BIRLA INSTITUTE OF TECHNOLOGY, MESRA, RANCHI
(END SEMESTER EXAMINATION)

CLASS: BTECH
BRANCH: EEE

SEMESTER : III
SESSION : MO/2022

SUBJECT: EE203 ELECTRICAL ENERGY GENERATION AND CONTROL

TIME: 3:00 Hours

FULL MARKS: 50

INSTRUCTIONS:
1. The question paper contains 5 questions each of 10 marks and total 50 marks.
2. Attempt all questions.
3. The missing data, if any, may be assumed suitably.
4. Before attempting the question paper, be sure that you have got the correct question paper.
5. Tables/Data hand book/Graph paper etc. to be supplied to the candidates in the examination hall.

			CO	BL
Q.1(a)	Match the following:	[2]		

Plant type	Time required for completion of the project
(a) Hydro-electric	(1) 7- 8 years
(b) Thermal	(2) 3 - 4 years
(c) Nuclear	(3) Less than 1 year
(d) Diesel	(4) 7 - 10 years

			1	1
Q.1(b)	Enumerate all renewable and non-renewable sources of electrical energy along with the primary fuel used in the conversion of energy.	[3]	1, 4	1
Q.1(c)	Write down the important (unavoidable) factor/s in site selection of following electric power plant: Coal fired thermal power plant; Hydro-electric plant; Nuclear power plant; Wind power plant; Solar power plant. Justify the statement "a coal fired thermal power plant should be far away from a populated area and also should be near to load center".	[5]	1, 3, 5	3
Q.2(a)	What is the need for compounding of steam turbine? Write the name of two type of compounding used in general.	[2]	1, 2	1, 2
Q.2(b)	What is the purpose of the governing system of steam turbine in thermal power station? Also, write the different types of governors employed.	[3]	1, 2	1, 4
Q.2(c)	Describe the function and usefulness of following systems in a thermal power plant: (a) economizer; (b) air-preheaters; (c) superheaters; (c) reheaters.	[5]	1, 2	3
Q.3(a)	What is the function of surge tank in hydroelectric plant?	[2]	1, 2	2
Q.3(b)	Classify the hydraulic turbines based on: (a) head and quantity of water available; (b) nature of working of the blades; (c) direction of flow of water; (d) axis of the turbine shaft; (e) the specific speed.	[3]	1, 2	2
Q.3(c)	The following data pertain to a hydroelectric plant. Available head = 140m, catchment area = 2000 sq. km; annual average rainfall = 145 cm, turbine efficiency = 85%, generator efficiency = 90%, percolation and evaporation losses = 16%. Determine the power developed and suggest the type of turbine to be used if the runner speed is kept below 240 rpm.	[5]	1, 2	6
Q.4(a)	What is the use of moderator in nuclear power generation, write the name of common moderator used in nuclear power plants.	[2]	1, 2, 3	3
Q.4(b)	With proper labeling draw the layout with subsystems of a nuclear power plant.	[3]	1, 2, 3	1
Q.4(c)	Draw the layout of diesel engine power plant with proper labeling. Write the process of combustion in CI engine.	[5]	2, 3	1, 3
Q.5(a)	Draw following characteristics with proper labeling: (a) V-I and P-V characteristics of solar cell; (b) Power-wind characteristic of wind turbine.	[2]	4	4
Q.5(b)	What do you mean by Maximum Power Point Tracking (MPPT) in a solar power plant. Using PV-curve explain the incremental conductance method of MPPT.	[3]	4, 5	5
Q.5(c)	What is Betz limit in wind power generation. Prove that the maximum power that can be extracted from the wind is less than 50%.	[5]	4, 5	5