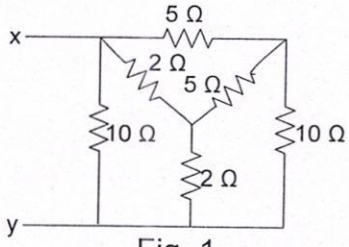
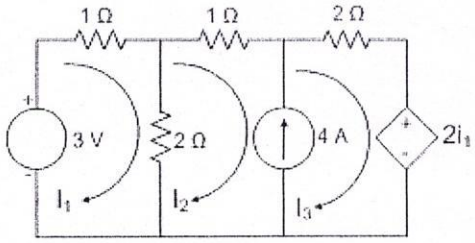
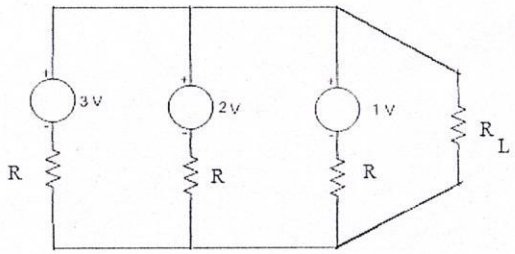
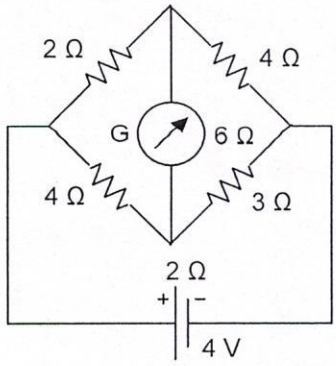
NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR
Even Semester Mid-term Examination, 2021-22

Course Code: EEC01
Course Name: ELECTRICAL TECHNOLOGY
Question Paper No.: NITDGP/EEC01/1

Full Marks: 25
Time: 90 Minutes
Date of Exam: 01/06/2022

Answer question 1 and any 03 from the rest.

Question No.	Body of the Question	Marks	Mapped CO
1.	a) What is a bilateral network? b) Four resistors of ohmic values 5 Ω, 10 Ω, 15 Ω and 20 Ω are connected in series and a 100 V source is applied across the combination. How is the voltage divided among the various resistors? c) Two resistances $R_1 = 15\ \Omega$ and $R_2 = 25\ \Omega$ are connected in parallel and are supplied by a current source, I = 5 A. Determine the power consumed by each resistance. d) The resistance of a conductor of diameter d and length l is R Ω. If the diameter of the conductor is halved and its length is doubled, what will be the resistance value? e) State Kirchhoff's laws as applied to an electrical circuit. f) Give the statement of Norton's theorem. g) What do you understand by active and passive elements in electrical engineering? h) What are dependent sources? Explain with the help of an example. i) Why are electrical loads connected in parallel across the source instead of in series? j) A parallel network consists of three resistors of 4 Ω, 8 Ω and 16 Ω. If the current in the 8 Ω resistor is 3 A, what are the currents in the other resistors?	(10 × 1)	CO1
2.	a) Find the equivalent resistance between terminals x-y in the circuit of Fig. 1.  Fig. 1 b) Prove that efficiency for maximum power to the load resistance is 50%.	(2+3)	CO1

3.	(a) Find the loop currents I_1, I_2 and I_3 of the circuit in Fig. 2 by mesh method.  Fig. 2 (b) What is the difference between ideal voltage source and practical voltage source? Explain with their characteristics.	(3+2)	CO1
4.	(a) Find the value of R in Fig 3 such that maximum power delivered to R_L is 3 mW.  Fig 3 (b) Explain Superposition Theorem.	(3+2)	CO1
5.	Find the current flowing through the galvanometer (G) as shown in Fig. 4 by using Thevenin's theorem.  Fig. 4	5	CO1

Course Outcomes

- CO1: To learn the fundamentals of Electric Circuits and Network theorems.
- CO2: To develop an idea on Magnetic circuits, Electromagnetism
- CO3: To learn about single phase and poly phase AC circuits.
- CO4: Introduction to single phase transformer.
- CO5: Analysis of transient phenomena in electrical circuits with DC excitation.

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

Even Semester End-term Examination, 2021-22

Course Code: EEC401 Full Marks: 30

Course Name: Power System-I Time: 90 Mins

Question Paper No.: NITDGP/EEC401/1 Date of Exam: 25/04/2022

Instruction: Answer all the questions.

Materials to be supplied: Graph paper, if required.

Question No.	Body of the Question	Marks	Mapped CO
1.	A string insulator has 6 units. The voltage across the bottom-most unit is 20% of the total voltage. What is the string efficiency?	2	CO4
2.	Find the most economical size of a single-core cable working on a 220 kV, 3-phase system, if a dielectric stress of 70 kV/cm can be allowed.	2	CO5
3.	Consider a three-phase, 50 Hz, 11 kV distribution system. Each of the conductors is suspended by an insulator string having two identical porcelain insulators. The self-capacitance of the insulator is 5 times the shunt capacitance between the link and the ground, as shown in the figures. The voltages across the two insulators are	3	CO 4
4.	In a transmission line, each conductor is at 20 kV and is supported by a string of 3 suspension insulators. The air capacitance between each cap-pin junction and tower is one-fifth of the capacitance C of each insulation unit. A guard ring, effective only over the line-end insulator unit is fitted so that the voltages on the two units nearest the line-end are equal. Calculate the value of guard ring capacitance required.	3	CO 4
5.	What are the different standardized voltages used in transmission and distribution systems in India?	2	CO 1
6.	A direct current two wire distributor XY 700m long is fed at the two ends X and Y at 250V and 245V, respectively. There are three concentrated loads of 100A, 150A, and 100A at 200m, 350m, and 500m, respectively, from the end X. If the go and return resistance of the distributor is 0.0001 Ω/m, find the currents supplied by the two ends X and Y.	3	CO 1
7.	For the system of question no. 6, find the location of the point of minimum potential and voltage at this point.	2	CO 1
8.	What is a stringing chart?	2	CO 2
9.	A single span of a transmission line is 500m long, the supporting structures being level. The conductor diameter is 2.0 cm and weighs 2.0 kg/m in length. Find the sag which must be allowed if tension is not to exceed one-fourth of the ultimate strength of 4200 kg/cm^2 in still air.	2	CO 2
10.	For the system of question no. 9, calculate the sag if the wind pressure is 50 kg/m^2 of the projected area and 10 mm radial ice coating over the conductor's surface. Take the weight of ice as 910 kg/m^3.	3	CO 2
11.	Show that the expression of the most economical voltage of transmission for a specific power (P) and a particular length (L) of a line is $\sqrt{\frac{EPL}{(BP+DL)}}$ where B, D, and E are constants.	4	CO 1
12.	Calculate the ground clearances of 3Ø 220kV and 400kV transmission lines.	2	CO 2

Course Outcomes:

On completion of the course, the students will be able to:

- CO1: find out economical voltage, minimum consumer voltage for different kinds of loads for transmission of electrical energy, and suggest remedies to improve the voltage if needed.
- CO2: evaluate different parameters associated with electrical design and mechanical design of transmission lines, including the presence of neighbouring communication lines.
- CO3: analyze the performance of short, medium, and long-distance transmission lines.
- CO4: apply the knowledge to find out different important parameters of insulators and know different methods to improve the performance parameters of the insulators.
- CO5: select the appropriate type of power cables for different applications and determine operating voltage, charging current, charging kVAR, insulation resistance, and dielectric power loss of power cables.
- CO6: mitigate different adverse situations that may arise due to corona.

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

Even Semester End-term Examination, 2021-22

Course Code: EEC402 Full Marks: 30

Course Name: Electrical Machines-I Time: 90 Minutes

Question Paper No.: NITDGP/EEC402/1 Date of Exam: 26/04/2022

Instructions: **Answer any five questions.**

All parts of a question should be answered at one place. Notations used for different parameters are to be taken as standard.

Question No.	Body of the Question	Marks	Mapped CO
1	(a) Draw the equivalent circuit of a single-phase transformer referred to the primary side.	2	CO5
	(b) A 200 kVA, 50 Hz, 220/11000 V, single-phase transformer has an efficiency of 98.2% when supplying full-load current at 0.8 lagging power factor and an efficiency of 99% when supplying half-load current at unity power factor. Calculate the core and copper losses at full-load current. At what load current will the efficiency be maximum?	4	CO5
2	(a) The relative phase displacement between the secondary line-voltages of two three-phase transformers, connected in parallel should be zero -Give reasons.	3	CO6
	(b) Resistive loads of 20 Ω and 25 Ω are connected across the teaser and main transformer secondaries respectively of a Scott-connected transformer arrangement, fed from three-phase, 400 V supply mains. If the main transformer primary to secondary turns ratio is 2, then determine the supply line currents. Neglect the magnetizing current and internal impedance drops.	3	CO6
3	(a) Explain why equalizer connections are used in lap windings.	3	CO2
	(b) A long-shunt compound generator is delivering 100 A at 230 V. It has armature resistance of 0.03 Ω, series field resistance of 0.02 Ω and shunt field resistance of 230 Ω. Find the induced emf in the generator and the armature current. The brush voltage drop is 1 V per brush.	3	CO4
4	(a) Two shunt generators having drooping characteristics are best suited for parallel operation – Give justification.	2	CO3
	(b) Two shunt generators running in parallel are supplying a load of 300 A. One generator is rated at 65 kW and has voltage regulation of 5%. The other generator is rated at 130 kW and has voltage regulation of 6%. The no-load terminal voltage of both the machines is 500 V. Assuming linear characteristics, find the current supplied by each machine.	4	CO3
5	(a) What are the effects of armature reaction? Name the methods of compensating the armature reaction.	3	CO1 & CO4
	(b) A 250 kW, 400 V, 6-pole lap-connected armature has 720 armature conductors. It is given a brush lead of 2.5°	3	CO1 & CO4

	(mechanical). Calculate the demagnetizing and cross-magnetizing ampere-turns per pole.		
6	(a) Give reasons of high starting current in a dc motor? (b) A shunt generator has a full-load current of 200 A at 500 V. The stray losses are 1500 W and the shunt field resistance is 100 Ω. The full-load efficiency is 90%. Find the armature resistance and the armature current corresponding to maximum efficiency.	2 4	CO1 & CO3 CO1 & CO3
7	(a) Draw and explain, in brief, the speed-current, torque-current and speed-torque characteristics of a dc series motor. (b) A 250 V, dc shunt motor running at 1000 rpm draws 3 A at no-load. The armature resistance is 0.5 Ω and field resistance is 125 Ω. Find the speed of the machine when the motor input is 10 kW.	3 3	CO4 CO4

Course Outcomes
CO1: Able to understand the fundamental principles and classification of electromagnetic machines.
CO2: Ability to design an armature winding
CO3: Able to learn about the constructional details and principle of operation of dc machines.
CO4: Acquire knowledge about the working of dc machines as generators and motors.
CO5: Acquire knowledge about the constructional details, principle of operation of transformers.
CO6: Acquire knowledge about testing and applications of dc machines & transformers.

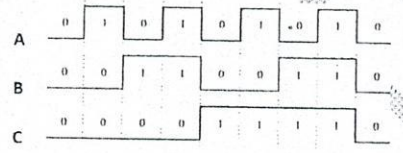
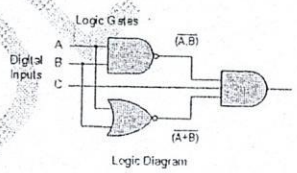
NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

Even Semester End-term Examination, 2021-22

Course Code: EEC403
Course Name: Digital Electronics
Question Paper No.: NITDGP/EEC403/NNN

Full Marks: 30
Time: 90 Minutes
Date of Exam: 27/04/2022

Instructions: Answer any three questions.

Question No.	Body of the Question	Marks	Mapped CO
1	(a) What is a CPU? What are the low level language and the high level language associated with the computers? (b) (b) Why binary number system is important in digital electronics? What do you mean by digital 0 and 1? Draw a schematic o the circuit generating a digital high signal (1_2) utilizing the 230 Volts, 50 Hz, Single Phase, AC main supply.	2+2 1+2+3	CO1
2	a. Using the principles of Boolean algebra, choose the correct answer and prove it. i. $\overline{A}B + A\overline{B} + AB = A.B$ ii. $\overline{A}B + A\overline{B} + AB = A + B$ iii. $\overline{A}B + A\overline{B} + AB = \overline{A} + \overline{B}$ iv. None of the above b. Write down the DeMorgan's laws for 6 variables to representing six different digital signals showing the following conversions a. AND to OR b. OR to AND c. If the three digital signals (A, B, C) as shown in the Fig. 1a are applied to the inputs A, B, and C respectively of the digital circuit (as shown in the Fig. 1b), draw the timing-diagram of the output signal X. Construct the truth table of the circuit.  Fig. 1a  Fig. 1b	3 2 3+2	CO2
3	Using the two input NAND gates construct the following gates and derive the expression of the output variable X for the given input signals A and B.: (a) AND, (b) OR (c) NOR (d) XOR (e) XNOR	1+2+2+3+2	CO3
4	(a) What is multiplexer? Using 4:1 MUX/DEMUX ICs, construct an 8:1 MUX/DEMUX IC utilizing the enable pins of the 4:1 MUX/DEMUX ICs which are activated with a digital high signal (1_2). (b) Design a logic circuit required for an automobile to give an alarm to the driver when the ignition switch is one but the seat belt is not engaged. Provide a timer circuit to switch off the alarm after a specified time say 10 seconds.	1+3 3+3	CO4
5	(a) What is SOP and POS? Explain SSOP and SPOS. (b) What do you mean by Minterms and Maxterms? Simplify the following three variable expression using Minterm principal of Boolean Logic: $Y(A,B,C) = \sum m(0,1,2,3,4,5,6,7)$	2+3 2+3	CO2
6	(a) What are the 1's Complement and 2's Complement? What is a binary adder? (b) What do you mean by K-Map? Draw the truth table of the following Boolean expression and simplify it with K-Map technique $f(A,B,C) = \overline{A}\overline{B}C + \overline{A}B\overline{C} + ABC$	2+3 2+3	CO4

Course Outcomes
CO1: Acquire an idea about digital electronics and its applications
CO2: To learn the fundamentals of different numbers systems and codes and code conversion techniques
CO3: To study about the Boolean algebra and basic logic gates along with their digital design procedure using elementary logic gates.
CO4: To learn about the different sequential and combinational logic circuits and their use in digital electronics applications

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

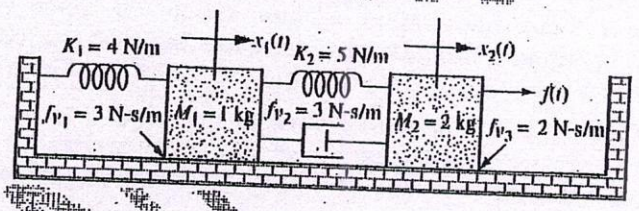
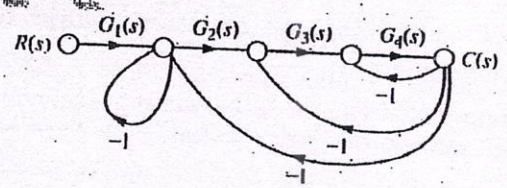
Even Semester End-term Examination, 2021-22

Course Code: EEC431 **Full Marks:** 30

Course Name: Control Systems **Time:** 90 Minutes

Question Paper No.: NITDGP/EEC431/1 **Date of Exam:** 28/04/2022

Instructions: Answer *any ten* questions.

Question No.	Body of the Question	Marks	Mapped CO
1	A temperature control system operates by sensing the difference between the thermostat setting and the actual temperature and then opening a fuel valve an amount proportional to this difference. Draw a functional closed-loop block diagram identifying the input and output transducers, the controller, and the plant. Further, identify the input and output signals of all subsystems.	3	CO1
2	Enumerate the advantages and dis advantages of open loop and closed loop control systems	3	CO1
3	Elucidate the design cycle of a controller for any physical system with the help of a flow chart.	3	CO1
4	For the system of Figure 1 derive the transfer function, G(s)=X1(s)/F(s)  Figure 1	3	CO2
5	Using Mason's gain formula find the transfer function of the signal flow graph provided in Figure 2.  Figure 2	3	CO2
6	Draw the block diagram of a DC servo position control system and estimate the reference angular position (θ_R) to actual angular position (θ) transfer function of a DC servo position control	3	CO2

Course Outcomes

CO1: To get the knowledge of basic objectives of control system design

CO2: To derive input-output relationship of systems based on their mathematical modeling governed by basic laws of physics

CO3: To justify stability of systems based on their transfer functions, time domain and frequency domain specifications

CO4: To develop concepts on root pattern with variable gains and comment on the stability

CO5: To determine the stability of closed-loop system based on open loop frequency response

CO6: To be able to design controllers so as to meet design specifications both in time as well as frequency domain

CO7: To be able to realize the controller both in software simulation through MATLAB coding as well as in real-time environment

	system. A constant current I_f flows through the field circuits. The armature circuit has inductance **L**, resistance **R**. The back emf constant is **K** which is same as the torque constant. The moment of interia of the motor is J and damping is B. The feedback is provided by a potentiometer.		
7	For a seconder order unity feedback closed system the step response have the peak time, Tp, of 3.14 sec and settling time, Ts, (based on 2% error band) of 12 sec. The steady state error is 10%. Comment on the stability of the closed loop system after estimating the transfer function from the time domain specifications. Find out the forward path transfer function.	3	CO3
8	A unity feedback closed loop system has the forward path transfer function $\frac{K}{s(s+1)}$. Design the proportional gain to ensure a rise time (Tr) of 0.25 sec.	3	CO3, CO6
9	Derive mathematically the expressions of Rise time, Peak time and Maximum percentage of overshoot for the step response a second order closed loop systems with transfer function $\frac{\omega_n^2}{s^2+2\zeta\omega_n s+\omega_n^2}$	3	CO3
10	The loop transfer function of a closed loop system is $\frac{K(s+1)(s+2)}{(s+0.1)(s-1)}$. Using Routh Hurwitz criterion estimate the range of K such that the stability of the system is ensured.	3	CO3, CO4, CO6
11	Sketch the root locus mentioning all the significant steps for obtaining root locus and compute the damping ratio of the step response of a unity feedback closed loop system for a choice of K=1.33. The forward path transfer function is $\frac{K(s+2)}{(s^2+2s+3)}$.	3	CO4
12	The forward path transfer function of a unity feedback closed loop system is given by $\frac{K(s+1)}{s^2}$. Sketch the root locus mentioning all the significant steps for obtaining root locus and justify your sketch by deriving the algebraic equation for the locus.	3	CO4
13	The DC motor speed control through armature voltage has the forward path transfer function $\frac{1}{(s+2)(s+6)}$. Design a PD controller such that closed loop response for a constant reference speed ensures 0.707 damping ratio and setting time (2% error band) of 0.5 sec	3	CO6
14	For a DC servo position control system with forward path transfer function $\frac{1}{(s+1)(s+7)}$. Design a PI controller such that closed loop response for a constant reference speed ensures 0.707 damping ratio and setting time (2% error band) less than 2 sec. Give the circuit for the realization of the controller you have designed.	3	CO6, CO7
15	Explicate the consequences of adding a zero in the forward path and feedback path of a feedback control system for a type 1 second order plant. Provide the analytical justifications of your answer	3	CO3, CO6

NITDGP/BTECH/Reg/Even/2021-22

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

Even Semester End-term Examination, 2021-22

Course Code: EEC432 Full Marks: 30

Course Name: Electrical Machines Time: 90 minutes

Question Paper No.: NITDGP/EEC432/1 Date of Exam: 28/04/2022

Question No.	Body of the Question	Marks	Mapped CO
1.	Short answer type question: Answer any ten ,2 marks each.	2*10=20	
a.	Why is the autotransformer not used as distribution transformer and isolation for the circuit?	2	CO2 &CO3
b.	The air gap between stator and rotor of an induction motor is made very small or large, answer with proper justification.	2	CO2 &CO3
c.	Mention the importance that the slots on the rotor of an induction motor are usually skewed and for inserting additional resistance in rotor circuit of a slip ring induction motor?	2	CO2 &CO3
d.	Why the no load current of an induction motor is much higher than that of an equivalent transformer.	2	CO2, CO3 &CO4
e.	Mention the advantages and draw backs of cage rotor induction motor.	2	CO2
f.	The power factor of an induction motor is low at starting---justify and derive the condition of maximum starting torque at starting.	2	CO2 &CO3
g.	How will you improve the starting torque of an induction motor, answer with proper justification? And for which type of motor?	2	CO2 &CO3
h.	A three phase, 50 Hz induction motor has a full load speed of 960 rpm. Calculate the speed of the rotor field with respect to (i) rotor structure, (ii) stator structure and (iii) stator field.	2	CO5
i.	The power input to the rotor of a 440 V, 50 Hz, 6 pole induction motor is 60 kW. It is observed that the rotor e.m.f. makes 90 complete cycle per minute. Calculate the mechanical power developed.	2	CO5
j.	Distinguish in between the salient and non-salient pole synchronous machines.	2	CO2
k.	Mention the importance that the field winding is placed in the rotor for synchronous machines.	2	CO2 &CO3
l.	Mention the effect of armature reaction with justification for an Alternator.	2	CO5
2.	MCQ type: Answer any ten ,1 mark each.	10*1=10	

Course Outcomes:

- CO 1: Theory of electromechanical energy conversion, the concepts of voltage generation and fundamental torque equation.
- CO2: Basic understanding of the principles of operation and construction of direct and alternating current machines and transformers.
- CO3: A study of theory and concept of Electric Machines (AC & DC).
- CO4: Deriving equivalent circuit of electrical machines.
- CO5: Studying the performance and characteristics of Electrical machines (AC & DC).

a.	In an autotransformer of voltage ratio V_1/V_2 and $V_1 > V_2$, the fraction of power transformed inductively is (i) $V_1/(V_1+V_2)$, (ii) V_2/V_1, (iii) $(V_1-V_2)/(V_1+V_2)$, (iv) $(V_1-V_2)/V_2$.	1	CO3
b.	A 100/10 V, 50 VA double winding transformer is converted to 100/110 V autotransformer. The rating of autotransformer is (i) 550VA/ (ii) 500VA, (iii) 110 VA, (iv) 100 VA.	1	CO3
c.	Which of the following statements about a cage rotor induction motor is incorrect? (i) It has no commutator no slip ring, (ii) It is robust and instructible in construction, (iii) It has high starting torque, (iv) Almost 90 percent of induction motors are of this type.	1	CO2
d.	The operation of induction motor is based on (i) Lenz's law, (ii) Ampere's law, (iii) Principle of mutual induction, (iv) Principle of self-induction.	1	CO3
e.	The rotor of three phase induction motor rotates in the same direction as that of stator rotating field. This can be explained by (i) Faraday's law electro-magnetic induction, (ii) Lenz's law, (iii) Newton's law of motion, (iv) Fleming's right-hand rule.	1	CO3
f.	An induction motor in general analogous to (i) two winding transformers with secondary short circuited, (ii) two winding transformers with secondary open circuited, (iii) autotransformer, (iv) none of the above.	1	CO2 &CO3
g.	A 4 pole, three-phase induction motor is running at 4 percent slip at full load. If the speed of the motor is 720 rpm, the supply frequency is (i) 50/3 Hz, (ii) 25 Hz, (iii) 50 Hz, (iv) 60 Hz.	1	CO5
h.	For a slip ring induction motor, if the rotor resistance is increased then (i) Starting torque and efficiency increase, (ii) Starting torque and efficiency decrease, (iii) Starting torque decreases but efficiency increases, (iv) Starting torque increases but efficiency decreases.	1	CO2
i.	Which one of the following is the primary reason for placing field on the rotor in an alternator? (i) Small power in the field circuit, (ii) Insulation of high voltage is made easy on stator than on rotor, (iii) Large power in stator, (iv) Large current in stator.	1	CO2
j.	Which type of alternator is used in hydro-electric power station? (i) Non-salient pole alternator, (ii) Turbo alternator, (iii) Salient pole alternator, (iv) Steam turbine alternator.	1	CO1 & CO2
k.	The open circuit voltage and short circuit current of a 3 phase, star connected alternator are 1050 V and 250 A respectively. Its field current is 12 A. Then the synchronous impedance of alternator will be (i) 1.34 ohm, (ii) 1.69 ohm, (iii) 2.42 ohm, (iv) 2.85 ohm.	1	CO3
l.	What happens if the field winding of the synchronous motor is short-circuited? (i) First, starts as induction motor then run as synchronous motor, (ii) Not start, (iii) Motor will burn out, (iv) Run as induction motor.	1	CO2 &CO3

NATIONAL INSTITUTE OF TECHNOLOGY DURGAPUR

Even Semester End-term Examination, 2021-22

Course Code: EEC601 Full Marks: 30

Course Name: Advanced Power Systems Time: 90 Minutes

Question Paper No.: NITDGP/EEC601/ Date: 18-04-2022

Instructions: Answer any Two questions from the following

Materials to be supplied: Graph paper shall be supplied, if required.

Q. No.	Question	Marks	Mapped CO
1	**(a)** Describe the electric field distribution of two types of geometrical configuration of electrodes and application of High Voltage in power system. **(b)** Prove the Paschen's Law for breakdown of Gases i.e. V=f(Pd), where V is the Breakdown voltage, 'P' is pressure and 'd' is the distance between the electrodes from the derivation of Townsend's breakdown coefficients. **(c)** Explain Electromechanical & Thermal breakdown phenomenon for solid dielectrics.	15 (4+4+7)	CO1 & CO2
2	**(a)** Build the 'Cascade connection of three identical Transformers' for generating of AC high voltage of 750 KV, 3 A with an input voltage regulator of 0-230V/0-1000V, draw & explain it with neat sketch and proper caption of voltage & current ratings of each transformer. **(b)** A modified impulse generator has eight stages with each condenser rated for 0.25 μF, 100kV. The load capacitor is of 500 pF and the front and charging resistances are 100 Ω and 100 k Ω respectively. Find out the output voltage, tail resistance needed to produce 1.2/50μs impulse wave. **(c)** Describe the procedure of Impulse High Voltage test of a transformer with neat sketch and wave shapes.	15 (7+4+4)	CO2 & CO4
3.	**(a)** Distinguish between steady state and transient stability of a power system. **(b)** A double circuit three phase feeder connects a single generator to a large network. The power corresponding to the limit of steady state stability for each circuit is 100 MW. The line is transmitting 80 MW, when one of the circuits is suddenly switched out. Determine the reference to appropriate diagram whether the generator is likely to remain synchronism. **(c)** The fuel costs of a two-unit plant are given by $C_1 = 100 + 2P_1 + 0.005\ P_1^2$ $C_2 = 200 + 2P_2 + 0.01\ P_2^2$ Where P_1 and P_2 are in MW. The plant supplies a load of 450 MW, Find economic load scheduling of the two units and incremental fuel cost, Neglect losses.	15 (3+ 6+6)	CO6 & CO7

Course Outcomes:

CO1: To understand basics of High Voltage Engineering & power system stability

CO2: To design the insulation system and load management module

CO4: To learn about the testing of High Voltage power apparatus

CO6: Given specification of stability analysis leads to modelling of power system equipment's like transmission line, generator and design system to obtain operating limits to satisfy the reliability criteria.

CO7: Given specification leads to knowledge of regulation of active, reactive power and frequency of any system and its application in optimal load flow and scheduling

NIT, DURGAPUR, B. Tech, EE, 6th Semester, End Semester Examination, 2022

Subject: Microprocessor & Microcontroller, Subject Code: EEC602

Question No. 1 is compulsory. Attempt any four questions from the rest,

Time: 1.5 hour, Full Marks 30

1. Read the following program, and answer the questions: **[5 X 2]**

```
2000 LXI   SP, 2100H
2003 LXI   B, 0000H
2006 PUSH B
2007 POP   PSW
2008 LXI   H, 200BH
200B CALL 2064H
200E OUT   01H
2010 HLT


2064 PUSH H
2065 PUSH B
2066 LXI   B, 80FFH
2069 DCX   B
206A MOV  A, B
206B ORA   C
206C JNZ   2069
206F POP   B
2070 RET
```

(a) What is the status of the flags and the contents of the accumulator after the execution of the POP instruction located at 2007 H?
(b) Specify the stack locations and their contents after the execution of the CALL instruction (not the CALL subroutine)

(c) What are contents of the stack pointer register and the program counter, after the execution of the CALL instruction?

(d) Specify the memory location where the program returns after the subroutine.

(e) What is the ultimate fate of this program?

2. Write short notes on (any two) of the following: **[2.5 x 2]**

(a) ADC

(c) DAC

(d) 8255

3. Specify the register contents A and B, and the flag status S, Z and CY as the following instructions are executed. **[5]**

```
XRA  A
MVI  B, 4AH
SUI  4FH
ANA  B
HLT
```

4. a) Explain the operations of following pins of 8085: **[5 x1]**

(i) HOLD (ii) TRAP

(b) Explain about the following instructions of 8085:

(i) SHLD D100H (ii) DAD D (iii) XTHL

5. Show the schematic, of interfacing I/O device using memory Mapped 1/0 Technique, with address FFF9H. **[5]**

6. Design a circuit for interfacing 8K EEPROM and 16K RAM with 8085 Microprocessor, so that the RESET location is mapped in EEPROM and the SP can be located in the RAM address of FFFF (H). **[5]**

7. Design a circuit for interfacing 8 DIP switches and 8 LED devices with address 00 (H) and 04 (H) respectively using I/O mapped I/O address decoding technique. **[5]**