BRAINWARE UNIVERSITY

Term End Examination 2021 - 22
Programme – Diploma in Electronics & Communication Engineering
Course Name – Industrial Electronics I
Course Code - DECE504
(Semester V)

Time : 1 Hr.15 Min. **Full Marks : 60**

[The figure in the margin indicates full marks.]

Group-A

(Multiple Choice Type Question) 1 x 60=60

Choose the correct alternative from the following :

(1) Which of the following devices does not belong to the transistor family?

a) IGBT b) MOSFET
c) GTO d) BJT

(2) In a power transistor, ____ is the controlled parameter.

a) VCE b) VBE
c) IB d) IC

(3) In a power transistor, _____ is the controlling parameter.

a) VCE b) VBE
c) IB d) IC

(4) For a power transistor, if the base current IB is increased keeping VCE constant, then

a) IC increases b) IC decreases
c) IC remains constant d) none of these

(5) The value of β is given by the expression

a) IC/IB b) IC/IE
c) IE/IC d) IE/IB

(6) A power BJT is used as a power control switch by biasing it in the cut off region (off st ate) or in the saturation region (on state). In the on state

a) both the base-emitter & base-collector juncti ons are forward biased
b) the base-emitter junction is reverse biased, a nd the base collector junction is forward bias ed
c) the base-emitter junction is forward biased, a nd the base collector junction is reversed bia sed
d) both the base-collector & the base-emitter ju nctions are reversed biased

(7) For a power transistor, if the forward current gain $\alpha = 0.97$, then β

a) 0.03
b) 2.03
c) 49.24
d) 32.33

(8) For a power transistor, which of the following relations is true?

a) Ie>Ic>Ib
b) Ib>Ic>Ie
c) Ic>Ie>Ib
d) Ie=Ib

(9) The instantaneous power loss during the delay time of a transistor is given by

a) Ic Vce
b) Ib Vbe
c) Ic Vbe
d) Ib Vce

(10) A 1mv of i/p gives an output of 1V, the voltage gain as such would be

a) 0.001
b) 0.0001
c) 1000
d) 100

(11) Which of the following relations is true for a BJT?

a) $Ic \approx Ie$
b) $Ib \approx Ic$
c) $Ie \approx Ib$
d) $Ib \approx Ie \approx Ic$

(12) Choose the correct statement

a) A transistor will remain on as long the the base current is applied
b) A transistor remains on after a high to low pulse is applied at the base
c) A transistor will remain on as long the the collector current is applied
d) A transistor remains on after a high to low pulse is applied at the collector

(13) A thyristor (SCR) is a

a) P-N-P device
b) N-P-N device
c) P-N-P-N device
d) P-N device

(14) Choose the false statement.

a) SCR is a bidirectional device
b) SCR is a controlled device
c) In SCR the gate is the controlling terminal
d) SCR are used for high-power applications 12 80μs

(15) The static V-I curve for the SCR is plotted for

a) Ia (anode current) vs Ig (gate current), Va (anode – cathode voltage) as a parameter
b) Ia vs Va with Ig as a parameter
c) Va vs Ig with Ia as a parameter
d) Ig vs Vg with Ia as a parameter

(16) For an SCR in the reverse blocking mode, (practically)

a) leakage current does not flow
b) leakage current flows from anode to cathode
c) leakage current flows from cathode to anode
d) leakage current flows from gate to anode

(17) For an SCR in the forward blocking mode (practically)

a) leakage current does not flow
b) leakage current flows from anode to cathode
c) leakage current flows from cathode to anode
d) leakage current flows from gate to anode

(18) For a forward conducting SCR device, as the forward anode to cathode voltage is increased

a) the device turns on at higher values of gate c
b) the device turns on at lower values of gate c

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c) the forward impedance of the device goes on increasing

d) the forward impedance of the device goes on decreasing

(19) A thyristor can be bought from the forward conduction mode to forward blocking mod e by

a) the dv/dt triggering method

b) applying a negative gate signal

c) applying a positive gate signal

d) applying a reverse voltage across anode-cath ode terminals

(20) Usually the forward voltage triggering method is not used to turn-on the SCR because

a) it increases losses

b) it causes noise production

c) it may damage the junction & destroy the de vice

d) relatively it's an inefficient method

(21) The forward break over voltage is maximum when

a) Gate current = ∞

b) Gate current = 0

c) Gate current = $-\infty$

d) It is independent of gate current

(22) The value of anode current required to maintain the conduction of an SCR even though the gate signal is removed is called as the

a) holding current

b) latching current

c) switching current

d) peak anode current

(23) _____ are semiconductor thyristor devices which can be turned-on by light of appr opriate wavelengths.

a) LGTOs

b) LASERs

c) MASERs

d) LASCRs

(24) During the transition time or turn-on time

a) The forward anode voltage decreases from 9 0 % to 10 % & the anode current also decrea ses from 90 to 10 % of the initial value

b) The forward anode voltage increases from 1 0 % to 90 % & the anode current also increa ses from 10 % to 90 % of the initial value

c) The forward anode voltage decreases from 9 0 % to 10 % & the anode current increases fr om 10 % to 90 % of the initial value

d) The forward anode voltage increases from 1 0 % to 90 % & the anode current decreases f rom 90% to 10% of the initial value

(25) For an SCR the total turn-on time consists of i) Delay time ii) Rise time and iii) Spread time During the delay time the

a) anode current flows only near the gate

b) anode current rises from zero to very high va lue

c) losses are maximum

d) anode to cathode voltage is zero

(26) For an SCR the total turn-on time consists of i) Delay time ii) Rise time and iii) Spread time During the rise time the

a) anode current flows only near the gate

b) anode current rises from zero to very high va lue

c) losses are maximum

d) anode to cathode voltage is zero

(27) For an SCR the total turn-on time consists of i) Delay time ii) Rise time and the iii) Spr ead time The spread time interval depends upon

a) the value of gate current

b) junction temperature

c) area of the cathode

d) area of the anode

(28) To avoid commutation failure

a) circuit turn-off time must be greater than the thyristor turn-off time

b) circuit turn-off time must be lesser than the t hyristor turn-off time

c) circuit turn-off time must be equal to the thyr istor turn-off time

d) none of these

(29) The area under the curve of the gate characteristics of thyristor gives the

a) total average gate current

b) total average gate voltage

c) total average gate impedance

d) total average gate power dissipation

(30) A tangent drawn from the Y-axis to the Pavg on the gate characteristics gives the value of the

a) maximum value of gate-source resistance

b) minimum value of gate-source resistance

c) maximum value of gate-source power

d) minimum value of gate-source power

(31) Higher the magnitude of the gate pulse

a) lesser is the time required to inject the charg es

b) greater is the time required to inject the char ges

c) greater is the value of anode current

d) lesser is the value of anode current

(32) For an SCR, the gate-cathode characteristic has a slop of 130. The gate power dissipati on is 0.5 watts. Find Ig

a) 0.62 A

b) 620 mA

c) 62 mA

d) 6.2 mA

(33) Latching current for an SCR is 100 mA, DC source of 200 V is also connected from th e SCR to the L load. Compute the minimum width of the gate pulse required to turn on the device. Take L = 0.2 H.

a) 50 micro-sec

b) 100 micro-sec

c) 150 micro-sec

d) 200 micro-sec

(34) From the two transistor (T1 & T2) analogy of SCR, the total anode current of SCR is _ _____ in the equivalent circuit.

a) the sum of both the base currents

b) the sum of both the collector current

c) the sum of base current of T1 & collector cur rent of T2

d) the sum of base current of T2 & collector cu rrent of T1

(35) Latching current for an SCR is 100 mA, a dc source of 200 V is also connected to the S CR which is supplying an R-L load. Compute the minimum width of the gate pulse req uired to turn on the device. Take L = 0.2 H & R = 20 ohm both in series.

a) 62.7 micro-sec

b) 100.5 micro-sec

c) 56.9 micro-sec

d) 81 micro-sec

(36) A fully controlled converter uses

a) diodes only

b) thyristors only

c) both diodes and thyristors

d) none of these

(37) A single phase full controlled bridge converter (B-2) uses

a) 4 SCRs and 2 diodes

b) 4 SCRs

c) 6 SCRs

d) 4 SCRs and 2 diodes

(38) In a three-phase half wave rectifier usually, the primary side of the transformer is delta connected because

a) it has no neutral connection

b) we can get greater output voltage

c) it provides a path for the triplen harmonics

d) it provides better temperature stability

(39) In a three-phase half wave diode rectifier, if Vmp is the maximum phase voltage, then t he output voltage on a R load varies from

a) 0 to Vmp
b) 0.5 Vmp to Vmp
c) Vmp to 3Vmp
d) –Vmp to Vmp

(40) In a three-phase half wave 6-pulse mid-point type diode rectifier, each diode conducts f or

a) 120°
b) 60°
c) 90°
d) 180°

(41) A step-down delta-star transformer, with per-phase turns ratio of 5 is fed from a 3-phas e 1100 V, 50 Hz source. The secondary of this transformer is connected through a 3-pul se type rectifier, which is feeding feeding an R load. Find the average value of output v oltage.

a) 220 V
b) 257 V
c) 650.08 V
d) 206 V

(42) For a 3-phase 6-pulse diode rectifier, has Vml as the maximum line voltage value on R load. The peak current through each diode is

a) Vml/2R
b) 2Vml/R
c) Vml/R
d) Insufficient Data

(43) A 3-phase bridge rectifier charges a 240 V battery. The rectifier is given a 3-phase, 230 V supply. The current limiting resistance in series with the battery is of 8 ohm. Find the average value of battery charging current.

a) 12.56 A
b) 8.82 A
c) 9.69 A
d) 6.54 A

(44) For a single phase, full bridge, diode rectifier excited from a 230 V, 50 Hz source. With R = 10 ohm & the inductance(L) large enough to maintain continues conduction, the av erage and rms values of diode currents will be

a) 7.85 A, 8 A
b) 10.35 A, 7.85 A
c) 10.35 A, 14.6 A
d) 8 A, 8 A

(45) The rectification efficiency for B-2 type & M-2 type full wave diode rectifiers are ___ & ___ respectively.

a) $8/\pi$ & $4/\pi$
b) $4/\pi$ & $8/\pi$
c) $8/\pi$ & $8/\pi$
d) $4/\pi$ & $4/\pi$

(46) SPMS are based on the _____ principle.

a) Phase control
b) Integral control
c) Chopper
d) MOSFET

(47) _____ is used for critical loads where temporary power failure can cause a great d eal of inconvenience.

a) SMPS
b) UPS
c) MPS
d) RCCB

(48) To make a signal diode suitable for high current & high voltage carrying applications w ith minimum losses, _____

a) a lightly doped n layer is grown between the two p & n layers
b) a heavily doped n layer is grown between th e two p & n layers
c) a lightly doped p layer is grown between the two p & n layers
d) a heavily doped p layer is grown between th e two p & n layers

(49) The V-I Characteristics of the diode lie in the

a) 1st & 2nd quadrant
b) 1st & 3rd quadrant
c) 1st & 4th quadrant
d) Only in the 1st quadrant

(50) A diode is said to be reversed biased when the

a) cathode is positive with respect to the anode
b) anode is positive with respect to the cathode
c) cathode is negative with respect to the anode
d) both cathode and anode are negative

(51) The peak inverse current IP for a power diode is given by the expression

a) IP=t di/dt
b) $I_P=t * \log i$
c) IP=t * di/dt
d) $I_P=t * \int t*i \, dt$

(52) If V & I are the forward voltage & current respectively, then the power loss across the diode would be

a) V/I
b) V2 I2
c) I2 V
d) VI

(53) Even after the forward current reduces to zero value, a practical diode continues to con duct in the reverse direction for a while due to the

a) resistance of the diode
b) high junction temperature
c) stored charges in the depletion region
d) none of these

(54) In an AC-DC converter, a diode might be used as a

a) voltage source
b) phase angle controller
c) freewheeling Diode
d) filter

(55) When the p-n junction diode is reversed biased, the width of the depletion region _____

a) increases
b) decreases
c) remains Constant
d) none of these

(56) A triac can be considered as:

a) Two SCRs connected in anti-parallel with a c ommon gate
b) Two transistors corrected in antiparallel
c) Two SCRs connected in parallel with a com mon gate
d) Two SCRs connected in parallel with two ga tes

(57) A triac is semiconductor device acting

a) As a diode in the forward direction and SCR in the reverse direction
b) As an SCR in both the directions
c) As diode in both the directions
d) As an SCR in one direction and diode in the other direction

(58) Auxiliary commutation is also known as

a) Class A commutation
b) Class C commutation
c) Class D commutation
d) None of these

(59) In the equilibrium state, the barrier potential across a unbiased silicon diode is _____

a) 0.3 V
b) 0.7 V
c) 1.3 V
d) 0 V

(60) IGBT possess

a) low input impedance
b) high input impedance
c) high on-state resistance
d) second breakdown problems