13/5/19

Bharatiya Vidya Bhavan's

SARDAR PATEL COLLEGE OF ENGINEERING

(Government Aided Autonomous Institute)

Munshi Nagar, Andheri (W) Mumbai – 400058

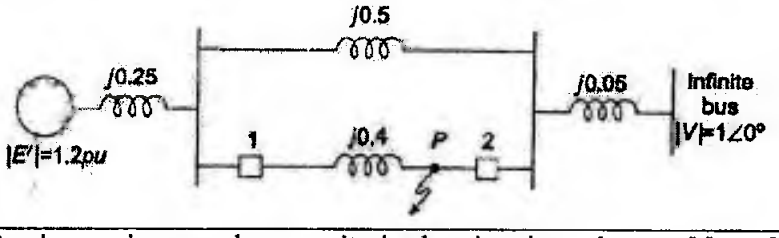
End Semester Examination - May 2019

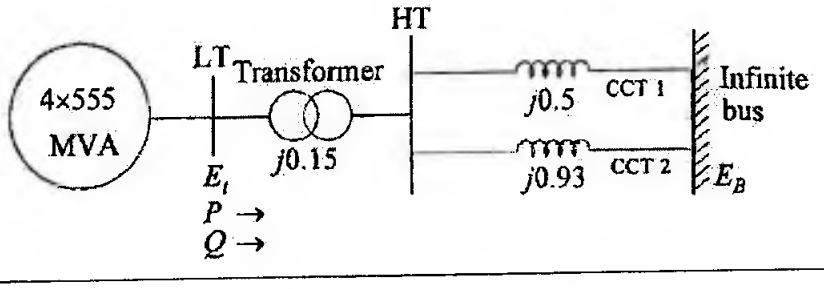
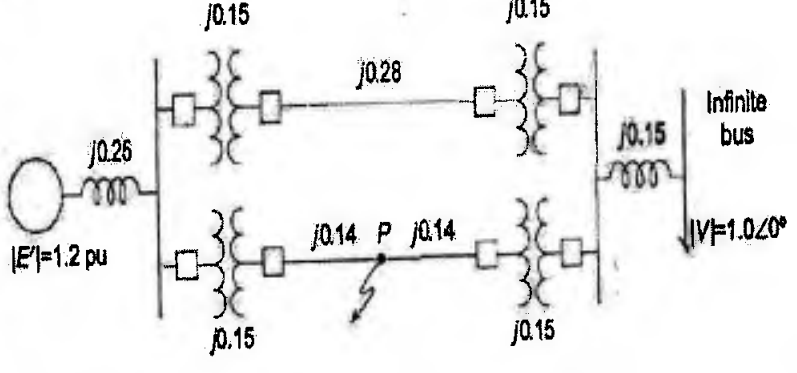
Program: M. Tech Electrical Engineering **Duration: 3 Hr**

Course Code: PC-MTPX201 **Maximum Points: 100**

Course Name: Power System Dynamics and Control **Semester: II**

Instruction: (i). Assume suitable data if required.
(ii). Question No. 1 is compulsory and attempt any four from rest

Q.No.	Questions	Points	CO	BL	PI
1(a)	Find the eigen values , eigen vectors and participation factor for following nonlinear equations. $\frac{dX}{dt}=3X+2Y+4Z$, $\frac{dX}{dt}=2X+2Z$ and $\frac{dX}{dt}=4X+2Z+3Z$	10	3.1	L2	3.1.2
1(b)	For the system shown in figure when a three phase fault is applied at point P. Find the critical clearing angel for clearing the fault with simultaneously opening of breaker 1 and 2. The reactance values of various components are given in diagram. The generator is delivering 1.0 pu power at the instant preceding the fault. 	10	3.2	L2	3.2.1
2(a)	Analyze using equal area criteria the situation when **sudden short circuit** takes place on one end of parallel lines for following cases: (a) When short circuit takes place at one end of line. (b) When short circuit takes place away from line ends. (c) When reclosure action takes place successfully.	15	4.1	L4	4.1.1
2(b)	What will be the behavior of different trajectories around a singular point for different eigen values combinations?	5	1.4	L6	1.4.1
3(a)	Discuss the $\frac{d(\Delta Q)}{dV}$ voltage stability criteria with the help of necessary equations and curves.	10	1.3	L4	1.3.1
3(b)	How the stability for non-linear and liner system can be defined. Elaborate and classify the stability of non-liner system based on region of state space.	10	2.1	L5	2.1.3
4(a)	The figure represents the system of thermal generating station consisting of four 555MVA, 24KV, 60 Hz Units. The network reactances shown in figure are given in pu on 2220MVA , 24KV	10	1.4	L6	1.4.1

	base(referred to thr LV side of step up transformer). Resistances are assumed to be constant.Analyse the small signal stability of the system about the steady state operating conditions following the loss of circuit 2. The post fault system condition in pu on 2220MVA, 24KV base is as follows: $P = 0.9$, $Q = 0.3$(overexcited), $E_t = 1\angle 36^\circ$ and $E_B = 0.995\angle 0^\circ$ The generators are to be modelled as a single equivalent generator represented by the classical model with the following parameters expressed in pu on 2220MVA , 24 KV base: $X_d' = 0.3$ H= 3.5 MW.s/MVA Write the linearized state equations of the system. Determine the eigen values, damped frequency of oscillations in Hz, damping ratio and undamped natural frequency when K_D = 10 (in pu torque/pu speed). 				
4(b)	How the steam turbine can be modelled mathematically?	10	2.2	L2	2.2.1
5(a)	Derive the equation of Pn nose curves, the family of Pn/Qn curves and corresponding equation of inverted parabola in Pn-Qn. Explain all the eqations.	10	1.3	L2	1.3.1
5(b)	Develop with the suitable equations and block diagram generator classical model for SMIB.	10	2.1	L5	2.1.3
6(a)	Find the critical clearing angle for the system shown in figure for a three phase fault at point P. The generator is delivering 1pu power under prefault conditions. 	10	1.4	L6	1.4

6(b)	Discuss critical load demand and voltage collapse condiation with the help of necessary equations.	10	1.3	L3,L4	1.3.1
7	Elaborate in detail with suitable equations and block diagram how the modelling of hydro turbine can be done.	20	1.4	L6	1.4.1

Notes: All the best.

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End Sem - May 2019 Examinations

15/5/19

Program: M. Tech PEPS

Course Code: PC-MTPX 202

Course Name: Advanced Control of Electrical Drives

Duration: 3 Hr

Maximum Points: 100

Semester: II

Notes:

- **Question no 1 is compulsory**
- **Assume suitable data and justify if required**

Q.No.	Questions	Points	CO	BL	PI
Q1	Justify with reasons any **two**: 1) Current ripple and its effect on the performance of motor 2) Give a brief comparison of the D.C. drive response with P, PI and PID controllers 3) Principal of field oriented control.	**20**	3	2	1.3.1
Q2a)	A 220 V, 960 rpm, 12.8 A separately excited dc motor has armature circuit resistance and inductance of 2 ohm and 150 mH, respectively. It is fed from a single phase half controlled rectifier with an c source voltage of 230 V, 50 Hz. Calculate i) Motor torque for $\alpha = 60°$ and speed = 600 rpm ii) Motor speed for $\alpha = 60°$ and T = 20 N-m	**10**	2	3	2.4.1
b)	Derive the **state space model** of separately excited DC motor.	10	3	2	1.3.1
Q3a)	A 200 V, 960 rpm and 200 A separately excited dc motor has an armature resistance of 0.02Ω. The motor is fed from a chopper which provides both motoring and braking operations. The source has a voltage of 230V.Assume continuous conduction. i) Calculate duty ratio of chopper for motoring operation at rated torque and 350 rpm. ii) Calculate duty ratio of chopper for braking operation at 350 rpm. iii) If maximum duty ratio of chopper is limited to 0.95 and maximum permissible motor current is twice the rated, calculate maximum permissible motor speed obtainable without field weakening and power fed to the source. If the motor field is also controlled in iii) calculate field current as a fraction of its rated value for a speed of 1200 rpm.	**10**	2	3	2.4.1

b)	Explain neatly with waveforms two quadrant chopper controlled drive **OR** Elaborate the braking and multi quadrant operation of VSI Induction motor drives. (dynamic and regenerative braking)	**10**	3	3	1.3.1
Q4a)	A 400 volts ,50 Hz , 4 pole, 1370 rpm star connected induction motor is supplied from a current regulated PWM voltage source inverter and is operated with rotor flux oriented control. The motor parameters are given as Rs' = 2 ohm, Rr' = 5 ohms, Xls = Xlr' = 5 ohms, Xm = 80 ohms, all reactances are calculated at 50 Hz. Neglect friction and core losses. a) Find the required values of Ids and Iqs to operate the motor at rated speed, if the terminal voltage and frequency are kept at the rated value b) Calculate the torque and slip frequency in rad/sec under the condition (a)	**10**	3	3	2.4.1
b)	Elaborate neatly Braking operation of synchronous motor	**10**	4	2	1.3.1
Q5	Explain **Direct torque control** of Induction Machines? Derive the torque expression with stator and rotor fluxes, and also explain DTC hysteresis control strategy.	**20**	5	5	1.3.1
Q6a)	Elaborate neatly Synchronous motor control with Brushless excitation.	**10**	5	2	1.3.1
b)	A 3-phase, 460 volts, 60 Hz, 6 pole, Y connected cylindrical rotor synchronous motor has a synchronous reactance of Xs = 2.5 ohms and armature resistance is negligible. The load torque, which is proportional to the speed squared is TL = 398 Nm at 1200 rpm. The PF is maintained at unity by field control and the voltage to frequency ratio is kept constant at the rated value. If the inverter frequency is 36 Hz and the motor speed is 720 rpm, calculate a) the input voltage Va, b) the armature current Ia, c) the excitation voltage Vf, d) the torque angle δ, and e) the pull out torque Tp.	**10**	5	3	2.4.1
Q7	Write short notes on any **two** i) Load commutated inverter fed drive ii) Stationary reference frame theory. iii) Indirect or direct vector control	**20**	2	4	1.3.1

17/5/19

Bharatiya Vidya Bhavan's

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End Sem - May 2019 Examinations

Program: M. Tech PEPS | **Duration: 3 Hr**

Course Code: PE-MTPX 201 | **Maximum Points: 100**

Course Name: Advanced Techniques in Power System Protection | **Semester: II**

Notes:

- **Question no 1 is compulsory**
- **Assume suitable data if required and justify**

Q.No.	Questions	Points	CO	BL	PI
Q1	Explain with neat diagrams and reasons : 1) How transmission lines are protected against lightning? 2) Explain the functioning of reverse power flow relay. 3) Why is phase angle information required to protect a radial system with source at both ends? 4) Distinguish between dependability and security of a relay.	20	1	2	1.3.1
Q2a)	How is differential protection scheme used in the following: (1) Transmission line protection. (2) Transformer protection. (3) Bus bar protection.	12	1	2	1.3.1
b)	Find out the value of Zn for a mho relay with torque angle 75° which has to give 100% protection to a 50 km long 110kV transmission line with impedance 0.8 ohm per km and angle 80° If the maximum load on this line is 1000A at 30° lagging, is there any possibility of relay tripping on load? CT ratio is 1000:5	08	2	3	2.4.1
Q3a)	Explain neatly in detail each component with diagram the basic elements of digital protection in power system.	14	1	2	1.3.1
b)	Using the method of least squares, find an equation of the form $y = ax + b$ that fits the following data: x 0 1 2 3 4 y 1 5 10 22 38	06	2	3	2.4.1

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End Sem - May 2019 Examinations

Q.No.	Questions	Points	CO	BL	PI
Q4a)	Derive the sampling theorem. A 40 kHz signal is sampled at 49 kHz. What is the minimum frequency to which this signal will be aliased?	08	2	3	2.4.1
b)	Explain Sample and first derivative sinusoidal wave based algorithms (Mann and Morrison)	12	3	2	1.3.1
Q5a)	Find the fourth element of the Walsh function having the order of 5 and length N = 8, ie. Wal(5,4)	08	2	3	2
b)	Explain briefly the digital Generator protection	12	1	2	1.3.1
Q6a)	What are the advantages of single breaker double bus arrangement over single bus single breaker arrangement? What are the advantages of ring bus arrangement?	14	1	2	1.3.1
b)	The performance of an overcurrent relay was monitored over a period of one year. It was found that the relay operated 14 times, out of which 12 were correct trips. If the rely failed to issue trip decision on 3 occasions, compute dependability, security and reliability of the relay.	06	2	3	2.4.1
Q7a)	What are auxiliary CTs? Why are they used? What is the advantage of numerical relaying over other relaying schemes in differential protection? **OR** Based on the Bergeron's scheme for travelling wave protection explain the principle of internal fault detection.	12	1	2	1.3.1
b)	Let the primary of the transformer winding has 1000 turns while secondary has 500 turns. If the primary CT ratio is 100:5, find the CT ratio required in the secondary side to establish circulatory current scheme. Draw neat diagram also **OR** Taking an example for explain the Fourier Algorithm for Full cycle window algorithm	08	3	3	2.4.1

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Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Examination – May 2019

20151119

Program: M. Tech Electrical Engineering **Duration: 3 Hr**

Course Code: PE-MTPX202 **Maximum Points: 100**

Course Name: Smart Grid Technologies **Semester: II**

Instruction: (i). Question No 1 is compulsory and attempt any four from rest.

Q.No.	Questions	Points	CO	BL	PI
1	a What are the challenges of existing grid which lead us to think about SGT? b What are plastic solar cells? How they are advantageous from classical solar cells? c What is CPP and what are the conditions to set up CPP? d What are the different types of Wi-max services?	5*4	2.2	L1	2.2.2
2(a)	Do the comparative analysis of AMR and AMI. Elaborate in detail primary components of AMI.	10	3.1	L2	3.1.6
2(b)	Define micro-grid. Explain in detail how it will be categorized?	10	3.2	L4	3.2.2
3 (a)	Define i) Fuel Cell ii) Smart Grid iii) PMU iv) Thin Filmed Solar Cell v) OPV	1*5	1.3	L1	1.3.1
3(b)	Write a short note on Smart Meter.	5	2.1	L1	2.1.2
3(c)	Formulate the problem for PMU placement problem.	10	3.1	L1,L4	3.1.1
4(a)	What is power quality and why it is important? Classify and elaborate different power quality events.	10	4.1	L5	4.1.2
4(b)	Explain in detail the various services provided by cloud computing in SG. Also elaborate the various deployment models of cloud services.	10	6.1	L2	6.1.1

5(a)	Distinguish between SCADA system and PMU.	5	1.4	L6	1.4.1
5(b)	Describe in detail various application of PMU	5	4.3	L4,L3	4.3.4
5(c)	Discuss in detail the various interconnection methods and technologies of micro-grid along with its advantages and issues.	10	2.2	L6	2.2.1
6(a)	Explain in detail various constituents of IED configuration.	10	2.2	L4	2.2.2
6(b)	What is the role of power quality conditioners in solving power quality issue? Classify in detail various power quality conditioners.	10	6.1	L2	6.1.1
7(a)	How the communication networks HAN, NAN and WAN are different from each other?	5	2.1	L1	2.1.1
7(b)	What are the building blocks of Wi-max?	5	1.4	L5	1.4.1
7(c)	Explain in detail the components of BPL system and Elaborate any five layers of open system interconnection.	10	4.3	L2,L4	4.3.4

Notes: All the Best.

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Munshi Nagar, Andheri (W) Mumbai – 400058

End Semester Exam May-2019

22/5/19

Program: M. Tech TE/MD/PEP/CM
Course Code: THAU4/MDAU4/AUMTPX201/CMAU2
Course Name: Stress management by yoga

Duration: 3 Hour
Maximum Points: 100
Semester: II

Notes:

1. Question number ONE is compulsory and solve any four out of remaining six.

Q.No.	Questions	Points	CO	BL	PI
1.	"Integral yoga for integrated personality" Explain?	20	1	1	1.2.1
2.	How yoga helps in education?	20	2	2	1.2.1
3.	How yoga helps in healthy lifestyle?	20	2	2	1.3.1
4.	Health is the key of blissful living, Explain	20	1	1	1.2.1
5	45 minutes of yoga a day keeps the tension away?	20	1	1	1.3.1
6	How yoga helps the executives in corporate sector?	20	2	2	1.3.1
7	Explain how yoga helps in modern living	20	1	2	1.3.1