Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE202

Course Name: SYNCHRONOUS AND INDUCTION MACHINES (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

(Graph sheets may be supplied)

1 Compare salient pole & cylindrical rotor type of alternators. (5)

2 What is armature reaction? Explain the effects of armature reaction in an alternator. (5)

3 Draw the phasor diagram of a salient pole alternator working at a lagging power factor and derive an expression for the regulation. (5)

4 Sketch and explain the V and inverted V- curves of a synchronous motor. (5)

5 What is the need for starter in a 3-Φ induction motor? Explain the principle of operation of a star – delta starter. (5)

6 Sketch the equivalent circuit of a double cage induction motor and explain the parameters. (5)

7 Explain the principle of operation of synchronous induction motor. What are its advantages over synchronous motors? (5)

8 Why is a 1-Φ induction motor not self starting? How is it made self starting? (5)

PART B

Answer any twofull questions, each carries 10 marks.

9 a) Define pitch factor and distribution factor as related to an ac winding. Derive expressions for both. (4)

b) A 3-Φ, 10 pole alternator has 2 slots/ pole/ phase on its stator with 10 conductors per slot. The air gap flux is sinusoidally distributed and equals 0.05 Wb. The stator has a double layer winding with a coil span of 150^{o}E. If the alternator is running at 600 rpm, calculate the emf generated /phase at no load. (6)

10 a) The following data pertains to a 5000kVA, 6600 V, 3-Φ, 50 Hz star connected alternator. (10)

Field current	32	50	75	100	140
OC voltage	3100	4900	6600	7500	8300
ZPF voltage (line) (full load)	0	1850	4250	5800	7000

Determine the regulation by ZPF method at full load unity power factor. Neglect

armature resistance. Draw its phasor diagram also.

11 a) How do harmonics affect the emf generated in an alternator? What are the techniques used to minimise these harmonic voltages in the induced emf? (4)

b) A 3-Φ, 10 kVA, 400 V, 50 Hz, star connected alternator supplies the rated load at 0.8 pf lag. If the armature resistance is 0.5Ω and synchronous reactance is 10Ω, find the load angle and voltage regulation. (6)

PART C

Answer any twofull questions, each carries 10 marks.

12 a) Explain the procedure for conduct of slip test using a neat circuit diagram. (4)

b) The efficiency of a 3-Φ, 400 V, star connected synchronous motor is 95 % and it takes 24A at full load, upf. What will be the induced emf and mechanical power developed at full load, 0.9 pf lead. The synchronous reactance is (0.2+ j2)Ω. (6)

13 a) Describe with the help of a neat circuit diagram, the two bright and one dark lamp method of synchronising an alternator to the AC mains. (4)

b) A 6-pole, 50 Hz,3-Φ induction motor running on full load develops a useful torque of 150 Nm at a rotor frequency of 1.5 Hz. Calculate the shaft power output. If the mechanical torque lost in friction is 10 Nm, determine a) rotor copper loss b) input to the motor c) the efficiency. The total stator loss is 700 W. (6)

14 a) Describe a set of torque slip characteristics of a 3-Φ induction motor. Explain the effect of change in rotor resistance on the characteristics. (4)

b) Two 3-Φ, 6.6 kV star connected alternators supply a load of 3000kW at 0.8 pf lag. The synchronous impedance/phase of machine A is 0.5 + j 10 Ω and that of machine B is 0.4 +j12 Ω. The excitation of machine A is adjusted so that it delivers 150 A at a lagging power factor and the governors are so set that the load is equally shared between the machines. Determine the current, power factor and induced emf of each machine. (6)

PART D

Answer any two full questions, each carries 10 marks.

15 a) What is "Crawling" in induction motors? What are its causes and how can it be eliminated? (5)

b) Draw the equivalent circuit of a 1-Φ induction motor and explain how it is used to predetermine the performance of the machine. (5)

16 a) A 3-Φ, 400 V, 14.91 kW induction motor gave the following test results. (6)

NL test : 400 V, 1250 W, 9A.

BR test : 150 V, 4000 W, 38 A.

Draw the circle diagram and determine the full load current, power factor, slip and efficiency.

b) With a neat diagram, explain the capacitor start and run type of induction motor. (4)

17 a) Describe the principle of operation of an induction generator. Compare grid connected and self excited type of induction generators. (5)

b) Describe any two methods of speed control of a 3-Φ induction motor. (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE202

Course Name: SYNCHRONOUS AND INDUCTION MACHINES (EE)

Max. Marks: 100 ***Graph sheets shall be provided.*** Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

1		Derive the emf equation of an alternator.	(5)
2		Draw the phasor diagram of a cylindrical rotor type alternator with a) unity power factor load and (b) leading power factor load	(5)
3		Write the necessary conditions for synchronization of alternators.	(5)
4		Synchronous motor is not self starting. Why?	(5)
5		What is crawling in induction motor? How it can be eliminated?	(5)
6		Explain V/f speed control method in 3 phase induction motor.	(5)
7		Explain the working principle of synchronous induction motor?	(5)
8		Why single-phase induction motor is not self-starting? Also draw its torque - slip curve?	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	Compare salient pole alternator with smooth cylindrical alternator?	(4)
	b)	A 3-phase, 8 pole, 750rpm, star connected alternator has 72 slots on armature. Each slot has 12 conductors and winding is short pitched by two slots. Find the induced emf between the lines , given flux per pole 0.06 Wb.	(6)
10		Following test results are obtained on a 6600V alternator	(10)

Open circuit voltage in volts	3100	4900	6600	7500	8300
Field currents in Amperes	16	25	37.5	50	70

A field current of 20A is found to circulate full load current on armature with short circuited. Calculate full load regulation at 0.8 pf lag by using mmf method. Neglect armature resistance.

11	a)	Explain the causes of harmonics in alternators? How it can be eliminated?	(5)

b) A 3-phase star connected alternator supplies a load of 1000kW at a pf of 0.8 lagging with a terminal voltage of 11kV. Its armature resistance is 0.4Ω per phase while synchronous reactance is 3Ω per phase. Calculate the line value of emf induced and full load regulation. (5)

PART C

Answer any twofull questions, each carries 10 marks.

12 a) Explain the procedure to conduct slip test with a neat circuit diagram (5)

b) Explain synchronisation of alternators using dark lamp method. (5)

13 a) Explain any one method of starting of synchronous motor. (4)

b) A 2000V, 3-phase, 4 pole star connected synchronous motor runs at 1500 rpm. The excitation is constant and corresponds to an open circuit voltage of 2000V. The resistance is negligible compared to synchronous reactance of 3Ω per phase. Determine power input, power factor, torque developed for an armature current of 200A (6)

14 a) Explain the effect of change in excitation of an alternator? (5)

b) A 400V, 4-pole, 3-phase, 50Hz, star connected induction motor has rotor resistance and reactance per phase 0.01Ω and 0.1Ω respectively. Determine a) starting torque b) slip at maximum torque and c) maximum torque. Given rotor to stator turns is 0.25. (5)

PART D

Answer any twofull questions, each carries 10 marks.

15 Draw the circle diagram of a 20 Hp, 400 V, 50 Hz, 3-phase, star-connected induction motor from the following test data (line values) (10)

No load Test : 400V, 9 A , 0.2 pf

Blocked Rotor Test : 200V, 50 A, 0.4 pf

From the circle diagram, find the line current and power factor at full load.

The stator and rotor copper losses are divided equally in the blocked rotor test.

16 a) Explain with neat diagram, star-delta starter in 3-phase induction motor. (5)

b) Compare induction generator with synchronous generator. (5)

17 a) Explain types of single-phase induction motors with relevant figures? (8)

b) Draw the equivalent circuit of single-phase induction motor (2)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: EE202

Course Name: SYNCHRONOUS AND INDUCTION MACHINES

Max. Marks: 100 Duration: 3 Hours

Graphs sheets shall be supplied.

PART A

Answer all questions, each carries 5 marks. Marks

1 Explain the term pitch factor in an alternator and derive an expression for it. Also discuss the effect of short pitching on harmonics. (5)

2 Define armature reaction. Explain the effect of armature reaction on the terminal voltage of an alternator at zero leading power factor load. (5)

3 Explain why X_d and X_q are different for salient pole alternators whereas they are the same for the smooth rotor machines. (5)

4 Explain the working of a synchronous condenser. (5)

5 How would you rate the performance of an autotransformer starter with a DOL starter used in an induction motor? (5)

6 Equivalent circuit parameters of a 3 phase induction motor can be determined from no load and blocked rotor tests. Justify. (5)

7 Explain the principle of shaded pole induction motor with suitable diagram. (5)

8 Using equivalent circuit prove that the induction machine becomes a generator when the machine is driven above synchronous speed. (5)

PART B

Answer any two full questions, each carries 10 marks.

9 a) Differentiate between salient pole type and cylindrical type alternator with sketches. (5)

b) Derive the EMF equation of an alternator. (5)

10 The open-circuit test data for a 3-phase, 3.5 MVA, 4.16 kV, 50 Hz star connected synchronous generator are given below. (10)

Open-circuit characteristic:

I_f (A)	50	100	150	200	250	300	350	400	450
V_{OC} (line) (kV)	1.62	3.15	4.16	4.75	5.13	5.37	5.55	5.65	5.75

A field current of 200A is found necessary to circulate full load current on short circuit of the alternator. The machine supplies full-load at a p.f. of 0.8 lagging. Determine its voltage regulation by (i) EMF method (ii) MMF method. Neglect resistance.

11 a) Show that the output emf wave of an alternator do not contain even harmonics. (5)

b) Find the distribution factor and pitch factor of a 3 phase 4 pole 24 slots alternator having its armature coils short pitched by one slot. (5)

PART C

Answer any two full questions, each carries 10 marks.

12 a) Derive the expression for mechanical power developed in a cylindrical rotor type synchronous motor. (6)

b) A 2.3kV, 3 phase star connected synchronous motor has Z_s = (0.2 + j 2.2) ohms per phase. The motor is operating at 0.5pf leading with a line current of 200A. Determine the induced emf per phase. (4)

13 a) Derive an expression for developed torque in a 3-phase induction motor and find the condition for maximum torque. Also sketch the torque-slip curve. (6)

b) A 746KW, 3-phase, 50Hz, 16 pole induction motor has a rotor impedance of (0.02+j0.15) ohm at stand still. Full load torque is obtained at 360 rpm. Calculate (i) the ratio of maximum to full load torque and (ii) the speed corresponding to max torque. (4)

14 a) Explain the effect of change in excitation in parallel operation of alternators. (6)

b) The power input to a 500V, 50Hz, 6-pole, 3-phase induction motor running at 975 rpm is 40KW. The stator losses are 1KW and the friction and windage losses total 2KW. Calculate: (i) the slip (ii) the rotor copper loss (iii) shaft power and (iv) the efficiency. (4)

PART D

Answer any two full questions, each carries 10 marks.

15 Draw the circle diagram for a 3.73kW, 200V, 50Hz, 4 pole 3 phase star connected induction motor from the following data : (10)

No load Test : 200V, 5A, 350W

Blocked Rotor Test: 100V, 26A, 1700W

Rotor copper loss at stand still = half of the total copper loss

Construct the circle diagram and estimate: (i) full load current, (ii) power factor at full-load and (iii) maximum torque in terms of full-load torque.

16 a) Explain the phenomenon crawling as applied to induction motor. (5)

b) Explain how pulling into step is achieved in synchronous induction motor. (5)

17 a) Differentiate between plugging and regenerative braking as applied to induction motors. (4)

b) If the standstill impedance of the outer cage of a double cage induction motor is (2+j0.4) ohm and of the inner cage is (0.4+j2) ohm, compare the relative torques of two cages (i) at standstill (ii) at a slip of 5%. (6)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: EE202

Course Name: SYNCHRONOUS AND INDUCTION MACHINES (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks. Marks

Graph sheets may be supplied

1		Derive the expressions for 'Distribution factor' and prove that distribution factor approaches a constant value as number of slots/pole increases.	(5)
2		Explain the EMF method of determining voltage regulation of an alternator.	(5)
3		Explain the effects of change in excitation when two alternators are connected in parallel.	(5)
4		A 2 pole, 3-phase Induction motor runs at 2910 rpm on a 50Hz supply. Find (i) synchronous speed and (ii) frequency of rotor emf.	(5)
5		Describe the constructional feature of double cage induction motor to obtain large starting torque.	(5)
6		Explain how the shunt parameters of the equivalent circuit of a 3-phase Induction motor can be obtained from no-load test.	(5)
7		Explain the principle of operation of an Induction generator.	(5)
8		Explain the working of shaded pole motor.	(5)

PART B

Answer any two full questions, each carries 10 marks.

9	a)	Derive the expression for pitch factor. Also find the value of short pitching angle to eliminate fifth harmonics completely.	(6)
	b)	Derive the emf equation of an alternator. (Expressions for pitch and distribution factors need not be derived)	(4)
10		A 3-phase, 4-pole, star connected alternator has a smooth cylindrical type rotor. The effective resistance and synchronous reactance per phase are 0.15Ω and 2.5Ω respectively. Calculate the voltage regulation when delivering 250 A at 6.6 kV at different power factors of (i) 0.6 pf lagging. (ii) upf (iii)0.8 pf leading.	(10)

11 a) A 3-phase, 4 pole, 50 Hz, synchronous generator has 48 slots in which double layer winding is housed. Each coil has 10 turns short pitched by an angle of 36^0 electrical. Flux/pole is 0.025 Wb (sinusoidally distributed). Then, for a 3phase, Y connection, find (i) the line to line induced emf (ii) the fifth harmonic component of line to line induced emf. (6)

b) List the effects of armature reaction in a synchronous generator at upf, zero pf lag and zero pf lead? (4)

PART C

Answer any two full questions, each carries 10 marks.

12 Describe the synchronising procedure using dark lamp and bright lamp methods. (10)

13 a) Explain clearly how a rotating magnetic field is setup around the stator of a 3-phase Induction motor when a 3-phase supply is fed to it. (6)

b) Define slip related to an Induction motor. What is the expression for slip? (4)

14 a) Draw the phasor diagram of a salient pole alternator supplying a current which leads line voltage V and lags the generated voltage E. (5)

b) Draw and explain the V-curve and Inverted V-curve of a synchronous motor (5)

PART D

Answer any two full questions, each carries 10 marks.

15 A 4 pole, 50Hz, 415V, 37kW, delta connected , 3-phase Induction motor gave the following test results: (10)
No load test: 415V, 16A, 1.75kW
Blocked rotor test: 100V, 55A, 1.85kW
Draw the circle diagram and find the input line current and input power factor at full load. Assume rotor Cu loss at standstill is equal to half of total Cu loss.

16 Describe the following single phase Induction motors: (i) Capacitor start type and (ii) split phase type with torque-speed characteristics and phasor diagram (10)

17 a) Find the line current drawn from the supply when a 3-phase Induction motor is started using (i) a star-delta starter, (ii) Auto transformer of ratio 0.5, if the line current drawn from the supply is 6A without any starter. (5)

b) Explain the double revolving field theory related to single phase Induction motor. (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE204

Course Name: DIGITAL ELECTRONICS AND LOGIC DESIGN

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all eight questions, each question carries 5 marks.

1. Why is two's - complement methodof representing signed integer numbers preferred over ones complement in digital circuits? What is range of numbers that can be represented using two complement with fourbits.
2. Expand$A + B\,\overline{C} + AB\,\overline{D} + ABCD$ to min-terms and max-terms
3. Obtain the logic function (based on the truth table) needed to implement a half adder circuit using NAND logic.
4. Explain the functioning of Master-Slave J-K flip-flop.
5. Explain the working of Johnson counter.
6. What is meant by synchronous counter? Give an example
7. What is mean by programmable logic devices?
8. Differentiate DAC and ADC

PART B

Answer any two questions, each question carries 10 marks.

9. a. With examples, explain the conversion of a gray code to corresponding binary code sequence and vice-versa. (5)
   b. Reduce the expression f= πM(0,1,2,3,4,7) using K-maps and implement it using NOR logic (5)
10. a. How parity checkers help in finding errors in digital data transmission. (5)
    b. Differentiate the features of CMOS and TTL logic gates. (5)
11. a. With examples, explain the significanceof Octal number system and Hexadecimal number system in digital circuit designs. (4)
    b. Reduce the expression f = ∑ m (0,1,2,3,5,7,8,9,10,12,13) using K-maps and implement the real minimal expression using NAND logic (6)

PART C

Answer any two questions, each question carries 10 marks.

12. What is the purpose of decoder? Explain the functioning of a BCD to Decimal Decoder circuit (10)

13. a. Differentiate Multiplexer and De-multiplexer. With simple examples, explain how they are implemented. (5)
    b. Differentiate SR and JK flip-flops. (5)
14. With the help of neat circuit and timing diagram, explain the functioning of a BCD decade asynchronous counter (MOD10) (10)

PART D

Answer any two questions, each carries 10 marks.

15. Design a counter for the following irregular binary count sequence using J-K flip flops

    001→010→101→ 111 → 001(recycles) (10)

16. a. Draw the truth-table and logic circuit diagram of a Ring counter (5)
    b. What is the basic difference between PAL (programmable Array Logic) and PLA (Programmable Logic Array). (5)
17. Explain the working of
    (i) R-2R Ladder type DAC
    (ii) Successive approximation ADC (5+5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE204

Course Name: DIGITAL ELECTRONICS AND LOGIC DESIGN (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		Convert AD_{16} to its equivalent decimal and binary form.	(5)
2		Express $F = \Pi M(1,5,7)$ using SOPs and POSs and minimize the expression.	(5)
3		What is meant by race around condition? How can it be avoided?	(5)
4		Realise a full adder using the 3x8 decoder.	(5)
5		Explain Johnsons ring counter with an example.	(5)
6		What is the difference between a Moore and Mealy machines? Explain with examples?	(5)
7		Explain the working of a three-bit R-2R ladder DAC.	(5)
8		Implement $F = \Sigma m(2,3,4,5,7)$using PAL.	(5)

PART B

Answer any two questions, each carries 10 marks

9	a)	Determine the range of numbers that can be represented using signed bit, 1's complement and 2's complement form for a word length of 8 bits. Also represent and using word length of 8 bit in signed bit, 1's complement and 2's complement form.	(5)
	b)	Digital data is to be transmitted with even parity for transmitting the letter A in ASCII code. Discuss how is parity added to digital data to detect errors in transmission?	(5)
10	a)	Draw and explain the operation of TTL NAND gate.	(5)
	b)	Simplify the Boolean expression using K-map and draw the logic diagram. $F(A,B,C,D) = \sum m(0,1,5,12,13,15) + d(1,3,56)$	(5)
11	a)	Convert gray code to binary and hexadecimal.	(3)
	b)	Minimize the Boolean expression F=AB'C'+C'D+BD'+A'C using K -map and implement the logic circuit using NAND gates only.	(7)

PART C

Answer any two questions, each carries 10 marks

12 a) Realise the Boolean expression $F = \Sigma m(1,5,7,15)$ using a 4 x 1 Multiplexer (5)

b) Realise a full adder using two half adders. (5)

13 a) Discuss the different types of shift registers. (5)

b) Design a 3 bit asynchronous counter using JK flip flops. (5)

14 a) What is a glitch? Show the timing diagram for a Mod 6 asynchronous counter showing the glitches in the diagram. (5)

b) How can a 2:4 decoder be used as 1:4 Demultiplexer? (5)

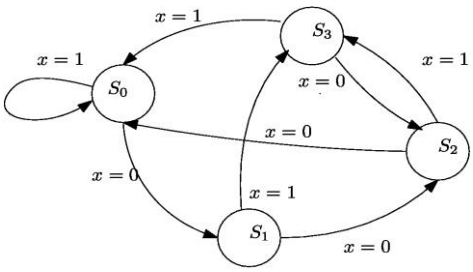
PART D

Answer any two questions, each carries 10 marks

15 a) Develop the logic circuit diagram and table for 4 -bit ring counter and explain the working. (5)

b) Explain the working of Flash type ADC. (5)

16 Develop the state diagram and design the sequential circuit using T flip flops. Also, draw the logic circuit diagram. (10)



$S_0 = 101, S_1 = 111$

$S_2 = 110, S_3 = 011$

17 a) Bring out the differences between a PAL and PLA. (4)

b) Write a VHDL program for a Full Adder (use structural approach). (6)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S),DECEMBER 2019

Course Code: EE204

Course Name: DIGITAL ELECTRONICS AND LOGIC DESIGN

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1	a)	Convert $9B30_{16}$ to decimal .	5
	b)	Subtract $5C_{16}$ from 94_{16} .	
2		Convert Y=AB + B'CD into a product of max terms by algebraic method.	5
3		Design a full subtractor and show that it can be realized using two half subtractors.	5
4		Realize an S-R flip flop using D flip flop.	5
5		What is the importance preset and clear pin in flip flops? How they are utilised when designing a counter .	5
6		Explain Moore state machine model	5
7		Draw the schematic of a successive approximation A/D converter and explain working	5
8		Differentiate ROM, PLA and PAL circuits	5

PART B

Answer any two questions, each carries 10 marks

9	a)	Explain the gray code 10110010101 to binary numbers	3
	b)	Convert 1010.011_2 into decimal number	3
	c)	Add the hexadecimal numbers $DF_{16} + AC_{16}$	4
10	a)	Differentiate the methods of binary subtraction using 1's complement and 2's complement methods with suitable example.	5
	b)	Obtain the canonical product of sum form of the following function; F(A,B,C) = (A+B')(B+C)(A+C')	5
11	a)	Apply De-Morgan's theorems to the following expression (ABC)' + (D'+E)'	5
	b)	Using karnaugh map, simplify the expression $F(A,B,C,D) = \sum (0,2,3,5,7,8,13) + d(1,6,12)$	5

PART C

Answer any two questions, each carries 10 marks

12	a)	Design a full adder circuit with decoder I C	5

	b)	Realize a 4 bit parallel binary adder with look ahead carry generator	5
13	a)	Implement the function F(A,B,C,D) =∑(0,1,3,4,8,9,15) using a suitable multiplier	5
	b)	What is the race around condition of a J-K flip flop? How can it be avoided	5
14	a)	Show how a T flip flop can be converted to S-R flip flop	5
	b)	Draw a parallel in –serial out (PISO) register and explain its working	5

PART D

Answer any two questions, each carries 10 marks

15	a)	Explain why Johnson counter have decoding gates,where as Ring counter does not?	5
	b)	Explain the design of a synchronous counter with modulus < 2^n ,take MOD -5 counter as an example to illustrate	5
16	a)	Construct a Johnson counter for 12 timing sequences.	5
	b)	Describe flash ADC and integrating type ADC	5
17	a)	Design and implement a half adder and a full adder using VHDL	5
	b)	Explain FPGA and what are the advantages of FPGA over other types of PLD	5

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech S4 (S) Exam Sept 2020

Course Code: EE204

Course Name: DIGITAL ELECTRONICS AND LOGIC DESIGN (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		Convert	
	a)	$(2469)_{10}$ in to BCD.	(1)
	b)	$(735)_8$ to decimal.	(1)
	c)	$(650)_{10}$ to hexadecimal, gray and binary.	(3)
2		Using Boolean algebra prove that (A + B) (A'+C) = AC +A'B.	(5)
3		Design a full subtractor logic circuit.	(5)
4		Explain SISO and SIPO shift registers.	(5)
5		Draw the logic diagram and timing sequence of a 4-bit ring counter.	(5)
6		Prepare the state table and derive the logic expression for each flip flop input for a 3-bit binary synchronous down counter using T flip flop?	(5)
7		Explain the working of R-2R ladder type DAC.	(5)
8		Compare PAL and PLA.	(5)

PART B

Answer any two questions, each carries 10 marks

9	a)	Given X= 38_{10} and Y= 105_{10}. Using 2's complement method calculate (i) X-Y (ii) Y-X	(5)
	b)	How is the error detection and correction carried out using parity method in digital data transmission?	(5)
10	a)	Using K map, minimize the expression $F(A,B,C,D) = \sum m(1,2,3,8,14,15) + d(0,4,6,10)$.	(5)
	b)	Realize the Boolean expression Z=ABC + AD + CD' using NAND gates only.	(5)
11	a)	Explain a CMOS NAND gate .	(5)
	b)	Find the standard Product of Sum (POS) for the logic expression F=(A + B'C) C	(5)

PART C

Answer any two questions, each carries 10 marks

12 Develop a 3-stage carry look ahead adder and implement using basic gates. (10)

13 Realize the following function F(A,B,C,D) = ∑m(1,3,4,10,11,12,13) using

(i) 4 X 1 MUX (ii) 8 X 1 MUX (10)

14 a) Explain a 3 bit asynchronous up counter. Draw the timing diagram and truth table. (5)

b) Draw the logic diagram of J-K flip flop and explain it. What is the advantage of J-K flip flop over S-R flip flop. (5)

PART D

Answer any two questions, each carries 10 marks

15 Design a 3-bit gray code synchronous counter using J-K flip flop and explain the steps in detail. (10)

16 a) Compare Mealy and Moore state machine models with example. (5)

b) Differentiate between ROM and RAM. (5)

17 a) Implement a full adder circuit using VHDL (5)

b) Explain the working of successive approximation ADC. Mention the advantages and disadvantages. (5)

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Reg. No._____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE206

Course Name: MATERIAL SCIENCE

Max. Marks:100 Duration: 3 Hours

PART A

Answer all questions.

1. How the dielectrics are thermally classified? (5)
2. What are compound semi conductors ? specify examples with application (5)
3. Explain Townsend criteria for breakdown of gaseous dielectrics (5)
4. Derive Curie- Weiss law for magnetic materials. Explain ferromagnetism (5)
5. What is carbon nano tube? Give its application (5)
6. Define super conductivity. What are the applications of superconductive materials in electrical engineering (5)
7. What are the classification of solar cells based on their technology? (5)
8. Write note on atomic absorption spectrography (5)

PART B

Answer any 2 questions

9. (a). What is meant by mobility, mean freepath, and relaxation time in conduction Phenomenon? (6)

   (b).Why carbon is used as brush in electrical machines? (4)

10. (a) Explain the difference in conduction properties of conductors, semiconductors and insulators on the basis of energy band diagram? (6)

(b) What are ferrites? Give two applications of Ferrites. (4)

11. (a) What are the properties of SF_6 gas as a dielectric material? Give one example.

What is the effect when it is mixed with N_2 ? (6)

(b) Write a note on common insulating materials with their applications? (4)

PART C

Answer any 2 questions

12. What are the mechanisms of breakdown in solid dielectrics? (10)

13. Explain the method of processing of Transformer oil? (10)

14. (a) Enumerate the magnetic materials used in electrical machines and relays? (6)

(b) What is meant by spontaneous magnetization? Give examples of materials exhibiting this property. (4)

PART D

Answer any 2 questions

15. a)Explain the difference between Type I and Type II superconductors on the basis of Messner effect? (6)

b) What are the materials used for making thin film solar cells? Give applications of thin film solar cells . (4)

16. a) Explain photo voltaic conversion. What are the advantages of solar power? (6)

b) Compare and contrast photo thermal conversion and photo voltaic conversion. (4)

17. Explain various techniques used for materials study. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE206

Course Name: MATERIAL SCIENCE (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks

1		Define polarization and what are different polarization processes?	(5)
2		Explain the properties of Mica and Ceramics.	(5)
3		List any five characteristics of SF_6.	(5)
4		Explain Curie Wiess law.	(5)
5		Explain superconductivity and its applications.	(5)
6		What are the materials used for solar cells? Explain.	(5)
7		Write short notes on bio materials.	(5)
8		What is photoelectron spectroscopy? Explain.	(5)

PART B

Answer any two questions, each carries 10 marks

9	a)	Derive Claussius-mosotti relation.	(5)
	b)	What are compound semiconductors?	(5)
10	a)	Differentiate organic and inorganic insulators.	(4)
	b)	Why SF_6 gas is used in circuit breakers?	(3)
	c)	What are the insulating materials used in capacitor materials?	(3)
11	a)	Explain different types of polarizations in dielectrics.	(6)
	b)	What do you mean by insulating materials? Explain its classification based on temperature.	(4)

PART C

Answer any two questions, each carries 10 marks

12	a)	Explain streamer theory of breakdown in gases.	(6)
	b)	Define suspended particle theory.	(4)
13	a)	Explain properties and applications of iron.	(6)
	b)	Explain the applications of magnetic materials in electrical machines.	(4)
14	a)	How breakdown occur in vacuum insulators? Explain any one mechanism.	(6)

b) Explain transformer oil treatment method. (4)

PART D

Answer any two questions, each carries 10 marks

15 Explain

1. Antireflection coating
2. Solar selective coating (10)
3. Cold mirror coating

16 a) Explain atomic absorption spectroscopy. (5)

b) Explain the different characteristic properties of superconductors. (5)

17 Explain different types of electron microscopy and their applications. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: EE206

Course Name: MATERIAL SCIENCE

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Mark

1		Explain how the conductivity of conducting materials vary with temperature and composition	(5)
2		What do you mean by ferroelectricity? Name any two ferroelectric materials.	(5)
3		What are the factors influencing ageing of insulators?	(5)
4		Differentiate between soft and hard magnetic materials.	(5)
5		What are the materials used for the solar sell?	(5)
6		Why solar selective coating is used in solar system?	(5)
7		What do you mean by optical microscopy? Explain with diagram.	(5)
8		How the nanomaterials are classified?	(5)

PART B

Answer any two questions, each carries 10 marks

9	a)	Explain the behaviour of dielectrics in alternating field.	(7)
	b)	Name any three alloys of copper and explain its composition.	(3)
10	a)	Explain physical and chemical properties of SF6.	(6)
	b)	What are the polymeric organic materials used in electrical apparatus?	(4)
11	a)	Why SF6 gas is mixing with nitrogen for industrial applications?	(4)
	b)	What are the materials used for solders and contacts?	(6)

PART C

Answer any two questions, each carries 10 marks

12	a)	Explain the mechanism of breakdown in gases dielectrics	(7)
	b)	Why transformer oil testing is so important?	(3)
13	a)	Explain the classification of magnetic material based on magnetic diploes.	(6)
	b)	What is ferrites? Explain its properties	(4)
14	a)	Derive the Townsends current growth equation for primary ionization.	(5)
	b)	Write five applications of iron alloys.	(5)

PART D

Answer any two questions, each carries 10 marks

15	a)	Explain the Photo-thermal solar energy conversion with figure.	(6)
	b)	What are the main applications of superconducting materials?	(4)
16	a)	Draw and explain the schematics of Atomic Absorption Spectroscopy	(10)
17	a)	What are the organic solar cells? Explain its advantages.	(6)
	b)	Write short notes on importance of biomaterials.	(4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: EE206

Course Name: MATERIAL SCIENCE (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks

1	What are the properties of materials utilised in (i) Rheostats (ii) Solders? Also mention some of the materials used for the above.	(5)
2	Write a short note on 1) spontaneous polarization and 2) ferroelectric materials and its applications	(5)
3	Explain the testing procedure of transformer oil.	(5)
4	Write notes on the magnetic materials used in (i) Electrical machines (ii) Relays	(5)
5	Differentiate Type I and Type II superconductors.	(5)
6	What is the significance of organic solar cells?	(5)
7	Explain optical microscopy.	(5)
8	Define nanomaterial. Highlight any two possible a) applications and b) its limitations or major challenges.	(5)

PART B

Answer any two questions, each carries 10 marks

9	a)	Derive Clausius – Mosotti relation.	(5)
	b)	Define dielectric polarization and write the expression relating polarization P, Electric field E and permittivity $\varepsilon_r\varepsilon_0$. Comment on its physical significance.	(5)
10		Explain a good insulating material in terms of its a) Electrical b) Mechanical c) Thermal. d) Chemical properties.	(10)

11	a)	State properties and applications of any two inorganic insulators.	(5)
	b)	Obtain the expression for conductivity in intrinsic semiconductors.	(5)

PART C

Answer any two questions, each carries 10 marks

12	a)	Define Townsend's first and second ionisation coefficients.	(4)
	b)	Derive the Townsend's criterion for spark	(6)
13	a)	Write short notes on intrinsic breakdown in solid dielectrics.	(5)
	b)	Explain origin of permanent magnetic dipoles.	(5)
14	a)	How magnetic materials are classified?Explain any four types of them with example.	(6)
	b)	State Curie –Weiss Law	(4)

PART D

Answer any two questions, each carries 10 marks

15	a)	Explain the concept of superconductivity. Also draw the magnetic field Vs Temperature characteristics.	(5)
	b)	Describe the fundamental principle behind atomic absorption spectroscopy.	(5)
16	a)	Why solar selective coatings are required? Give examples.	(5)
	b)	Explain the fundamentals of (i) Photo thermal conversion (ii) Photo voltaic conversion	(5)
17	a)	Describe electron microscopy with appropriate schematic diagram.	(5)
	b)	Explain photo electron spectroscopy.	(5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EE208

Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		Define the following terms in measurement i) Accuracy ii) Resolution iii) Precision	(5)
2		Write short notes on Electronic Energy Meters.	(5)
3		Write short notes on clamp-on meters.	(5)
4		What are RPM Sensors, what are their types?	(5)
5		What is the general principle of operation of AC potentiometer, what are its types?	(5)
6		What is Maxwell's bridge? Derive the equation of balance for the bridge.	(5)
7		Discuss the working of anload cell.	(5)
8		Discuss the working of a piezoelectric transducer in detail.	(5)

PART B

Answer any two questions, each carries 10 marks

9		Explain the construction and working principle of a single-phase dynamometer type wattmeter, what are the errors present in it?	(10)
10		Explain the construction and principle of operation of permanent magnet moving coil instrument.	(10)
11	a)	Write short notes on TOD meter	(5)
	b)	A dc meter having a coil of resistance 3 Ω gives full scale deflection when acurrent of 60milliampere is passed through it. Show that it can be adopted to do work: i)As an ammeter with a range of 0-6A, ii)As a voltmeter with arrange of 0-600V.	(5)

PART C

Answer any two questions, each carries 10 marks

12		A current transformer with a bar primary has 400 turns in the secondary. The resistance and reactance of secondary circuit are 1.4ohms and 1.0ohms respectively including the transformer winding with 6A flowing in secondary winding. The magnetizing mmf is 110A and Iron loss is 1.3W. Find the ratio and phase angle errors (Assume nominal ratio to be equal to turns ratio).	(10)
13		Discuss the determination of iron losses by using Lloyd fisher magnetic square method.	(10)
14	a)	Discuss the methods for measuring high AC voltages.	(5)
	b)	Explain how BH curve can be determined using Ballistic galvanometer?	(5)

PART D

Answer any two questions, each carries 10 marks

15 Draw a neat block diagram of a cathode ray oscilloscope, specify the function of each block and explain its working principle. (10)

16 a) The arm of a four-arm bridge ABCD supplied with sinusoidal voltage have the following values (5)
Arm AB: a resistance of 250 Ω in parallel with a capacitance 2 μF
Arm BC: 425 Ω
Arm CD: 999 Ω
Arm DA: a resistance R_2 in series with a 2.5 μF capacitance
Find the value of R_2 and find the frequency at which the bridge will balance.

b) Draw the block diagram of data acquisition system and explain its various elements (5)

17 a) Explain the basic principle and working of LVDT. (6)

b) Write short notes on thermistors. (4)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(R&S), MAY 2019

Course Code: EE208

Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		The weight of 5g is used as control weight in a gravity controlled instrument. Find its distance from the spindle, if the deflecting torque for a deflection of 60^0 is $1.13x10^{-3}$.	(5)
2		Explain the measurement of insulation resistance by loss of charge method.	(5)
3		How high voltage is tested using the method of sphere gaps?	(5)
4		Explain the measurement of flux in a ring specimen.	(5)
5		How frequency is measured using a Wien's bridge?	(5)
6		Draw the diagram of a Cathode Ray Tube.	(5)
7		Explain the flow measurement using ultrasonic transducer.	(5)
8		Explain the working of piezoelectric transducer.	(5)

PART B

Answer any two questions, each carries 10 marks

9		Explain the working of attraction type and repulsion type of moving iron instrument with the help of neat diagrams	(10)
10	a)	Explain any two errors that occur in electrodynamometer type wattmeter and its compensation.	(5)
	b)	Explain the working of electronic energy meter.	(5)
11	a)	Write short note on deflecting, damping and controlling torque	(5)
	b)	Write short note on 3 phase induction type energy meter	(5)

PART C

Answer any two questions, each carries 10 marks

12		Draw the phasor diagram of a current transformer. Derive the expressions for ratio and phase angle errors.	(10)
13	a)	How high voltage is measured using electrostatic voltmeter?	(5)
	b)	Explain the measurement of rotational speed by optical sensors.	(5)
14		What is a Lloyd- Fisher square? Explain the measurement of iron losses in a magnetic material employing Lloyd-Fisher square using wattmeter method.	(10)

PART D

Answer any two questions, each carries 10 marks

15 a) Derive the equations for balance in the case of Maxwell's inductance –capacitance bridge. (5)

b) Explain the working of a dc potentiometer with figure. (5)

16 Explain how CRO can be used to measure frequency and phase angle (10)

17 a) Explain the measurement of any non-electrical quantity employing load cell. (5)

b) How strain is measured using a strain gauge? (5)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

FOURTH SEMESTER B.TECH DEGREE EXAMINATION(S), DECEMBER 2019

Course Code: EE208

Course Name: MEASUREMENTS AND INSTRUMENTATION

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		What are the different methods of obtaining the controlling torque in an indicating instrument?	(5)
2		What is meant by creeping? What are the causes of creeping and how it can be eliminated?	(5)
3		Define the following terms of an instrument transformer? (i) Burden (ii) Nominal ratio	(5)
4		Explain how BH curve can be determined using Ballistic galvanometer?	(5)
5		Explain the working of a Vernier potentiometer?.	(5)
6		What is Maxwell's bridge? Derive the equation of balance for the bridge?.	(5)
7		What are primary and secondary transducers?	(5)
8		Discuss the working of a load cell?	(5)

PART B

Answer any two questions, each carries 10 marks

9		Explain the construction and principle of operation of Permanent Magnet Moving Coil Instrument? Derive it's torque equation?	(10)
10		Explain the construction and working principle of an induction type energy meter. Show that number of revolutions of the disc in induction type energy meter is proportional to energy consumed?	(10)
11	a)	Explain the general requirements for ammeter shunts.	(5)
	b)	Explain any two errors that occur in electrodynamometer type wattmeter and its compensation?	(5)

PART C

Answer any two questions, each carries 10 marks

12		Derive the expression for Ratio and Phase angle error in a Current Transformer?	(10)
13		What do you mean by Lloyd -Fisher square? How it can be used for	(10)

determination of iron losses in a specimen. Explain.

14 Explain the working principle of electrostatic voltmeters. How they can be employed for measurement of High AC voltages? (10)

PART D

Answer any two questions, each carries 10 marks

15 a) Explain the basic principle and working of LVDT? (6)

b) Write short notes on RTD? (4)

16 Draw a neat block diagram of a Cathode Ray Oscilloscope and specify the function of each block .Also Explain its working principle (10)

17 Explain basic potentiometer principle. Also explain the calibration of ammeter, voltmeter and wattmeter using potentiometer. (10)

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Reg No.:_____ Name:_____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

Fourth semester B.Tech examinations (S), September 2020

Course Code: EE208

Course Name: MEASUREMENTS AND INSTRUMENTATION (EE)

Max. Marks: 100 Duration: 3 Hours

PART A

Answer all questions, each carries 5 marks Marks

1		List the different types of errors in measurements?	5
2		Write short notes on TOD meter?	5
3		Write short notes on Phasor Measurement Units?	5
4		Describe the method for the measurement of flux density of magnetic material using flux meter?	5
5		Draw and explain the different parts of cathode ray tube?	5
6		What is Schering bridge? Develop the equation of balance for the bridge?	5
7		List any three classifications of transducers?	5
8		Explain the working of a Load cell?	5

PART B

Answer any two questions, each carries 10 marks

9		Explain the construction and operating principle of permanent magnet moving coil instrument. Derive the expression for deflection of PMMC?	10
10	a)	How the range of DC ammeter and DC voltmeter can be extended. Derive the expression to find the shunt resistance and multiplier resistance?	5
	b)	Describe the measurement of earth resistance by using fall of potential method	5
11		Explain the construction and theory of a single-phase induction type energy meter. Show that number of revolutions in time t is proportional to energy supplied.	10

PART C

Answer any two questions, each carries 10 marks

12		Draw the equivalent circuit and phasor diagram of a current transformer. Derive the expression for ratio and phase angle errors?	10

13	a)	Discus the determination of hysteresis loop of a magnetic material by using step by step method?	6
	b)	Write short notes on proximity sensors?	4
14	a)	What is LIoyd Fisher square?	4
	b)	Explain the methods for the measurement of high AC voltage.	6

PART D

Answer any two questions, each carries 10 marks

15		Write short notes on Lissajous patterns. Explain how are they used for the measurement of frequency and phase angle?	10
16	a)	With a neat sketch explain the principle of operation of LVDT.	5
	b)	Compare RTD and Thermistor?	5
17	a)	Write short notes on Electromagnetic flow meter?	5
	b)	Explain any two applications of DC potentiometer?	5

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