University of Mumbai
Examination 2021 under Cluster 06
(Lead College: Vidyavardhini's College of Engg Tech)

Examination for Direct Second Year Students Commencing from 10th April 2021

Program: **Electronics Engineering**

Curriculum Scheme: Rev 2019

Examination: SE Semester III (For DSE Students)

Course Code: ELC302 and Course Name: Electronic Devices and Circuits I

Time: 2 hour Max. Marks: 80

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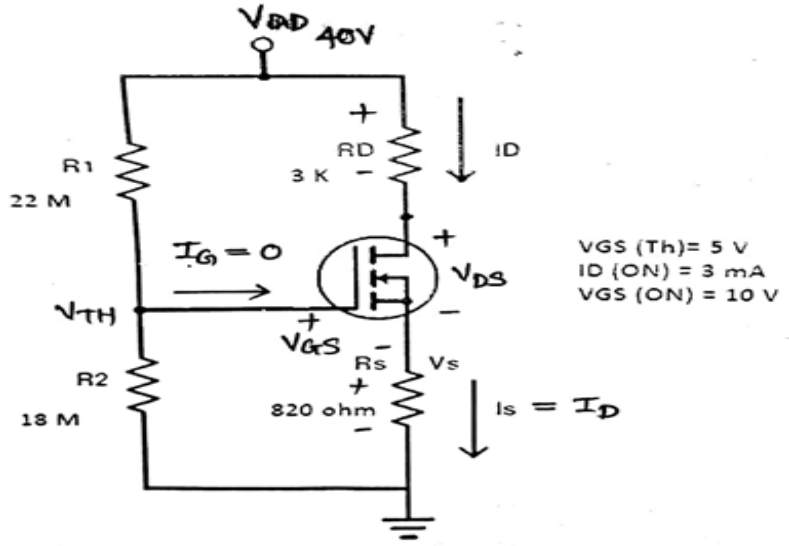
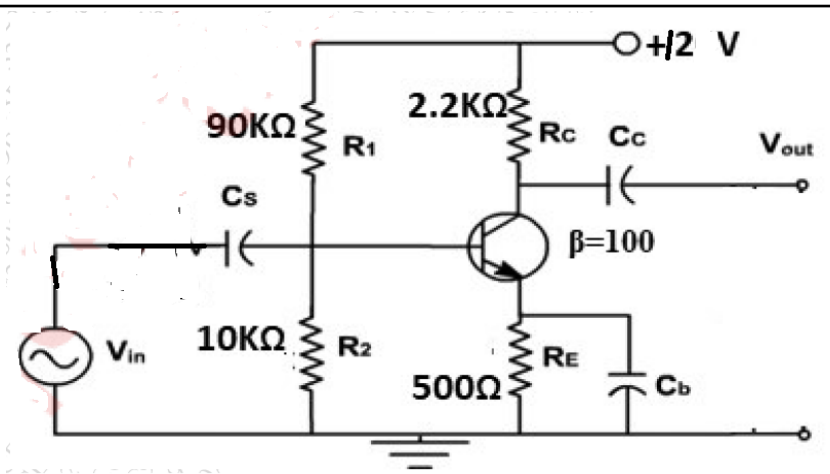
Q1.	**Choose the correct option for following questions. All the Questions are compulsory and carry equal marks**
1.	Fermi energy level for n-type semiconductors lies ----------and P type semiconductor lies ----------
Option A:	Close to conduction band , Close to valence band
Option B:	Close to conduction band , Close to conduction band
Option C:	Close to valence band , Close to conduction band
Option D:	Close to valence band, Close to valence band
2.	In any semiconductor material, the drift current is proportional to
Option A:	Concentration gradient of charge carriers
Option B:	Square of applied electric field
Option C:	Applied electric field
Option D:	Cube of applied electric field
3.	In fixed bias circuit using an NPN transistor, if VCC =12V, VBE=0.7V, Base resistor RB= 240 k then I_B is
Option A:	80 µA
Option B:	47 µA
Option C:	50 µA
Option D:	130 mA
4.	H parameter model consists of components such as
Option A:	small signal resistance rpi and a dependent current source gmVpi
Option B:	input impedance, reverse voltage gain, current gain and output conductance
Option C:	small signal resistance re and a controlled current source
Option D:	small signal resistance rpi and an independent current source gmVpi
5.	Which Configuration has a high input impedance and low output impedance
Option A:	Common Collector Configuration
Option B:	Common Base Configuration
Option C:	Common Emitter Configuration
Option D:	Collector Base Configuration
6.	In a bipolar junction transistor (BJT) if β = 100 & collector current (IC) is 0.93 mA then what is the value of base current (IB) ?
Option A:	9.3 µA
Option B:	0.93 µA

Option C:	93 μA
Option D:	93 mA
7.	To operate transistor in its forward active / linear mode of operation base emitter junction is ---------- and the collector base junction is ----------
Option A:	reverse biased, forward biased
.Option B:	reverse biased, reverse biased
Option C:	forward biased ,reverse biased
Option D:	forward biased, forward biased
8.	The voltage gain of a common base amplifier is
Option A:	Zero
Option B:	Less than unity
Option C:	Unity
Option D:	Greater than unity
9.	The relation between α and β is _____
Option A:	α =(1+β)/ β
Option B:	α =β/(1+β)
Option C:	α =β/(1- β)
Option D:	α =(1-β)/ β
10.	In case of DMOSFET drain current I_D depends upon
Option A:	Vdd
Option B:	I_G
Option C:	V_{GS}
Option D:	I_S
11.	For E-MOSFETs, the relationship between output current and controlling voltage is defined by----------.
Option A:	ID=〖(VGS-VGS(Th))〗^2
Option B:	ID=k〖(VGS-VSB)〗^2
Option C:	ID=k〖(VGS-VDS)〗^2
Option D:	ID=k〖(VGS-VGS(Th))〗^2
12.	The N channel connecting two N regions is absent in
Option A:	N channel DMOSFET
Option B:	N channel EMOSFET
Option C:	P channel DMOSFET
Option D:	P channel EMOSFET
13.	The biasing method used for EMOSFET are voltage divider biasing circuit and---
Option A:	self bias circuit
Option B:	fixed bias
Option C:	collector to base bias circuit
Option D:	feedback biasing circuit
14.	The input impedance of the MOSFET is very high .Give reason
Option A:	The Sio_2 layer is present between gate terminal and channel.
Option B:	Metallic contacts are used for connecting the Drain, gate and source terminals

Option C:	A P type semiconductor is used as a substrate.
Option D:	A N type semiconductor is used as a substrate.
15.	A common drain amplifier has voltage gain
Option A:	Slightly less than 1.
Option B:	Greater than 1
Option C:	Infinite
Option D:	Zero
16.	Input signal of common source amplifier is applied to
Option A:	Source terminal
Option B:	Gate terminal
Option C:	Drain terminal
Option D:	Substrate terminal
17.	Phase difference between input and output of a source follower circuit is
Option A:	0 degree
Option B:	90 degrees
Option C:	180 degrees
Option D:	45 degrees
18.	For the CS amplifier circuit calculate voltage gain Av if $g_{m=}$ 200 micro A/V and RD= 14KΩ
Option A:	-2.8
Option B:	2.8
Option C:	4.8
Option D:	-4.8
19.	Reactance of capacitor is given by
Option A:	Xc= 1/2 π f C
Option B:	Xc= 1/2 π R C
Option C:	Xc= 1 / 2 π L C
Option D:	Xc= 1/ 2 π R L
20.	In the design steps for RC coupled CE amplifiers, the voltage drop across emitter resistor R_E should be ---------- as compared to base emitter voltage of transistor
Option A:	lower
Option B:	higher
Option C:	same
Option D:	Zero

Q2. (20 Marks)	
Q.2 A)	**Solve any two out of three (5 marks each)**
i.	Draw Energy band diagram of PN junction diode under Forward biased, Reverse biased and Zero biased.
ii.	Compare CE, CB, CC Configurations of BJT.
iii.	Explain hybrid π model of BJT.
Q2. B)	**Solve any One Question out of two. (10 marks each)**
i.	Design a single stage RC Coupled CE amplifier using transistor with given specifications as $\|Av\|$=70, Vo rms=4.5V, F_L=10 Hz , $V_{CE(SAT)=}$1V , hfe= 180, hie=2.7KΩ and S< 8.
ii.	Draw the neat diagram of voltage divider biased CS MOSFET amplifier and source resistance bypass and derive the expression for the voltage gain.

Q3). (20 Marks)	**Solve any Two Questions out of Three (10 marks each)**
A	 Fig.1 For the voltage divider bias circuit shown in Fig. 1 using N-channel E-MOSFET, VDD=40V, $V_{GS(TH)=}$5V, I_D(ON)= 3 mA and $V_{GS(ON)=}$10V. Calculate Q - point where Q = [V_{DSQ}, I_{DQ}].

B	 Fig. 2 R1=90KΩ, R2=10KΩ, Vcc=12V, β=100, V_{BE}=0.7V, Rc=2.2KΩ, RE=500Ω Find out voltage gain Av, input impedance Ri and output impedance Ro for the given circuit in Fig. 2
C	Design a single stage RC Coupled CE amplifier using transistor with following specifications. hfe=220, hie=2.7KΩ, |Av|=180, S=10, Vo=3V, Vcc=18V, F_L=20Hz,$V_{CE(SAT)=}$1V

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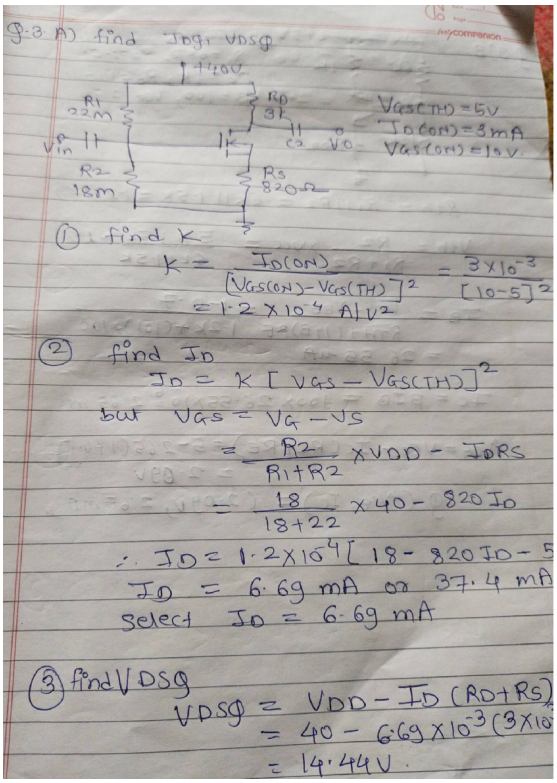
Q1:

Question Number	Correct Option (Enter either 'A' or 'B' or 'C' or 'D')
Q1.	A
Q2.	C
Q3.	B
Q4	B
Q5	A
Q6	A
Q7	C
Q8.	D
Q9.	B
Q10.	C
Q11.	D
Q12.	B
Q13.	D
Q14.	A
Q15.	A
Q16.	B
Q17.	A
Q18.	A
Q19.	A
Q20.	B

Important steps and final answer for the questions involving numerical example

Question number.3 A) SOLUTION



Question number.3 B SOLUTION