

Reg No.: _____

Name: _____

APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION(S), MAY 2019

Course Code: EC307

Course Name: POWER ELECTRONICS & INSTRUMENTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

Marks

- 1 a) Draw the structure of a power BJT and explain its static and dynamic characteristics. Explain the phenomenon of quasi saturation in power BJTs. (12)
- b) Distinguish between linear electronics and power electronics. (3)
- 2 a) Draw the circuit of a Buck Boost converter and explain its various modes of operation with relevant waveforms. Also write the expression for output voltage, voltage and current ripple under continuous conduction mode. (9)
- b) With a neat circuit diagram, explain the operation of a push pull converter circuit with all relevant waveforms. (6)
- 3 Draw the structure of a power MOSFET and explain its operation. Also explain the static and switching characteristics. Mention a few advantages of power MOSFETs compared to power BJTs. (15)

PART B

Answer any two full questions, each carries 15 marks.

- 4 Write notes on: (15)
 - (i) Principle of switched mode inverters.
 - (ii) Space vector modulation.
 - (iii) Push pull single phase inverters.
- 5 a) Explain the various classification of instruments with suitable examples. (10)
- b) Distinguish between static characteristics and dynamic characteristics of an instrument? (5)
- 6 a) Draw a bridge circuit for measuring capacitance and derive the balance condition of the bridge for determining unknown capacitance value. (8)
- b) For a Maxwell's bridge, given $R_1 = 10 \text{ kohm}$, $C_1 = 10 \text{ micro Farad}$, $R_2 = R_3 = 1 \text{ kOhm}$, find unknown R_x and L_x . (7)

PART C

Answer any two full questions, each carries 20 marks.

- 7 a) How the transducers are classified? Explain the working principle of a strain (10)

- gauge.
- b) Explain the working of a capacitor micro phone with relevant figures. (10)
- 8 a) Explain: (12)
- (a) Frequency synthesizer
- (b) Electronic multimeter
- b) What is the principle of operation of proximity transducers? Explain inductive and capacitive type proximity transducers. (8)
- 9 a) With a neat sketch, explain the working principle of a digital storage oscilloscope? List a few applications. (10)
- b) Explain the operating principle of the following transducers: (10)
- (i) Hall effect transducers
- (ii) LVDT



SCMS
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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2018

Course Code: EC307

Course Name: POWER ELECTRONICS & INSTRUMENTATION

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

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| 1 a) Compare power MOSFETs and power BJTs. | (5) |
| b) With neat sketch explain the static and dynamic characteristics of power diodes. | (10) |
| 2 a) Draw the circuit of a Buck converter and explain its working with relevant waveforms. | (6) |
| b) What are the advantages of isolated converter circuits over the basic converter circuits? Explain the forward converter circuit with relevant waveforms. | (9) |
| 3 a) Draw the structure of an IGBT and explain its operation. | (8) |
| b) Explain the operation of a Flyback converter. | (7) |

PART B

Answer any two full questions, each carries 15 marks.

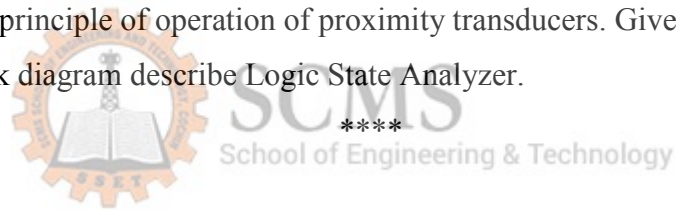
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|---|-------|
| 4 a) With relevant waveforms explain the circuit of a push pull single phase inverter circuit. | (9) |
| b) Explain the principle of space vector modulation in three phase inverter circuits. | (6) |
| 5 a) Draw the block diagram and explain the functional elements of an instrument? | (5) |
| b) What do you mean by static characteristics of an instrument? Define any six static parameters of an instrument. | (10) |
| 6 a) Explain the principle of operation of switched mode inverters. Draw the circuit of a full bridge single phase inverter circuit and explain its operation with relevant waveforms for R load. | (8) |
| b) Draw a Maxwell's bridge circuit and derive the condition for balance of the bridge for finding the unknown inductance value. | (7) |

PART C

Answer any two full questions, each carries 20 marks.

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| 7 a) Mention a few criterion that has to be considered in the selection of transducer for a particular application. | (5) |
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- b) What is the principle of operation of Hall effect transducers? Mention any two applications. (7)
- c) What is the working principle of strain gauge? Explain the various types of strain gauges with neat sketches. (8)
- 8 a) Explain the operating principle of time measurement of a signal using digital instruments. (8)
- b) Write notes on: (12)
- (i) spectrum analyzer
- (ii) Electronic multimeter
- 9 a) Explain the principle of operation of proximity transducers. Give two applications. (10)
- b) With a block diagram describe Logic State Analyzer. (10)



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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY
FIFTH SEMESTER B.TECH DEGREE EXAMINATION, DECEMBER 2017

Course Code: EC307

Course Name: POWER ELECTRONICS & INSTRUMENTATION (EC)

Max. Marks: 100

Duration: 3 Hours

PART A

Answer any two full questions, each carries 15 marks.

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| 1 a) Explain in details the static characteristics of Power BJT. Compare the I-V characteristics of Power BJT with low signal BJT. | (8) |
| b) What is meant by a boost converter? Explain using relevant circuit diagram and waveforms. Write down the expression for output ripple voltage. | (7) |
| 2 Describe the structure of Power MOSFET by explaining channel formation. Draw its I-V characteristics labelling different voltages as well as regions of operation. Also draw the switching characteristics. | (15) |
| 3 a) Describe Forward converter including its circuit, wave forms and expressions. | (5) |
| b) Explain Push-pull converter including its circuit, wave forms and expressions. | (5) |
| c) Explain full bridge DC-DC converter with the help of circuit diagram and suitable waveforms. | (5) |

PART B

Answer any two full questions, each carries 15 marks.

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|---|------|
| 4 a) What is the general arrangement of an online UPS system? Explain with the help of block diagram. | (5) |
| b) How to measure resistance using Wheatstone's bridge? | (5) |
| c) With neat block diagram explain functional elements of measuring instruments. | (5) |
| 5 a) Describesingle phase half bridge inverter explaining the principle of sinusoidal PWM switching scheme. | (7) |
| b) Explain the concept of space vector modulation? | (8) |
| 6 a) Define the following Static Characteristics: | (10) |
| i) Resolution ii) Precision iii) Repeatability iv) Linearity v) Sensitivity | |
| b) How to measure inductance using Maxwell-Wein's Bridge. | (5) |

PART C

Answer any two full questions, each carries 20 marks.

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| 7 a) What is the principle of operation of a resistance transducer? Explain the working of strain gauge. | (8) |
| b) Draw and explain the block diagram of Frequency synthesizer. | (6) |
| c) What is RF power meter? Explain its working. | (6) |
| 8 a) What is a transducer? Explain the classification of transducers. | (7) |
| b) Describe the Construction and working of LVDT with neat schematic. | (8) |
| c) Explain the working of a Hall effect transducer. | (5) |
| 9 a) Discuss DSO with the help of a block diagram. | (8) |
| b) Draw and explain the block diagram of Spectrum Analyzer. | (6) |
| c) Describe digital voltmeter with neat block diagram. | (6) |
