac machine is designed to have double layer winding is accommodated in 18 slots. Coil span = 8 slots. Draw the cross sectional view of winding arrangement. c. Compare the structures of Permanent Magnet Synchronous Motors (PMSM) & Brushless DC motors (BLDC).	10 10 10	02 03 01	03 04 02	3.1.6 3.2.1 3.1.6

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End Semester –May 2019 Examinations

Qs.VII	**Answer any two questions from the following:** **a. A 15 kW, 400 V, 3-phase, 50Hz, 6 pole induction motor has aa diameter of 0.3m and the length of core 0.12m. The number of stator slots is 72 with 20 conductors per slot and a coil span of 11 slots. The stator is delta connected. Calculate the value of magnetizing current per phase if the length of airgap is 0.55mm. The gap contraction factor is 1.2. assume the mmf required for the iron parts to be 35% of the airgap mmf.**	**10**	**03**	**04**	**3.2.1**
	b. What is meant by Fractional slot winding used in AC machines? Obtain the slot star diagram and slot distribution table for a 36 slot, 10 pole 3-phase winding.	**10**	**03**	**03**	**3.2.2**
	c. Name & state their basic difference in procedure of various methods used in Computer Aided Design of Electrical machines & Draw the flow chart for any one method mentioned.	**10**	**04**	**03**	**3.3.1**

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End Semester

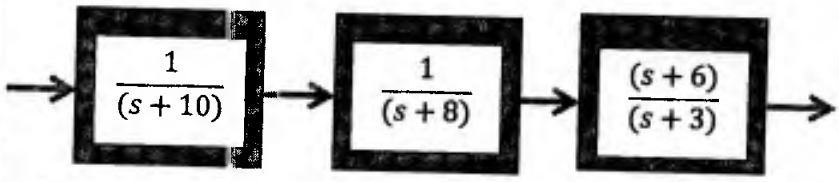
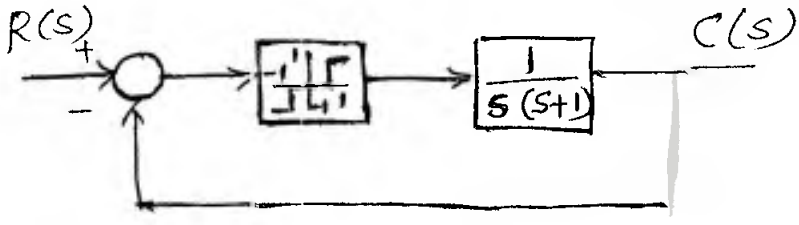
Program: Electrical Engineering | **Date: May 2019**
Duration: 3 hrs. | **Course code: PE-BTE602**
Maximum Marks: 100 | **Semester: VI**

Course Name: Control System Design

Note: Q1 is compulsory. Solve any four questions from the remaining six.

Q. No.	Questions	Max Marks	CO No	BL	PI
1 a	What major advantage does compensator design by frequency response have over root locus design?	04	01	03	1.3.1
b	Why is the correction factor added to the phase margin required to meet the transient response?	04	02	04	1.3.1
c	Why is there more improvement in steady state error if a PI controller is used instead of a lag network?	04	01	04	1.3.1
d	Briefly describe the configuration of an observer.	04	03	02	1.3.1
e	Describe the physical meaning of controllability? How is the controllability determined mathematically?	04	03	02	1.3.1
2 a	A unity feedback system with a forward transfer function $G(s) = \frac{k}{s(s+7)}$ is operating with closed loop response that has 20% overshoot. a> Evaluate the settling time b> Evaluate the steady state error for unit ramp input. c> Design a lag lead compensator to decrease the settling time by two times and decrease the steady state error for a unit ramp input by 10 times. Place the lead zero at -3.	12	01	06	3.1.6
b	For a unity feedback system $G(s) = \frac{k}{s(s+5)(s+15)}$	08	01	06	3.1.6

	Design rate feedback compensator to reduce settling time by a factor of 4 if %overshoot is 20%.				
3 a	For a unity feedback system with $$G(s) = \frac{k}{(s+1)(s+4)}$$ Design a PID controller that will yield peak time of 1.047 sec and damping ratio of 0.8 with zero error for step input. Realize the same using active realization	12	01	06	3.1.6
b	Describe the relation between closed loop transient and closed loop frequency response. Also, briefly explain how to find static error constant from Bode magnitude plot.	08	02	02, 03	1.3.1
4 a	For a unity feedback system with a forward transfer function $$G(s) = \frac{k}{s(s+50)(s+120)}$$ Use frequency response method to find system gain k, to yield closed loop step response with 20% overshoot.	08	02	05	2.1.2
b	Design lag lead compensator for unity feedback system with forward path transfer function $$G(s) = \frac{k}{s(s+1)(s+4)}$$ to meet the following specifications: % overshoot 14%, peak time 2 sec and k_v=12. Use frequency response method.	12	02	06	3.1.6
5 a	Design the observer for the plant $$G(s) = \frac{10}{(s+2)(s+6)(s+12)}$$ operating with 10% overshoot and 2 sec peak time. Design the observer to respond 10 times faster than the plant. Place the observer's third pole 20 times farther from the imaginary axis than the observer dominant poles. Assume the plant is represented in observer canonical form.	10	03	06	3.1.6
b	Design an observer for the plant $$G(s) = \frac{1}{(s+1)(s+2)(s+5)}$$	10	03	06	3.1.6

	represented in cascade form. The closed loop performance of the observer is given by the characteristic polynomial as $s^3 + 120s^2 + 2500s + 50000.$				
6 a	Consider the following transfer function $$G(s) = \frac{(s+6)}{(s+3)(s+8)(s+10)}$$ If the system is represented in cascade form as shown below, design a controller to yield closed loop response of 10% overshoot with a settling time of 1 sec. Design the controller by first transforming the plant to phase variables. 	10	03	06	3.1.6
b	For the plant $$G(s) = \frac{100(s+10)}{s(s+3)(s+12)}$$ represented in phase variable form. Design phase variable feedback gains to yield 5% overshoot and peak time of 0.3 sec.	10	03	06	3.1.6
7 a	Explain various types of system non-linearity and their effect on system performance.	08	04	02	1.3.1
b	For the system having transfer function $\frac{i}{s(s+1)}$ and a relay with dead zone as non-linearity, draw the phase trajectory originating from the initial condition (3, 0). 	12	04	02, 03	1.3.1

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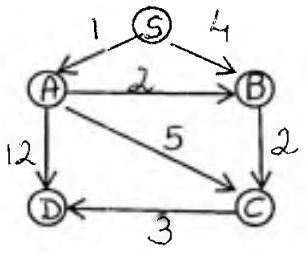
End Sem - May 2019 Examinations

Program: Electrical
Course Code: OE-BTE602
Course Name: Artificial Intelligence

Duration: 3 hours
Maximum Points: 100
Semester: VI

- Attempt **any 5** out of 7.
- Make suitable assumptions wherever necessary

Q.No.	Questions	Points	CO	BL	PI
1 a.	What is AI? How do we perceive intelligence and also categorize intelligence.	10	1	2	1.4.1
1 b.	Discuss the various characteristics/dimensions of environment.	10	1	2	1.4.1
2 a.	Implement the Best First Search and A* algorithm for the following graph to find the least cost path given the initial position is node S. The Heuristic values and path cost are as given. Node / Heuristic values: S 7; A 6; B 2; C 1; D 0  Compare and comment on the results obtained by both the methods.	15	3	3,5	4.1.2

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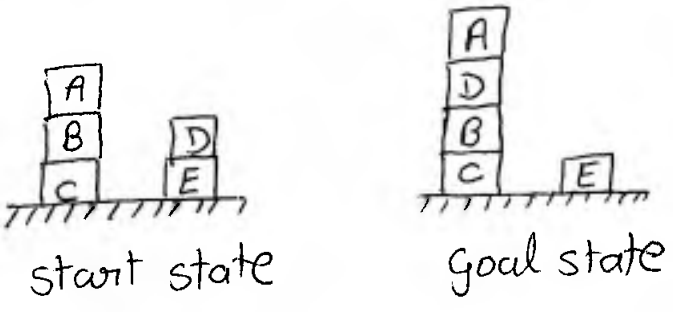
End Sem - May 2019 Examinations

2 b.	What is Knowledge Engineering? What is the role of a Knowledge Engineer?	05	1	2	1.4.1
3.	The start state and goal state are given below.  Implement hill climbing algorithm to reach the goal state using two different heuristic functions given below and hence explain the concept of local maxima. h1 = +1 if block is on correct block/table. = -1 if block is not on correct block/table. h2 = +1 for every block in a correct structure that the block is sitting on. = -1 for every block not in correct structure that the block is sitting on. Move possible is : Move(X,S,D) X-- Block S -- Top of stack/table T -- Top of stack/table	20	2	3	4.1.2
4 a.	Discuss NLP as an application of Artificial Intelligence	10	1	2	1.4.1
4 b.	Explain DLS algorithm. What are its limitations? Explain the new algorithm to overcome the limitations.	10	2	2	1.4.1
5 a.	Discuss the Wumpus World along with its PEAS description.	10	1	3	2.4.4
5 b.	Discuss the Expert System Architecture.	10	1	2	1.4.1

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6.	Built Decision Tree for the above data using ID3 algorithm.	20	3	6	4.2.2
7 a.	Represent the following sentences in FOL 1. Country Nano is an enemy of America 2. All the kings who are Greedy are Evil.	04	4	3	2.2.1
7 b.	Using resolution Refutation principal show that CVD is a logical consequence of S={AV B, ~AVD, CV~B}	06	2	4	2.4.2
7 c.	How is uncertainty in Data handled in AI? Discuss Belief Network in brief.	10	4	2	1.4.1

Outlook	Temperature	Humidity	Wind	Play Ball
Sunny	Hot	High	Weak	No
Sunny	Hot	High	Strong	No
Overcast	Hot	High	Weak	Yes
Rain	Mild	High	Weak	Yes
Rain	Cool	Normal	Weak	Yes
Rain	Cool	Normal	Strong	No
Overcast	Cool	Normal	Strong	Yes
Sunny	Mild	High	Weak	No
Sunny	Cool	Normal	Weak	Yes
Rain	Mild	Normal	Weak	Yes
Sunny	Mild	Normal	Strong	Yes
Overcast	Mild	High	Strong	Yes
Overcast	Hot	Normal	Weak	Yes
Rain	Mild	High	Strong	No

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END SEMESTER MAY 2019 EXAMINATION

Program: T.Y. B.Tech (Electrical) | **Duration: 03 Hour**

Course Code: MC-BT003 | **Maximum Points: 100**

Course Name: Environmental Science | **Semester: VI**

Notes: Attempt any FIVE questions out of SEVEN.

Q.No.	Questions	Points	CO	BL	PI
Q 1. (a)	What is environmental engineering? Hence explain the major responsibilities of an electrical engineer to improve, maintain and safeguard the environment.	02+08	01	L-1	1.2.1
Q 1. (b)	What is solid waste? Explain different types of solid waste. Hence describe different methods of solid waste management.	01+04+05	01	L-1	1.2.1
Q 2.	Explain the different constitutional provisions made for safeguarding the environment. (Discuss any four environmental protection act)	04x05=20	02	L-2	1.2.1
Q 3. (a)	What is Ecosystem? Explain the principal steps in the operation of Ecosystem. What is pyramid of biomass and explain it with suitable diagram.	01+04 02+03	01	L-1	1.2.1
Q 3. (b)	Define biotic component of ecosystem. Hence describe these components with suitable example. What are different classes or categories of consumers as biotic component of ecosystem?	01+03 06	01	L-1	1.2.1
Q 4. (a)	Discuss the environmental impact and economic impact of solar energy? What are the different types of wind energy?	03+03 04	01	L-2	1.2.1
Q 4. (b)	What is biomass energy and geothermal energy? Hence explain the environmental and economic impact of geothermal energy.	02+02 03+03	01	L-1	1.2.1
Q 5. (a)	State different types of mechanical and fire hazards. Hence explain the methods of safeguarding against these hazards.	04 06	01	L-2	1.2.1

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END SEMESTER MAY 2019 EXAMINATION

Q 5. (b)	What is hazard analysis and it's prevention? What is safety management? Hence explain the role of ISO 14000 (Environmental Management) to ensure environment safety.	02+02 02+04	01	L-1	1.2.1
Q 6. (a)	Explain GRIHA (Green Rating For Integrated Habitat Assessment) assessment criteria in detail to obtain it's certification.	10	03	L-2	1.2.1
Q 6. (b)	Describe the procedure of GRIHA certification. Explain one case study of GRIHA registered building in India.	05 05	03	L-2	1.2.1
Q 7. (a)	Write short notes on: (1) Convention on biological diversity (2) Convention to combat desertification (3) Convention on climate change.	05+05+04	03	L-1	1.2.1
Q 7. (b)	What is Ramsar convention? Why Ramsar treaty is important for conservation of wetlands?	06	03	L-1	1.2.1

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End Semester

Program: Electrical Engineering
Duration: 3 hrs.
Maximum Marks: 100

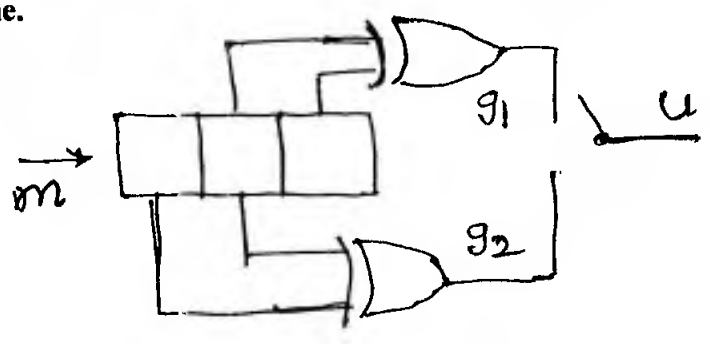
Date: May 2019
Course code: OE-BTE603
Semester: VI

Course Name: Communication Engineering

Note: Note: Q1 is compulsory. Solve any four questions from the remaining six.

Q. No.	Questions	Max Marks	CO No	BL	PI
1 a	Compare analog and digital communication systems.	05	01	02	1.2.1
b	What are the advantages of ISB (independent side band) modulation system? How is it implemented?	05	01	02	1.2.1
c	Using the generator polynomial $g(x) = 1 + X + X^3 + X^5 + X^8 + X^{10}$ for the (15,5) cyclic code, encode message sequence for message bits 10101 in systematic form.	05	02	03	1.3.1
d	Prove that for noisy channel, channel capacity $C = B\,log_2\left(1 + \frac{S}{N}\right)\ bits/sec$ *where B channel band width,* $\frac{S}{N}$ *is signal to noise rat*	05	02	03	1.3.1
2 a	What are the advantages of SSB transmission over DSBFC AM transmission? Explain any one method of SSB generation. An AM transmitter radiates 10KHz of carrier with 50 KW of power. The carrier is modulated by 300Hz, 500Hz and 1000Hz signals simultaneously. What will be the radiated power if each signal has 70% modulation? Draw frequency spectrum of modulated signal and show power content of each spectral component.	10	01	02, 03	1.3.1
b	How FM is generated using PM? In FM modulator, using FET reactance modulator, the maximum frequency deviation of 75KHz is to be provided for 88MHz carrier frequency. The g_m vs V_g characteristics of FET shows a linear range in g_m values from 300μS to 800μS for a corresponding variation in V_g from -2V to -0.5V. Assuming Xc=10R calculate the values of L and C of oscillator circuit.	10	01	02, 03	1.3.1
3 a	With a neat block diagram explain working of pulse code	10	01	02,	1.3.1

	transmitter receiver. An audio signal is in the range of 300Hz to 3KHz. PCM is generated with sampling frequency 8KHz and minimum (S_i/N_q) = 40dB.Calculate minimum number of quantization levels and signaling rate			03	
b	How does BPSK receiver works? Compare BPSK and DPSK. Explain DPSK modulator demodulator	10	01	02	1.2.1
4 a	Explain delta modulator demodulator. How does the performance of delta modulation depend on step size? The signal $x(t) = A\cos w_m t$ is quantized with step size δ, obtain the condition on amplitude of a signal when slope overload distortion will occur.	10	01	02, 04	1.3.1
b	Discuss and compare different based band modulation methods.	10	01	02	1.2.1
5 a	An analog signal having 3KHz bandwidth is sampled at 1.5 times the Nyquist rate and each sample is quantized into one of the 256 equally likely levels. 1. What is the information rate? 2. Can the output of the source transmitted without an error over AWGN channel with bandwidth 10KHz and SNR 20 dB? 3. If the transmission with the conditions in part (2) is erroneous calculate SNR for error free transmission.	06	02	03	1.3.1
b	Two messages m1 and m2 with probabilities 0.7 and 0.3 respectively are encoded with Huffman code. Calculate code efficiency if one message is transmitted at a time and two messages are transmitted at a time.	06	02	03	1.2.1
c	What is entropy? Prove the condition for entropy to be maximum. Why the average length of code word is not less than entropy?	08	02	03	1.2.1
6 a	Consider the systematic block code whose parity check equations are $p_1 = m_1 + m_3 + m_4$ $p_2 = m_1 + m_2 + m_3$	08	02	03	1.3.1

	$p_3 = m_1 + m_2 + m_4$ $p_4 = m_2 + m_3 + m_4$ where p_i and m_i are check and message digits respectively. Find a. Generator and parity check matrices b. Is the vector 10101010 is valid code word? If not correct the code word.				
b	Design decoder using gates for (6,3) linear block code if parity check matrix is $H=\begin{bmatrix}1&1&0&1&0&0\\0&1&1&0&1&0\\1&0&1&0&0&1\end{bmatrix}$	08	02	03	1.3.1
c	For the following convolution encoder form state diagram and generate the code for message bits 1101 from the same. 	04	02	03	1.3.1
7 a	Compare 1. Frequency division spread spectrum and Data sequence spread spectrum 2. Guided and Unguided Media	10	03, 04	02	1.2.1
b	What is multiplexing? Discuss multiplexing methods used in communication engineering?	10	03, 04	02	1.2.1

Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

(Govt. Aided Autonomous Institute Affiliated to University of Mumbai)

Academic Year 2018 – 19 [Second Half]
End – Semester Examination – May 2019

Program: B. Tech. Electrical Engineering
Course: Open Elective I [Project Management]
Course Code: OE –BTE601

Semester: VI
Date: 27th May 2019
Total Points: 100

Note: Solve any **FIVE** questions of the following.

CO: Course Outcomes **BL:** Bloom's Taxonomy Level **PI:** Performance Indicator

Q. No.	Question	Points	CO	BL	PI
1.	**Answer any FOUR questions of the following. All questions carry equal points.** *a.* Explain Project, Program and Portfolio Management. *b.* Which are the different leadership and Management styles? *c.* Which are the different types of risks that may occur on a project? *d.* What is a WBS? Why is it called as The Foundation of the Project? *e.* Which are the important points to be considered on a project while preparing time and cost estimates?	**20**	**1**	**2**	**1.2.2**
2.	*a.* Discuss the place of projects as a vehicle for change-implementing the strategic plans of the organization?	**10**	**2**	**2**	**1.7.1**
	b. Discuss various factors in an organization influencing project management and project life cycle.	**10**	**2**	**2**	**1.7.1**
3.	*a.* Explain the detailed procedure for making changes on a project.	**10**	**1**	**2**	**1.2.2**
	b. What a Project Manager should do before Validate Scope Process and what will she have when she is done with this process? How is this process different from Close Project or Phase Process? How is this process related to the Control Quality Process?	**10**	**1**	**2**	**1.2.2**
4.	*a.* What are the reasons for conflicts on any project? Why a Project Manager should possess the skill of Conflict Management? How is the modern view of conflict management different from traditional view? Which are the different conflict resolution techniques a PM use?	**10**	**2**	**2**	**1.2.1**
	b. Which are the three important communication methods used on projects?	**05**	**2**	**1**	**1.2.2**
	c. Which are the different negotiation tactics?	**05**	**2**	**1**	**1.2.2**

5.	*a.*	M/s. Mittal Biocare Ltd. (MBL) is a multinational pharmaceutical company, operating in 7 countries across globe. M/s. MBL is looking for upgrading their existing payroll system, which is currently managing payroll and other HR functions for its 25,000 odd employees. This current payroll system is geographically focused, not flexible and integrated and needs substantial manual clerical time. Administering this system currently costs around US $ 2.4 million annually. For proposed payroll system company has allocated a budget of US $ 12,00,000 and wants to get the project functional by May 2020. For this project, Ms. Ashwini will be a Project Manager. Ms. Janhavi, Vice President, Human Resources (Global Operations) alongiwht Ms. Saiprabha, MD M/s. MBL, will be the sponsors. Ms. Ashwini is collecting the requirements for this project. Which different methods she can use to prepare a Requirements Management Plan for this project? Explain the method of 'Context Diagram' in detail with a proper diagram to collect requirements for this project.	**10**	**3**	**3**	**2.6.3**
	b	Which are the different types of contracts? Explain each type in detail.	**10**	**2**	**1**	**1.6.1**
6.	*a*	With over 100 locations in 20+ countries, Syncreon is the leading Third Party Logistics (3PL) and Supply Chain Solutions provider; delivering customized end-to-end, best-in-class logistics and supply chain solutions. Syncreon has got a new project to design, build and provide strategic value-added contract logistics from one of its client M/s. Volkswagen Group. Ms. Snehal is a Sponsor and Ms. Manasi is a Project Manager for this Project. Ms. Snehal has figured out following dependencies in this project.	**10**	**3**	**4**	**2.8.3**

Activity	Preceding Activity	Estimate in Months
Start		0
D	Start	4
A	Start	6
F	D, A	7
E	D	8
G	F, E	5
B	F	5
H	G	7
C	H	8
End	C, B	0

(i) Help Ms. Snehal to draw a Network Diagram and determine duration of the critical path.

(ii) Calculate float for activity B, E and D.

(iii) After some discussion with the Ms. Snehal, Ms. Manasi realizes that the project duration needs to be shortened by 3 months. To shorten the duration of the project, Ms. Snehal has offered to remove the work of Activity E from the project, making activity D the predecessor to activities G and F. Will this option help Manasi to shorten the length of the project?

(iv) Which Schedule Compression techniques Ms. Manasi can use to shorten the duration of the project? Which activities she can fast track to shorten the project length?

	b. Mr. Bibin is a Project Manager on 'Installation and Commissioning of 4000 MW sub-bituminous coal-fired Ultra Mega Power Project (UMPP)'. Around 5500 odd people are working on this project. The coal for this power plant is going to be imported primarily from Indonesia. This plant is going to use super-critical boiler technology. Compared to other sub-critical plants in India, this UMPP is going to use 1.7 million metric tons of less coal per year while generating the same quantum of power. These boilers are supplied by Doosan Heavy Industries, South Korea and turbines are supplied by Toshiba Corporation, Tokyo Japan. The WBS for his project is ready and his team is working on estimating activity resources. Which actions he should consider in the Estimate Activity Resources Process?	**10**	**3**	**3**	**2.6.2**
7.	*a.* Ms. Vaishali is managing a project to create an interactive and content rich website that supports students in their efforts to visualize their future by using the neuroscience concept of Time Traveler. The Time Traveler guides students in seeing and planning for the future. In the latest earned value report of her project, she finds that CPI for the project is 1.2, the SPI is 0.8, the PV is $600,000 and the SV is - $120000. She can't find CV in the report. Help her to calculate CV of the project.	**05**	**3**	**3**	**2.6.2**
	b. Manish is managing a project to develop a cloud based Business Intelligence Solutions for the Health Care industry. In the latest earned value report of his project, he finds that CV of his project is $10,000, SV is –$ 3000 and PV is $100,000. What are SPI and AC of his project?	**05**	**3**	**3**	**2.8.1**
	c. Write the advantages and disadvantages of Analogous Estimating and Bottom-up Estimating?	**05**	**2**	**3**	**1.6.1**
	d Explain the concept of Cost of Quality, briefly.	**05**	**1**	**2**	**1.2.1**

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Bharatiya Vidya Bhavan's

Sardar Patel College of Engineering

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Munshi Nagar, Andheri (West), Mumbai – 400058.

End Semester Exam

May 2019

Max. Marks: **100** Duration: **3hr**

Class: **Third Year** Semester: **VI** Program: **Electrical Engineering**

Name of the Course: **VLSI Circuits** Course Code : **OE-BTE604**

Instructions:

- Question **One** is Compulsory.
- Solve any four of remaining six questions.
- Illustrate your answers with neat sketches wherever necessary.
- Assume suitable data if required.
- Preferably, write the answers in sequential order.

Question No.		M M	C O	B L	PI
Q1.					
A)	What are the steps involved in patterning of silicon dioxide.	5	1	2	
B)	Explain in detail VTC of resistive load inverter, and define noise immunity and noise margins.	5	1	2	
C)	Sketch a stick diagram for a CMOS gate computing $Z = \overline{(A+B+C).D}$ and estimate the cell width and height.	5	1	3	
D)	What are three main components of average power consumption in conventional CMOS digital circuits? Define each component.	5	1	2	
Q2.					
A)	Consider a diffusion area that has the dimension 0.4μm X 0.2μm and the abrupt junction depth is 32nm. Its n-type impurity doping level is $N_D = 2x10^{20}\ cm^{-3}$ and the surrounding p-type substrate doping level is $N_A=2x10^{20}\ cm^{-3}$. Determine the equivalent capacitance when the diffusion area is biased at 1.2V and substrate is biased at 0V. in this problem, assume that there is no channel stop implant.	5	2	3	
B)	Compare the two technology scaling methods, namely, (i) the constant	5	2	2	

electric-field scaling and (ii) the constant power-supply voltage scaling. In particular, show analytically by using equations how the delay time, power dissipation, and power density are affected in terms of the scaling factor, S.

C)	Consider a CMOS inverter circuit with the following parameters: $V_{DD} = 1.2V$ $V_{T0,n} = 0.48$ V $V_{T0,p} = -0.46$ V $\mu_n C_{ox} = 102\ \mu A/V^2$ $(W/L)_n = 10$ $\mu_p C_{ox} = 51.6\ \mu A/V^2$ $(W/L)_p = 19$ Calculate the noise margins of the circuit.	**10**	**2**	**2**
Q.3				
A)	Sketch the transistor level schematic and layout for CMOS 2-input NAND gate.	**5**	**2**	**3**
B)	Write short note on JK latch circuit.	**5**	**3**	**2**
C)	What are the different approaches for low power design through voltage scaling? Discuss in brief VTCMOS.	**5**	**3**	**2**
D)	Draw and explain the operation of CMOS D latch using pass gate.	**5**	**3**	**3**
Q.4				
A)	Give the classification of semiconductor memories. Draw typical random access memory array organization.	**5**	**3**	**2**
B)	Design a 4-bit X 4-bit NOR based ROM array to store following data stream. Also write its column and rows combination. Data: 1100 1010 0110 1001 Draw layout for circuit designed.	**10**	**3**	**4**
C)	Discuss the operation of resistive-load SRAM Cell.	**5**	**3**	**2**
Q.5				
A)	Discuss the operation of three transistors DRAM Cell.	**10**	**3**	**2**
B)	Give the CMOS inverter voltage transfer characteristics and operating regions.	**5**	**3**	**2**
C)	Design a resistive-load inverter with $R = 2$ kΩ, such that $V_{OL} = 0.05$ V. The nMOS driver transistor has the following parameters: $V_{DD} = 1.1V$ $V_{T0} = 0.52$ V	**5**	**3**	**3**

$\gamma = 0\ V^{1/2}$

$\lambda = 0$

$\mu_n C_{ox} = 22.0\ \mu A/V^2$

(a) Determine the required aspect ratio, W/L.

(b) Determine V_{IL} and V_{IH}.

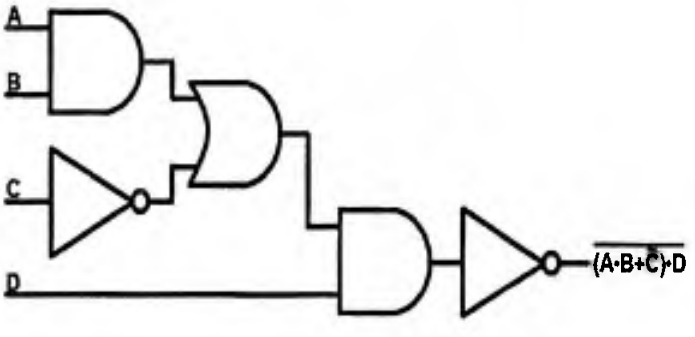
(c) Determine noise margins N_{ML} and N_{MH}.

Q.6

A)	What is clock skew? What are the sources of clock skew? How it can be overcome?	**5**	**4**	**2**
B)	What is the use of local clock gaters? Discuss various types of clock gaters.	**5**	**4**	**2**
C)	Explain in detail global clock generator of clock system.	**5**	**4**	**2**
D)	Comment on the advantages and disadvantages of H-trees and clock grids. How does the hybrid tree/grid improve on a standard grid?	**5**	**4**	**2**

Q.7

A)	Define: i) Pseudo-nMOS gate, ii) transmission gate. Implement two input multiplexer using CMOS transmission gate.	**5**	**4**	**2**
B)	Define: A) VDD & GND pads. B) Input and Output Pads. C) Bidirectional pads. D) Analog pads. Draw bidirectional pad circuitry.	**5**	**4**	**2**
C)	What do you understand by ESD? How this will change the device/circuit performance.	**5**	**4**	**2**
D)	Realize the gate level circuit for given logic circuit using Pseudo nMOS gate.	**5**	**4**	**3**



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Even Sem Re-Examination

{OLD Course}

Program: Electrical Engineering | **Date: July2019**
Duration: 3 hrs. | **Course code: BTE327**
Maximum Marks: 100 | **Semester: VI**

Course Name: Control System II

Note: Solve any Five questions

Q. No.	Questions	Max Points
1 a.	Explain how Position, Velocity and Acceleration error constants are derived from Bode plot.	10
b.	The second order system has transfer function Find peak time, settling time and maximum percentage overshoot. Draw the step response of the same.	10
2 a.	Briefly state the Nyquist criterion and define gain margin and phase margin and explain how gain and phase margins are determined using Nyquist plot	10
b.	Using Nyquist criterion find the range of K for stability of the system shown below. 	10
3 a.	Make a detailed comparative analysis of the various stability methods of control system	10
b.	Draw a typical Bode plot, define gain and phase margin and indicate gain and phase margin on Bode plot for the system with and	10
4 a.	Obtain the state space model for the following transfer function.	10

b.	Given the system by the following equations. Find the transfer function where, is the input and is the output	10
5 a.	Define controllability and observability of a system. Comment on controllability and observability of a system represented by	10
b.	For the state equation and initial state vector find the state transition matrix and solve for . is the step input.	10
6. a	List and prove the various properties of state transition matrix	10
b.	What is the use of compensators? Explain lead and lag compensators	10
7 a.	Briefly describe the design procedure for a controller	10
b.	Briefly describe the design technique for an observer	10

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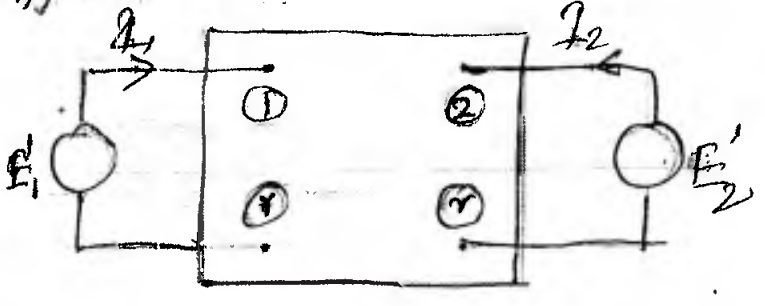
Re-Examination – July 2019 Examinations

Program: T.Y. B.Tech.(Electrical) | **Duration: Three Hour**

Course Code: PC-BTE601 | **Maximum Points: 100**

Course Name: Power System II | **Semester: VI**

Notes:
1. Question No. 1 is compulsory.
2. Solve any four questions from remaining six.
3. Draw neat diagrams.
4. Assume suitable data if necessary.

Q. No.	Questions	Points
1.	a. For the two bus system as shown below, derive the Swing equation along appropriate power angle curve $\frac{H}{\pi f}\frac{d^2\delta}{dt^2} = P_m - P_{max}\sin\delta_{pu}$  	08
	a. Describe the Brushless AC excitation system for Automatic Voltage Regulation at generator terminal.	08
	b. Explain the method of voltage control using shunt capacitor.	04
2.	a. With proper descriptions of variables used derive of Static Load Flow Equations (SLFE) explaining the meaning of SLFE. Also classify the buses for load flow studies.	10
	b. Describe the travelling waves on transmission lines with open end .	10

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Re-Examination – July 2019 Examinations

3.	a. Write *Algorithm* **OR** *Flow Chart* for Solution of Static Load Flow Equation using Newton Rapson Method. (Proper steps need to be executed indicating final solution of equation is expected.) b. A unit-step voltage surge is travelling on a long line of surge impedance Z_1 It reaches the junction with a cable of finite length whose far end is open. The cable has a surge impedance of Z_2 and the time of one-way wave travel on it is T. Draw the Bewley lattice diagram and find from it the value of voltage at the junction at time 4T after the surge reaches the line cable junction. **Given** $Z_1 / Z_2 = 9$.	10 10
4.	Develop the mathematical model of load frequency control system by systematically developing the models of Generator, Load, Prime Mover and Governor.	20
5.	a. Develop the Automatic Generation Control model for two area systems showing only primary Load Frequency Control. b. In network model $I_{BUS}=Y_{BUS}V_{BUS}$, describe the meaning of following parameters. I_i, Y_{ij} and V_j Write down the dimensions of Y_{BUS} and I_{BUS}.	15 05
6.	a. Explain architecture of Wide Area Measurement systems with a neat diagram. Discuss function of each device of WAMS. Compare WAMS with SCADA on the basis of speed and accuracy. . b. Define Steady State, Dynamic and Transient Stability. Derive Swing Equation. Derive equivalent swing equation for **4** number of machines swinging coherently.	10 10
7.	a. Describe merits and demerits of Restructuring power system.. b. Discuss the benefits of Demand Side Management for utility and consumers.	10 10

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REEXAMINATION JULY 2019

Program: Electrical Engg

Duration: 3 hrs.

Maximum Marks: 100

Date: JULY 2019

Course code: PC BTE-602

Semester: VI

Name of the Course: SWITCH GEAR AND PROTECTION

- **Instructions:**
- Attempt any FIVE questions
- Answers to all sub questions should be grouped together
- **Brief answers expected**

Sn	Questions	Points	CO	BL	PI
Q1) a)	What are the various types of IDMT overcurrent relays? Discuss their area of application.	10	1	2	1.3.1
b)	Write note on MHO relay using following points electro mechanical type MHO relay diagram and working, torque equation, characteristic on R-X plane	10	2	3	1.3.1
Q2	Explain protection provided for generator in case of a) Failure of prime mover b) Motoring operation of generator	20	3	2	1.3.1
Q3)	A three phase, 11KV/33KV, Y-Δ connected power transformer is protected by differential protection. The C.T.s on the LV side have a current ratio of 400/5. What must be the ratio of CTs on HV side? With the help of neat drawing show CTs on both sides.	20	4	4	1.3.1
Q4)	Write note on any two a. Numerical relay b. Buchholz relay c. BIL	20	3	2	1.3.1

<table>
<tr><td>Q5) A)</td><td>Using following key points write short note on air circuit breaker

(i)Ratings: (ii) Arc quenching :(iii)utilization categories 3(iv)applications: (v)advantages:</td><td>10</td><td>2</td><td>1</td><td>1.3.1</td></tr>
<tr><td>b)</td><td>The current rating of an overcurrent relay is 5A .Plug setting is 50%, TMS=0.3 is connected to secondary of C.T. of ratio 400/5. Fault current is 4000A.Determine operating time of relay. At TMS =1 operating time of the relay at various PSM are as follows
<table>
<tr><td>PSM</td><td>2</td><td>4</td><td>5</td><td>8</td><td>10</td><td>20</td></tr>
<tr><td>Operating time in seconds</td><td>10</td><td>5</td><td>4</td><td>3</td><td>2.8</td><td>2.4</td></tr>
</table></td><td>10</td><td>3</td><td>2</td><td>1.3.1</td></tr>
<tr><td>Q6) a)</td><td>With the help of voltage and current waveforms during contacts opening of C.B., derive restriking voltage and RRRV.</td><td>12</td><td>2</td><td>2</td><td>1.3.1</td></tr>
<tr><td>b)</td><td>With the help of connection diagram explain carrier acceleration scheme for distance protection of line.</td><td>8</td><td>2</td><td>2</td><td>1.3.1</td></tr>
<tr><td>Q7) a)</td><td>What are different zones of protection? What is meant by primary and back up protection? Explain various types of back up protections</td><td>10</td><td>3</td><td>2</td><td>1.3.1</td></tr>
<tr><td>b)</td><td>Explain stepped time-distance characteristics of three distance relaying units used for I, II and III zone of protection.</td><td>10</td><td>4</td><td>2</td><td>1.3.1</td></tr>
</table>

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SARDAR PATEL COLLEGE OF ENGINEERING
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RE-EXAM – July 2019 Examinations

Program: Electrical Engineering. **Duration: 03 Hr.**

Course Code:PE-BTE601 **Maximum Points:100**

Course Name:ELECTRICAL MACHINE DESIGN **Semester: VI**

Notes: Answer any five questions (Qs.1 to Qs.7)
Draw neat circuit diagrams wherever necessary to support your answer.
Assume suitable data if necessary.

Qs.No.	Questions	Points	CO	BL	PI
Qs.1	a. What are the factors to be considered in electrical machine design.	05	01	02	3.1.6
	b. State the desirable properties of the materials selected for the following purpose and also state its effect on overall size of the machine (with reference to transformer) :- i) Insulation. ii) Core.	10	02	03	3.1.6
	c. How does the choice of values for specific magnetic loading & specific electric loading affect the performance of induction motor.	05	02	03	3.1.6
Qs.1I	a. A 350 kVA, 3.2kV/400V, 50Hz, Single phase core type, oil immersed, self-cooled, power transformer is having the following data:- Volt / turn = 15.0; Flux density in the core = 1.25 T; Current density = 2.75 A/mm2; Window space factor = 0.30; type of core: three stepped; core material CRGO; height of the window = 3 times window width. Determine:- (i) Overall Height, Width & Depth of the core (ii) HV & LV winding number of turns (iii) Cross-sectional area of the hv and lv winding conductors used. (iv) Drawthe view of core showing the dimensions obtained. For 3-stepped core largest stamping size = 0.9d; Net iron area $A_i = 0.6d^2$. where d = diameter of the circumscribing circle.	15	03	03	3.2.1
	b. Calculate the no-load current of a 220/110V, 1kVA, 50Hz, Single phase transformer with the	05	03	03	3.2.1

	following data uniform cross-sectional area of the core = 25 cm2 , effective magnetic core length = 0.4m, core weight = 8 kg, maximum flux density = 1.2 T, magnetizing force = 200 AT/m, specific core loss = 1.0 W/kg				
Qs.1II	a. A 250 kVA, 6600 / 400 V, 3-phase, Δ/Y, core type oil immersed natural cooled transformer has the following particulars: i) winding temperature rise not to exceed 50°C. (ii) Total losses = 5.0 kW. (iii) Tank dimensions: height × length × width = 125×100×50 (all in cm.) (iv) Oil level = 115 cm height. The specific heat dissipation due to radiation and convection is respectively 6 & 6.5 watts/m² - °C. Assume that convection is improved by 35% due to provision of tubes. Sketch diagram to show the arrangement. Design an adequate cooling arrangement for this transformer.	10	03	04	3.2.2
	b. Select dimensions from the following range for a 2.2 kW, 400 Volts, 3-phase, 4-pole, 50Hz induction motor. The mean gap density is not to exceed 0.44 wb/m² and specific electric loading is not to exceed 21000 ac/m. calculate also the turns per phase for the stator winding. The product of efficiency and power factor may be taken as 0.66 and the motor must be suitable for star-delta starting.	10	03	05	3.2.3
Qs.1V	a. Determine the main dimensions, number of stator slots and the number of turns per phase	15	03	03	3.2.1

Stator bore m	0.08	0.10	0.16
Core length m	0.10 0.12	0.125 0.10	0.15 0.14

	c. Differentiate the structures of Permanent Magnet Synchronous Motors (PMSM) & Brushless DC motors (BLDC).	10	01	02	3.1.6
Qs.VII	Answer any two questions from the following:				
	a. Estimate the value of magnetizing current per phase for a 15 kW, 400 V, 3-phase, 50Hz, 6 pole induction motor has aa diameter of 0.3m and the length of core 0.12m. The number of stator slots is 72 with 20 conductors per slot and a coil span of 11 slots. The stator is delta connected. The length of airgap is 0.55mm. The gap contraction factor is 1.2. assume the mmf required for the iron parts to be 35% of the airgap mmf.	10	03	04	3.2.1
	b. What are the benefits of Fractional slot winding used in AC machines? Obtain the slot star diagram and slot distribution table for a 36 slot, 10 pole 3-phase winding.	10	03	03	3.2.2
	c. What are the various methods used in Computer Aided Design of Electrical machines & Draw the flow chart for any one method mentioned.	10	04	03	3.3,1

Qs.1V	for a 3.7kW, 400V, 3-phase, 4pole, 50 Hz squirrel cage induction motor with star delta starter is to be designed for minimum cost. The motor has to work with an efficiency & power factor of 0.85 & 0.84 respectively at full load. The specific magnetic loading = 0.45 wb/m² and specific electric loading =23000. b. Answer any one from the following: (i) Steps involved in designing a squirrel cage induction motor rotor bar conductor and end ring size. (ii) FEM applied in the analysis in electromagnetic devices.	05	03 04	03 03	3.2.1 3.2.1
Qs.V	An alternator is rated 15MVA, 11kV, 50Hz,, 2pole, star connected cylindrical rotor alternator, with the armature winding having 60° phase spread. The distribution of winding should be such that 5th harmonic is eliminated. Assume Bav = 0.55 wb/m² and ac = 36000 A/m. current density = 5A/mm²; peripheral speed = 160 m/sec. Determine the main dimensions, size & number of conductors and number of slots for the machine.	20	03	03	3.2.1
Qs.VI	Explain any two questions from the following: a. Significance of Short Circuit Ratio (SCR) on synchronous machine performance b. Obtain the winding arrangement for 3-phase 2 pole ac machine designed to have double layer winding that is accommodated in 18 slots. Coil span = 8 slots. Also draw the cross sectional view of winding arrangement.	10 10	02 03	03 04	3.1.6 3.2.1

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

EVEN SEM RE-EXAMINATION

(OLD COURSE)

Program: Electrical Engineering **Date July 2019**

Duration: 3 Hrs **Course Code: BTE328**

Maximum Points:100 **Semester: VI**

Course Name: Communication Engineering

Note: Solve Any Five Questions

Q.No.	Questions	Points
1a	List and compare different AM Modulators	10
b	With a neat block diagram explain how the FM is generated using PM	10
2 a	Explain delta modulator demodulator. How is the adaptive delta modulator better than delta modulator?	10
b	With a neat block diagram explain PWM modulator demodulator	10
3 a	With a neat block diagram explain 16 ary QPSK transmitter receiver	10
b	Compare BPSK and DPSK modulation techniques. For input bit pattern b(t)=1101011001 draw output of BPSK, DPSK, ASK and FSK modulators. Assume carrier frequency twice the bit frequency	10
4 a	Define entropy. Derive the condition for maximum entropy. Six messages with probabilities 0.25, 0.4, 0.15, 0.05, 0.1, 0.05 are transmitted using binary Huffman code. Find code efficiency of the system	10
b	Explain Shannon's theorem. An analog signal with bandwidth 4KHz is sampled at the Nyquist rate and each sample is quantized into one of 256 equally likely levels. Can the output of this source be transmitted without an error over AWGN channel with bandwidth 10KHz and SNR 20 dB?	10

5	**Compare** **a. A piconet and a scatternet** **b. Standard Ethernet and Fast Ethernet** **c. Message authentication and Digital signature** **d. Transport IP security and Tunnel IP security**	**20**
6 a	**How do guided media differ from unguided media?** **List the advantages of optical fiber over twisted pair and coaxial cable.** **How does sky propagation differ from line of sight propagation?**	**12**
b	**With neat diagram explain different types of SONET network**	**08**
7 a	**What is the purpose of Smart Grid?** **List features and challenges involved in Smart Grid system design.** **Explain various sensing devices used in Smart Grid.**	**10**
b	**What is man in the middle attack? How it can be prevented?**	**10**

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Sardar Patel College of Engineering

(A Government Aided Autonomous Institute)
Munshi Nagar, Andheri (West), Mumbai – 400058

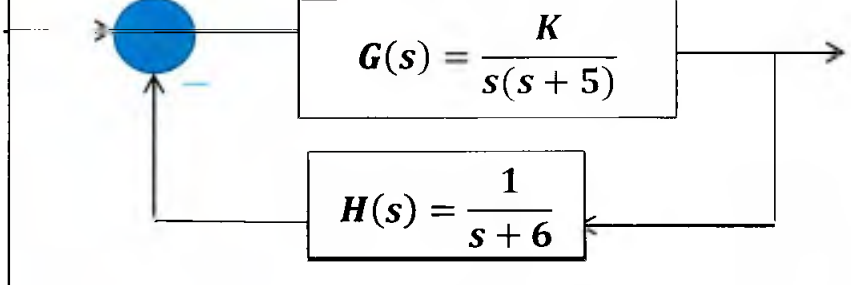
Even Sem Re-Examination

{OLD Course}

Program: Electrical Engineering | **Date: July2019**
Duration: 3 hrs. | **Course code: BTE327**
Maximum Marks: 100 | **Semester: VI**

Course Name: Control System II

Note: Solve any Five questions

Q. No.	Questions	Max Points
1 a.	Explain how Position, Velocity and Acceleration error constants are derived from Bode plot.	10
b.	The second order system has transfer function $$\frac{Y(s)}{u(s)} = \frac{9}{s^2 + 6s + 9}$$ Find peak time, settling time and maximum percentage overshoot. Draw the step response of the same.	10
2 a.	Briefly state the Nyquist criterion and define gain margin and phase margin and explain how gain and phase margins are determined using Nyquist plot	10
b.	Using Nyquist criterion find the range of K for stability of the system shown below. 	10
3 a.	Make a detailed comparative analysis of the various stability methods of control system	10
b.	Draw a typical Bode plot, define gain and phase margin and indicate gain and phase margin on Bode plot for the system with	10

	$G(s) = \frac{50}{(s+15)}$ and $H(s) = 1$	
4 a.	**Obtain the state space model for the following transfer function.** $$\frac{Y(s)}{U(s)} = \frac{1}{s^2 + 3s + 7}$$	10
b.	**Given the system by the following equations. Find the transfer function $T(s) = Y(s)/U(s)$ where, $U(s)$ is the input and $Y(s)$ is the output** $$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -1 & -2 & -4 \end{bmatrix} x + \begin{bmatrix} 10 \\ 0 \\ 0 \end{bmatrix} u$$ $$y = [1 \quad 0 \quad 0]x$$	10
5 a.	**Define controllability and observability of a system. Comment on controllability and observability of a system represented by** $$\dot{x} = \begin{bmatrix} 0 & 1 & 0 \\ 0 & 0 & 1 \\ -5 & -10 & -3 \end{bmatrix} x + \begin{bmatrix} 0 \\ 0 \\ 12 \end{bmatrix} u$$ $y = [1 \quad 0 \quad 0]x$	10
b.	**For the state equation and initial state vector find the state transition matrix and solve for x_1, x_2. $u(t)$ is the step input.** $$\begin{bmatrix} \dot{x}_1 \\ \dot{x}_2 \end{bmatrix} = \begin{bmatrix} 0 & 1 \\ -2 & -3 \end{bmatrix} \begin{bmatrix} x_1 \\ x_2 \end{bmatrix} + \begin{bmatrix} 0 \\ 1 \end{bmatrix} u(t)$$ $$x(0) = [1 \quad 0]^T$$	10
6. a	**List and prove the various properties of state transition matrix**	10
b.	**What is the use of compensators? Explain lead and lag compensators**	10
7 a.	**Briefly describe the design procedure for a controller**	10
b.	**Briefly describe the design technique for an observer**	10

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EVEN SEM RE-EXAMINATION

Program: Electrical Engineering **Date July 2019**

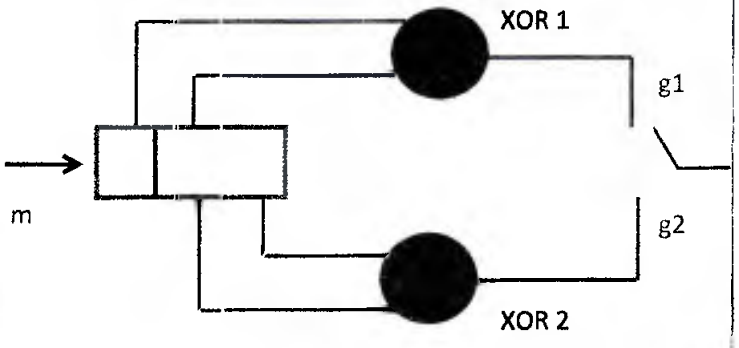
Duration: 3 Hrs **Course Code: OE-BTE603**

Maximum Points:100 **Semester: VI**

Course Name: Communication Engineering

Note: Solve Any Five Questions

Q.No.	Questions	Max. Points	CO No	BL	PI
1a	With a neat block diagram explain digital modulation system	10	01	02	1.2.1
b	Compare different amplitude modulation systems	10	01	02	1.2.1
2 a	Explain FM modulator demodulator	10	01	02	1.3.1
b	Compare TRF and Super heterodyne receivers. Explain any two characteristics of good receivers.	10	01	02	1.3.1
3 a	How can the performance of Pulse Code Modulation system be improved? In PCM system, if each sample at the receiving end be known to ±4% of peak to peak full scale value, how many binary digits must each sample contain?	10	01	02.03	1.3.1
b	How do BPSK transmitter and receivers work? Compare BPSK and DPSK systems.	10	01	02	1.2.1
4 a	Explain delta modulator demodulator. How does the performance of delta modulation depend on step size? Explain the method to avoid drawbacks of delta modulation.	10	01	02	1.3.1
b	Discuss and compare different base band modulation methods.	10	01	02	1.2.1
5 a	Define entropy. Derive the condition for maximum entropy. Six messages with probabilities 0.25, 0.4, 0.15, 0.05, 0.1, 0.05 are transmitted using binary Huffman code. Find code efficiency of the system.	10	01	02	1.2.1
b	Explain Shannon's theorem.	10	02	03	1.3.

	An analog signal with bandwidth 4KHz is sampled at the Nyquist rate and each sample is quantized into one of 256 equally likely levels. Can the output of this source be transmitted without an error over AWGN channel with bandwidth 10KHz and SNR 20 dB?				**1**
6 a	**How is the linear block code used for error correction and detection?**	**10**	**02**	**03**	**1.3. 1**
b	**For the following convolution encoder, form state diagram and generate the code for message bits m=1001.** 	**10**	**02**	**03**	**1.3. 1**
7	**Compare** **a. Frequency division spread spectrum and data sequence spread spectrum.** **b. Guided and unguided media.** **c. FDMA and TDMA.** **d. FM and PM**	**20**	**03, 04**	02	**1.2. 1**