Reg. No.

MANIPAL INSTITUTE OF TECHNOLOGY

⁵⁰ A Constituent Institution of Manipal University

V SEMESTER B.TECH (ELECTRICAL & ELECTRONICS ENGINEERING)

END SEMESTER EXAMINATIONS, NOVEMBER 2017

SUBJECT: GENERATION, TRANSMISSION & DISTRIBUTION [ELE 3104]

REVISED CREDIT SYSTEM

Time: 3 Hours		Durs Date: 22 November 2017	Max. Marks: 50	
Instructions to Candidates:				
	* A	Answer ALL the questions.		
	✤ N	Aissing data may be suitably assumed.		
1A.	Comp i) star	are Hydel, Coal, Nuclear and Diesel power plants with respect to the ndby losses ii) life span and iii) Plant capacity factor.	following:	(03)
1B.	State sketcł	clearly the function of cooling towers highlighting the importance of it. V n, explain the working of natural draft cooling tower.	Vith a neat ((03)
1C.	The fo availa turbir load f speed (Frand	bllowing is the data for setting up hydro power plant: Average annual rainfability of head=110m. i) Suggest a suitable turbine based on availability of he units suggested in (i) are used, what would be the installed capacity of the factor of 60%. Also compute the catchment area required. Take η =92%, sy of the generator =300 rpm, specific speed of different turbines=400(Ka cis), 45 (Pelton). Assume the direct coupling between generator and turbine.	all=200cm, nead ii) if 4 plant for a mchronous nplan), 100	(04)
2A.	With and d	a neat sketch, explain the working of pressurized water reactor plant. State emerits of PWR.	the merits	(04)
2B.	Define	e load factor and diversity factor. Discuss the significance of these two factor	s. ((02)
2C.	A sing of eac strand and ca	gle phase system is composed of four stranded conductor for phase wire wit ch strand 0.2cm and three stranded conductor for return wire with diame d 0.25cm. The spacing between the conductors is 5m. Determine the loop indu apacitance/km between two lines.	h diameter ter of each ctance/km	(04)
3A.	Write	short notes on i) Surge Impedance Loading ii) FACTS controllers iii) Proxi	mity effect ((03)
3B.	With 230-k admit Using curre	a neat diagram, derive ABCD constants of the line modelled as nominal pi. $N, 60$ -Hz three-phase line has a series impedance/ph of 0.08 + j0.48 Ω /km a tance/ph of j3.33 *10 ⁻⁶ S/km. At full load, the line delivers 250 MW at 0.9 the above model, calculate (a) the ABCD parameters, (b) the sending-end w nt, and (c) the percent voltage regulation and efficiency.	A 200-km, and a shunt pf. lagging. voltage and ((07)
4B.	A 275kV three phase line has the following line parameters $A=0.93 \ge 1.5^{\circ}$, $B=115 \ge 77^{\circ}$. If the receiving end voltage is 275kV, determine the following analytically		∠77º. If the	
	(a)	Sending end voltage required if a load of 240 MW at 0.8 lagging pf is being d the receiving end.	elivered to	
	(b)	The maximum power that can be delivered if the sending end voltage is held	at 295 kV.	
	(c)	The additional MVA that has to be provided at the receiving end when 420MVA at 0.8 lagging pf, the supply voltage being maintained at 295 kV	delivering	(06)

- **4C.** A 3-phase line is supported by suspension string having three units. The voltage across first unit is 13 kV and that across the second unit is 15 kV. Find (a) the ratio of the shunt to mutual capacitance (b) system line voltage (c) string efficiency and (d) pin to line capacitances for uniform voltage distribution.
- **5A.** Deduce exact expressions for sag and tension of a conductor when it is strung between two towers.
- **5B.** A 3-phase, 50Hz, 132 kV line with 1.956 cm diameter conductors is built so that corona takes place if the line voltage exceeds 210 kV (rms). If the value of potential gradient at which ionization occurs can be taken as 30 kV/cm (peak), find the spacing between the conductors. Also find the total corona loss.
- **5C.** Explain the capacitance grading of an underground cable. Find the maximum working voltage of a single core cable having two insulating materials A and B and the following data. conductor radius 0.5cm, inside sheath radius 2.5 cm, maximum working potential gradient of A is 60 kV/cm, maximum working potential gradient of B is 50 kV/cm, permittivity's of A and B are 4 and 2.5 respectively.

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