

Roll No.

Question Booklet Number

O. M. R. Serial No.

--	--	--	--	--	--	--	--

Question Booklet Number

M. Sc. (Electronics) (Second Semester)

EXAMINATION, July, 2022

ELECTRONIC CIRCUIT

Paper Code

ELC	2	0	3	(N)
-----	---	---	---	-----

Questions Booklet
Series

B

Time : 1:30 Hours]

[Maximum Marks : 100

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.
2. The booklet contains 60 questions. Examinee is required to answer any 50 questions in the OMR Answer-Sheet provided and not in the question booklet. If more than 50 questions are attempted by student, then the first attempted 50 questions will be considered for evaluation. All questions carry equal marks.
3. Examine the Booklet and the OMR Answer-Sheet very carefully before you proceed. Faulty question booklet due to missing or duplicate pages/questions or having any other discrepancy should be got immediately replaced.

परीक्षार्थियों के लिए निर्देश :

1. प्रश्न-पुस्तिका को तब तक न खोलें जब तक आपसे कहा न जाए।
2. प्रश्न-पुस्तिका में 60 प्रश्न हैं। परीक्षार्थी को किन्हीं 50 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। यदि छात्र द्वारा 50 से अधिक प्रश्नों को हल किया जाता है तो प्रारम्भिक हल किये हुए 50 उत्तरों को ही मूल्यांकन हेतु सम्मिलित किया जाएगा। सभी प्रश्नों के अंक समान हैं।
3. प्रश्नों के उत्तर अंकित करने से पूर्व प्रश्न-पुस्तिका तथा OMR आन्सर-शीट को सावधानीपूर्वक देख लें। दोषपूर्ण प्रश्न-पुस्तिका जिसमें कुछ भाग छपने से छूट गए हों या प्रश्न एक से अधिक बार छप गए हों या उसमें किसी अन्य प्रकार की कमी हो, तो उसे तुरन्त बदल लें।

(Remaining instructions on the last page)

(शेष निर्देश अन्तिम पृष्ठ पर)

(Only for Rough Work)

1. Reverse saturation current of a common emitter transistor is
 - (A) Collector current when emitter is open circuited and base-collector junction is reverse biased
 - (B) Emitter current when collector is open circuited and base-collector junction is reverse biased
 - (C) Base current when emitter circuit is open circuited and emitter-collector junction is reverse biased
 - (D) Collector current when base circuit is open circuited

2. Reverse collector saturation current I_{CBO} is
 - (A) Collector current when emitter current is zero
 - (B) Collector current when base current is zero
 - (C) Same as reverse saturation current
 - (D) Collector current when either emitter or base current is zero

3. Which of the following statements about a common base transistor is true ?
 - (A) Very low input impedance
 - (B) Very low output impedance
 - (C) Current gain is greater than unity
 - (D) Voltage gain is very low

4. Which of the following statements about a common emitter transistor is true ?
 - (A) Very high input resistance
 - (B) High output resistance
 - (C) Current gain is less than unity
 - (D) Voltage gain is very low

5. Which of the following configurations is used for impedance matching ?
 - (A) Common base configuration
 - (B) Common emitter configuration
 - (C) Common collector configuration
 - (D) All configurations are equally suited.

6. What is Barkhausen criterion for oscillation ?
 - (A) $AB > 1$
 - (B) $AB < 1$
 - (C) $AB = 1$
 - (D) $AB \neq 1$

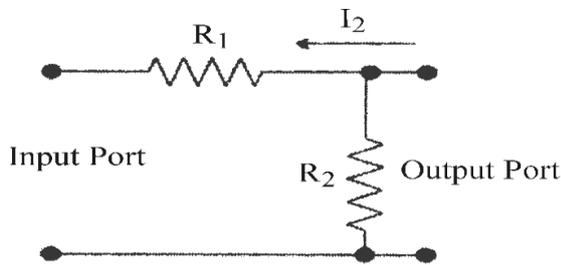
7. An oscillator is a type of :
 - (A) Feedforward amplifier
 - (B) Feedback amplifier
 - (C) Waveform amplifier
 - (D) RC amplifier

8. What happens if $|AB| < 1$?
- (A) Oscillation will die down
 (B) Oscillation will keep on increasing
 (C) Oscillation remains constant
 (D) Oscillation fluctuates
9. During high frequency applications of a B. J. T., which parasitic capacitors arise between the base and the emitter ?
- (A) C_{je} and C_b
 (B) C_{cs}
 (C) C_b
 (D) C_{cs} and C_b
10. The h -parameters analysis gives correct results for
- (A) large signals only
 (B) small signals only
 (C) both large and small
 (D) not large nor small signals
11. How many h -parameters are there for a transistor ?
- (A) Two
 (B) Three
 (C) Four
 (D) Five
12. The dimensions of h_{je} parameters are
- (A) MHO
 (B) OHM
 (C) Farad
 (D) Ampere
13. The h_{fe} parameter is called in CE arrangement with output short circuited.
- (A) Voltage gain
 (B) Current gain
 (C) Input impedance
 (D) Output impedance
14. If temperature changes, h parameters of a transistor
- (A) also change
 (B) do not change
 (C) remain same
 (D) may or may not change
15. The values of h -parameters of a transistor in CE arrangement are arrangement.
- (A) same as for CB
 (B) same as for CC
 (C) different from that in CB
 (D) similar to no

16. In a hybrid model of a two-port network, parameter h_{11} is also known as :

- (A) Input conductance
- (B) Input resistance
- (C) Output conductance
- (D) Output resistance

17. For the two-port network shown below, assume $R_1 = R_2 = 10 \text{ k}\Omega$. What is the value of the hybrid parameter h_{22} ?



- (A) 0.1 mho
- (B) 10 mhos
- (C) 20 mhos
- (D) 15 mhos

18. What are the hybrid parameters used to analyze ?

- (A) MOSFET
- (B) Junction Field Effect Transistor
- (C) Bipolar Junction Transistor
- (D) It has no use.

19. What type of amplifier is an emitter follower amplifier ?

- (A) Voltage amplifier
- (B) Wideband amplifier
- (C) Feedback amplifier
- (D) Power amplifier

20. How is the output impedance of an emitter follower amplifier ?

- (A) Irrelevant
- (B) Moderate
- (C) Low
- (D) High

21. What type of negative feedback does the emitter follower amplifier provide ?

- (A) Voltage, current and power
- (B) Voltage
- (C) Current
- (D) Power

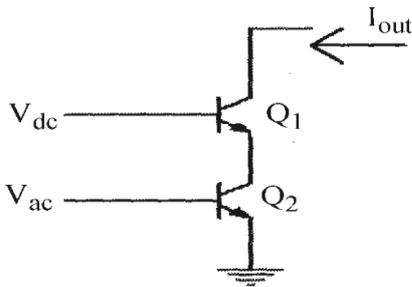
22. What is the voltage gain of an emitter follower amplifier ?

- (A) 1
- (B) β
- (C) ∞
- (D) 0

23. What is the other name for an emitter follower amplifier configuration ?
- (A) Common collector
 (B) Common base
 (C) Common emitter
 (D) Amplifier circuit
24. What is the application of a high input resistance transistor amplifier circuit amplifier ?
- (A) Positive feedback
 (B) Voltage gain
 (C) Power gain
 (D) Impedance matching
25. How is the power gain of a high input resistance transistor amplifier and circuit amplifier ?
- (A) Irrelevant
 (B) Moderate
 (C) Low
 (D) High
26. In an RC coupled CE amplifier, when the input frequency increases, which of these are incorrect ?
- (A) Reactance C_{SH} decreases.
 (B) Voltage gain increases.
 (C) Voltage gain decreases due to shunt capacitance.
 (D) An RC coupled amplifier behaves like a low pass filter.
27. Which of the statement is incorrect ?
- (A) At unity gain frequency the CE short circuit current gain becomes 1.
 (B) Unity gain frequency is the same as Gain Bandwidth Product of BJT.
 (C) Gain of BJT decreases at higher frequencies due to junction capacitances.
 (D) β -cut-off frequency is one where the CE short circuit current gain becomes $\beta/2$.

28. What is the condition to achieve oscillations ?
- (A) $|AB| = 1$
 (B) $\angle AB = 0^\circ$
 (C) $\angle AB = \text{multiples of } 2\pi$
 (D) All the mentioned
29. Given a MOSFET where gate to source capacitance is 300 pF and gate to drain capacitance is 500 pF. Calculate the gain bandwidth product if the transconductance is $30 \text{ m}\Omega^{-1}$.
- (A) 5.98 MHz
 (B) 4.9 MHz
 (C) 6.5 MHz
 (D) 5.22 MHz
30. The lower and upper cutoff frequencies of an amplifier are unknown. If originally, individual BW of such an amplifier is B_1 , and now the bandwidth of the cascaded network of 10 such amplifiers is B_2 , find B_2/B_1 .
- (A) 0.26
 (B) 3.84
 (C) Insufficient data
 (D) 5
31. For any cascaded amplifier network, which of these are incorrect ?
- (A) Cascading increases gain.
 (B) Overall input resistance is equal to the input resistance of the first amplifier.
 (C) The overall output resistance is less than the lowest output resistance in all amplifiers used.
 (D) Loading effect occurs.
32. Which of these is incorrect about Darlington amplifier ?
- (A) It has a high input resistance.
 (B) The output resistance is low.
 (C) It has a unity voltage gain.
 (D) It is a current buffer.
33. What is a cascade amplifier ?
- (A) A cascade of two CE amplifiers
 (B) A cascade of two CB amplifiers
 (C) A cascade of CE and CB amplifiers
 (D) A cascade of CB and CC amplifiers

34. Consider the figure shown :



Given that $g_{m_1} = 30 \text{ m}\Omega^{-1}$ and $g_{m_2} = 50 \text{ m}\Omega^{-1}$, $\alpha_1 = 1.1$, $\alpha_2 = 1.5$.

What is the transconductance of the entire network ?

- (A) $80 \text{ m}\Omega^{-1}$
- (B) $75 \text{ m}\Omega^{-1}$
- (C) $33 \text{ m}\Omega^{-1}$
- (D) $55 \text{ m}\Omega^{-1}$

35. Which of the following is not an LC oscillator ?

- (A) Hartley oscillator
- (B) Colpitts oscillator
- (C) Crystal oscillator
- (D) Clapp oscillator

36. Given that a feedback network is shunt-series, and output load is $10 \text{ k}\Omega$. What is the output voltage across it given that transfer gain is 10, source current is 20 mA and feedback current is 10 mA ?

- (A) 1 V
- (B) 2 V
- (C) 10 V
- (D) 20 V

37. Wide band amplifiers are most commonly

- (A) Single ended
- (B) Double ended
- (C) Unpredictable
- (D) None of the mentioned

38. The gain of an amplifier with feedback is known as gain.

- (A) Resonant
- (B) Open loop
- (C) Closed loop
- (D) None of the above

39. A negative-feedback amplifier is an amplifier.

- (A) Magnetic
- (B) Electronic
- (C) Electromagnetic
- (D) None of the above

40. The output impedance of an emitter follower is

- (A) High
- (B) Very high
- (C) Almost zero
- (D) Low

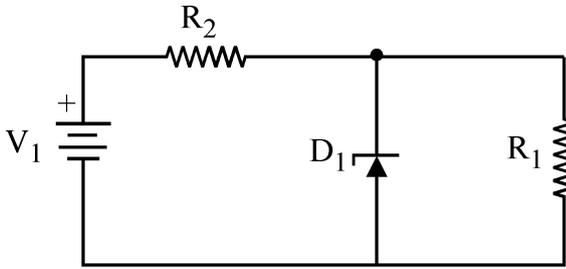
41. If the feedback fraction of an amplifier is 0.01, then voltage gain with negative feedback is approximately

- (A) 500
- (B) 100
- (C) 1000
- (D) 5000

42. When a negative voltage feedback is applied to an amplifier, its bandwidth
- (A) is increased
 - (B) insufficient data
 - (C) is decreased
 - (D) remains the same
43. When current feedback (negative) is applied to an amplifiers, its input impedance
- (A) remains the same
 - (B) is decreased
 - (C) is increased
 - (D) None of the above
44. The value of negative feedback fraction is always
- (A) Less than 1
 - (B) More than 1
 - (C) Equal to 1
 - (D) None of the above
45. A feedback circuit usually employs network.
- (A) Resistive
 - (B) Capacitive
 - (C) Inductive
 - (D) None of the above
46. In an unregulated power supply, if load current increases, the output voltage
- (A) Remains the same
 - (B) Decreases
 - (C) Increases
 - (D) None of the above
47. A power supply which has voltage regulation of is unregulated power supply.
- (A) 0%
 - (B) 5%
 - (C) 10%
 - (D) 8%
48. A Zener diode utilises characteristic for voltage regulation.
- (A) Forward
 - (B) Reverse
 - (C) Both forward and reverse
 - (D) None of the above
49. A Zener diode is used as a voltage regulating device.
- (A) Shunt
 - (B) Series
 - (C) Series-shunt
 - (D) None of the above

50. As the junction temperature increases, the voltage breakdown point for Zener mechanism
- (A) is increased
 - (B) is decreased
 - (C) remains the same
 - (D) None of the above
51. In a 15 V Zener diode, the breakdown mechanism will occur by
- (A) Avalanche mechanism
 - (B) Zener mechanism
 - (C) Both Zener and avalanche mechanism
 - (D) None of the above
52. Another name for Zener diode is diode.
- (A) Breakdown
 - (B) Voltage
 - (C) Power
 - (D) Current
53. Zener diode is generally made of
- (A) Germanium
 - (B) Silicon
 - (C) Carbon
 - (D) None of the above
54. A Zener diode
- (A) is a battery
 - (B) acts like a battery in the breakdown region
 - (C) has a barrier potential of 1 V
 - (D) is forward biased
55. Two similar 15 V Zeners are connected in series. What is the regulated output voltage ?
- (A) 15 V
 - (B) 5 V
 - (C) 30 V
 - (D) 45 V

56. Consider the circuit shown below where the breakdown voltage of the diode is 5 V. Source voltage varies between 6 V to 12 V.



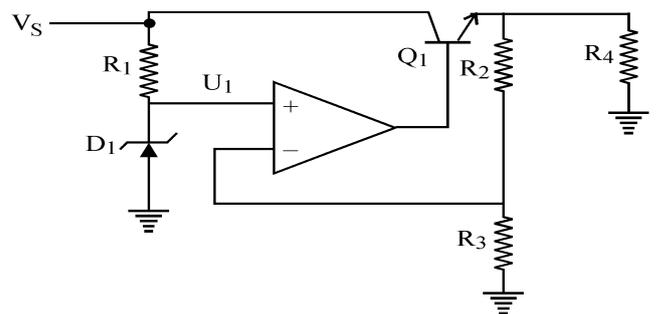
Find the maximum current through the R_2 , given that $R_1 = 2 \text{ k}\Omega$ and $R_2 = 5 \text{ k}\Omega$.

- (A) 3.5 mA
 (B) 1 mA
 (C) 1.4 mA
 (D) 0.2 mA
57. are the type of linear voltage regulators.
- (A) Series
 (B) Shunt
 (C) Both (A) and (B)
 (D) None of the above

58. Which one is a type of switching voltage regulator ?
- (A) Step-up
 (B) Step-down
 (C) Inverter
 (D) All of the above

59. What is not related to a transistorized series regulator ?
- (A) The output can be varied by using a variable resistor.
 (B) The output is independent of temperature.
 (C) The overload and short circuit protection is not required.
 (D) The circuit has negative feedback responsible for regulation.

60. Consider the Op-amp circuit shown.



The breakdown voltage of the Zener is 5 V. β for the transistor is 100. $R_1 = 10 \text{ k}\Omega$, $R_2 = 90 \text{ k}\Omega$, $R_3 = 30 \text{ k}\Omega$, $R_4 = 50 \text{ k}\Omega$. Calculate the total output voltage.

- (A) 20 V
 (B) 30 V
 (C) 5 V
 (D) 50 V

4. Four alternative answers are mentioned for each question as—A, B, C & D in the booklet. The candidate has to choose the most correct/appropriate answer and mark the same in the OMR Answer-Sheet as per the direction :

Example :

Question :

Q. 1 (A) ● (C) (D)

Q. 2 (A) (B) ● (D)

Q. 3 (A) ● (C) (D)

Illegible answers with cutting and over-writing or half filled circle will be cancelled.

5. Each question carries equal marks. Marks will be awarded according to the number of correct answers you have.
6. All answers are to be given on OMR Answer sheet only. Answers given anywhere other than the place specified in the answer sheet will not be considered valid.
7. Before writing anything on the OMR Answer Sheet, all the instructions given in it should be read carefully.
8. After the completion of the examination candidates should leave the examination hall only after providing their OMR Answer Sheet to the invigilator. Candidate can carry their Question Booklet.
9. There will be no negative marking.
10. Rough work, if any, should be done on the blank pages provided for the purpose in the booklet.
11. To bring and use of log-book, calculator, pager and cellular phone in examination hall is prohibited.
12. In case of any difference found in English and Hindi version of the question, the English version of the question will be held authentic.

Impt. : On opening the question booklet, first check that all the pages of the question booklet are printed properly. If there is any discrepancy in the question Booklet, then after showing it to the invigilator, get another question Booklet of the same series.

4. प्रश्न-पुस्तिका में प्रत्येक प्रश्न के चार सम्भावित उत्तर— A, B, C एवं D हैं। परीक्षार्थी को उन चारों विकल्पों में से एक सबसे सही अथवा सबसे उपयुक्त उत्तर छोटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 (A) ● (C) (D)

प्रश्न 2 (A) (B) ● (D)

प्रश्न 3 (A) ● (C) (D)

अपठनीय उत्तर या ऐसे उत्तर जिन्हें काटा या बदला गया है, या गोले में आधा भरकर दिया गया, उन्हें निरस्त कर दिया जाएगा।

5. प्रत्येक प्रश्न के अंक समान हैं। आपके जितने उत्तर सही होंगे, उन्हीं के अनुसार अंक प्रदान किये जायेंगे।
6. सभी उत्तर केवल ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर ही दिये जाने हैं। उत्तर-पत्रक में निर्धारित स्थान के अलावा अन्यत्र कहीं पर दिया गया उत्तर मान्य नहीं होगा।
7. ओ. एम. आर. उत्तर-पत्रक (OMR Answer Sheet) पर कुछ भी लिखने से पूर्व उसमें दिये गये सभी अनुदेशों को सावधानीपूर्वक पढ़ लिया जाये।
8. परीक्षा समाप्ति के उपरान्त परीक्षार्थी कक्ष निरीक्षक को अपनी OMR Answer Sheet उपलब्ध कराने के बाद ही परीक्षा कक्ष से प्रस्थान करें। परीक्षार्थी अपने साथ प्रश्न-पुस्तिका ले जा सकते हैं।
9. निगेटिव मार्किंग नहीं है।
10. कोई भी रफ कार्य, प्रश्न-पुस्तिका के अन्त में, रफ-कार्य के लिए दिए खाली पेज पर ही किया जाना चाहिए।
11. परीक्षा-कक्ष में लॉग-बुक, कैलकुलेटर, पेजर तथा सेल्युलर फोन ले जाना तथा उसका उपयोग करना वर्जित है।
12. प्रश्न के हिन्दी एवं अंग्रेजी रूपान्तरण में भिन्नता होने की दशा में प्रश्न का अंग्रेजी रूपान्तरण ही मान्य होगा।

महत्वपूर्ण : प्रश्नपुस्तिका खोलने पर प्रथमतः जाँच कर देख लें कि प्रश्न-पुस्तिका के सभी पृष्ठ भलीभाँति छपे हुए हैं। यदि प्रश्नपुस्तिका में कोई कमी हो, तो कक्षनिरीक्षक को दिखाकर उसी सिरीज की दूसरी प्रश्न-पुस्तिका प्राप्त कर लें।