GURU NANAK INSTITUTE OF TECHNOLOGY
An Autonomous Institute under MAKAUT
2022
INDUSTRIAL ELECTRICAL SYSTEM
EE802C

TIME ALLOTTED: 3 HOURS **FULL MARKS: 70**

The figures in the margin indicate full marks.
Candidates are required to give their answers in their own words as far as practicable

GROUP – A
(Multiple Choice Type Questions)

Answer any ***ten*** from the following, choosing the correct alternative of each question: 10×1=10

			Marks	CO No
1.	(i)	Which one of the following is an objective of tariff: a) Recovery of cost on production of power b) Recovery of capital investment c) Profit gain d) All of these	1	CO1
	(ii)	Fusing element of a fuse is usually made of: a) Steel b) Iron c) Mica d) Copper	1	CO1
	(iii)	A single device that ensures efficient protection from electrical hazard of shock and fire caused by over current, short circuit, earth leakage, and earth fault is: a) Miniature current circuit breaker b) (ELCB+RCCB) combination breaker c) Miniature circuit breaker d) Earth leakage circuit breaker	1	CO2
	(iv)	Earth leakage circuit breaker is also known as _____. a) Residual current circuit breaker b) Miniature case circuit breaker c) Oil control breaker d) Moulded circuit breaker	1	CO2
	(v)	Among following which one is a PLC Programming Language a) Assembly b) Ladder Logic c) Java d) HTML	1	CO2
	(vi)	Carbon arc lamps are commonly used in a) Domestic lighting b) Street lighting c) Cinema Projector d) Photography	1	CO3

(vii)	The device that are encouraged to be used for protection against heavy lighting strikes or over voltage is a) Surge protection device b) Residual current device c) Both (a) and (b) d) Either (a) or (b)	1	CO2
(viii)	Which starter is used for slip ring induction motors of high ratings? a) DOL starter b) Rotor resistance starter c) Autotransformer starter d) All of these	1	CO1
(ix)	Which among these tests are to be conducted on wiring installations? a) Testing of polarity of non linked single pole switches b) Testing of earth continuity path c) Testing of earth resistance d) All of these	1	CO1
(x)	Power factor can be improved by connecting which among these? a) Static capacitors. b) Resistors. c) Synchronous condensers. d) Both (a) and (c)	1	CO2
(xi)	Which of the following electric discharge lamp gives the highest lumens/watt? a) Sodium vapor lamp b) Neon lamp c) Mercury lamp at low pressure d) Mercury vapor at high pressure	1	CO3
(xii)	Which of the following is not the component of a SCADA system? a) Database server b) I/O system c) PLC controller d) Sparger controller	1	CO2

GROUP – B
(Short Answer Type Questions)
Answer any three from the following: **3×5=15**

		Marks	CO No
2.	Explain the working principle of Electromagnetic Contactor.	5	CO2
3.	Explain the various methods of electrical wiring system.	5	CO1
4.	Compare PCC and MCC panels.	5	CO2
5.	List out the points to consider for selections of transformer.	5	CO3
6.	What do you mean by grounding or earthing? Explain it with an example.	5	CO3

GROUP – C
(Long Answer Type Questions)
Answer any ***three*** from the following: **3×15=45**

			Marks	CO No
7.	(a)	Write down the difference between a relay and a contactor?	5	CO1
	(b)	Describe the operation and applications of the following circuit elements i) Thermal Overload Relay ii) Electromagnetic Induction Relay	10	CO2
8.	(a)	What is a fuse? Name and Explain different types of fuse used.	3	CO2
	(b)	Explain in detail the Three Part Power Tariff used for energy consumption.	4	CO1
	(c)	A hydro-electric plant costs Rs 3000 per kW of installed capacity. The total annual charges consist of 5% as interest; depreciation at 2%, operation and maintenance at 2% and insurance, rent etc. 1·5%. Determine a suitable two-part tariff if the losses in transmission and distribution are 12·5% and diversity of load is 1·25. Assume that maximum demand on the station is 80% of the capacity and annual load factor is 40%. What is the overall cost of generation per kWh?	8	CO1
9.	(a)	What is the difference between HT and LT lines?	4	CO1
	(b)	Discuss the various methods for power factor improvement.	4	CO2
	(c)	A 3-phase, 5 kW induction motor has a p.f. of 0·75 lagging. A bank of capacitors is connected in delta across the supply terminals and p.f. raised to 0·9 lagging. Determine the kVAR rating of the capacitors connected in each phase.	7	CO2
10.	(a)	Explain the cable size selection procedure for constant load.	7	CO3
	(b)	Single-phase 240V, 36A loads are to be supplied by means of 70°C thermoplastic PVC twin and earth cables having copper conductors, 25m in length, in an area having an ambient temperature of 35°C (Ca= 0.94). The cables are touching and single-layer clipped to a non-metallic surface (for 3 circuits Cg=0.79). The overcurrent device at the origin of the installation is a type-B MCB to BS EN 60898. Calculate the minimum permissible cable size.	8	CO3
11.	(a)	Develop a block diagram of PLC with basic components and its functions.	5	CO2
	(b)	Develop a simple ladder logic that allows a single light to be controlled by two switches in a room.	5	CO2
	(c)	Write down the advantages of implementing SCADA systems for electrical distribution.	5	CO2