M. Sc. (Electronics) (Second Semester) (NEP) EXAMINATION, 2022-23

ELECTRONICS CIRCUIT

| **Paper Code** |
| B | 1 | 4 | 0 | 8 | 0 | 3 | T |

Questions Booklet Series

A

Time : 1:30 Hours]

[*Maximum Marks : 75*

Instructions to the Examinee :

1. Do not open the booklet unless you are asked to do so.

2. The booklet contains 100 questions. Examinee is required to answer 75 questions in the OMR Answer-Sheet provided and not in the question booklet. 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 100 प्रश्न हैं। परीक्षार्थी को 75 प्रश्नों को केवल दी गई OMR आन्सर-शीट पर ही हल करना है, प्रश्न-पुस्तिका पर नहीं। 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. Oscillator differs from an amplifiers because it ....

   (A) Requires no input signal

   (B) Requires no d.c. supply

   (C) Always has the same input

   (D) Has more gain

2. Indentify the common element present inside all voltage regulator ICs from the given options :

   (A) Series pass transistor

   (B) Filter capacitor

   (C) Load resistor

   (D) Transformer

3. The power dissipation of the pass transistor during regulation is equal to the collector-emitter voltage multiplied by the :

   (A) Fullback current

   (B) Base current

   (C) Load current

   (D) Zener current

4. The output of a particular OP-amp increases 9 V in 12 µs. The slew rate is :

   (A) 90 V/µs

   (B) 1.5 V/µs

   (C) 0.67 V/µs

   (D) None of the above

5. The voltage between the base-emitter terminals of current booster may by used to switch it on :

   (A) A zener impedance

   (B) A current-sensing resistor

   (C) Another transistor

   (D) A load resistor

6. Compared to the ripple is a regular, the ripple out of regulars is :

   (A) Much larger

   (B) Equal in value

   (C) Much smaller

   (D) Impossible to determine

7. What is IC 723 ?

   (A) A half-ware rectifier

   (B) A voltage regulator

   (C) A full-wave rectifier

   (D) A clipper

8. Which of these is a not drawback of Zener diode shunt regulator ?

   (A) Variation in load current needs to be minimal

   (B) The output voltage can vary with temperature

   (C) It is difficult to design

   (D) The output voltage is fixed

9. Which of the following falls under the category of three-pin voltage regulator ICs ?

(A) Fixed voltage regulator

(B) Both fixed voltage regulators and variable current regulators

(C) Adjustable AC voltage regulator

(D) Variable current regulators

10. What is the standard form of AVR ?

(A) Adjustable Voltage Regulator

(B) Automatic Voltage Regulator

(C) Amplified Voltage Regulator

(D) None of the above

11. A certain regulator has a non-load voltage of 6 V and a full-load output of 5.82 V. What is the load regulation ?

(A) 87%

(B) 72%

(C) 09%

(D) None of the above

12. In a linear IC voltage regulator, series transistor always always operates in .... region.

(A) Cut-off

(B) Active

(C) Saturation

(D) All of the above

13. What is the about the breakdown voltage in a Zener diode ?

(A) It is approximately constant

(B) It decreases when load current increases

(C) It equals current times the resistance

(D) It destroys the diode

14. Which one is type of linear voltage regulator ?

(A) Step-down

(B) Inverter

(C) Series

(D) All of the above

15. When load current is zero, the Zener current will be ....

(A) Zero

(B) Minimum

(C) Maximum

(D) None of the above

16. The load voltage is approximately constant when a Zener diode is ....

(A) Operating in the breakdown region

(B) Forward biased

(C) Unbiased reverse

(D) Reverse biased

17. The ratio of (no load output voltage-full load output voltage/full load output voltage)* 100% is known as .... regulation :

(A) Load

(B) Line

(C) Both (A) and (B)

(D) None of the above

18. Voltage regulator require :

(A) Only line regulation

(B) Only load regulation

(C) A constant load

(D) Load and line regulation

19. What type of regulators offer inherent short-circuits protection ?

(A) Switching regulators

(B) Three-terminal regulators

(C) Series regulators

(D) Shunt regulators

20. In the power level of an amplifier reduces of half, the db gain will fall by ....

(A) 10 db

(B) 5 db

(C) 3 db

(D) 2 db

21. The % load regulation of power supply should be ideally .... and practically.

(A) small, zero

(B) zero, small

(C) large, zero

(D) zero, large

22. When negative voltage feedback is applied to amplifier, its voltage gain ....

(A) is reduced

(B) is increased

(C) remains the same

(D) None of the above

23. If the output of an amplifier is 10 V and 100 mV from the output if fed back to the input, then feedback fraction is ....

(A) 10

(B) 1

(C) 01

(D) 15

24. Which one of the following oscillators is a type of RC oscillator ?

(A) Wien bridge

(B) Hartley

(C) Phase shift

(D) Both (A) and (B)

25. The operation of the crystal oscillators is based on the .... effect.

(A) Piezoelectric

(B) Crystal

(C) Wien bridge

(D) All of the above

26. Which one of the following oscillators provides 180 degrees phase shift in a feedback network ?

(A) Wien bridge oscillator

(B) RC phase shift oscillator

(C) Both (A) and (B)

(D) None of the above

27. Transformer coupling is used for .... amplification.

(A) Power

(B) Voltage

(C) Current

(D) None of the above

28. If a three-state amplifier has individual stage gains of 10 db, 5 db and 12 db, then total gain in db is ....

(A) 14 db

(B) 27 db

(C) 27 db

(D) 600 db

29. .... are building blacks of regulated DC power supply :

(A) Step down transformer

(B) Rectifier, DC filter

(C) Regulator

(D) All of the above

30. .... is a fixed frequency oscillator :

(A) Colpitt's oscillator

(B) Crystal oscillator

(C) Hartley-oscillator

(D) Phase-shift oscillator

31. The hold-up time of linear power supply is around ....

(A) 1 ms-2m

(B) 10 ms-20ms

(C) 20ms-30ms

(D) None of the above

32. A wein bridge oscillator was .... feedback.

(A) Only positive

(B) Only negative

(C) Both positive and negative

(D) None of the above

33. An important limitation of a crystal oscillator :

    (A) Its high Q

    (B) Its low output

    (C) Its high output

    (D) Less availability of quartz crystal

34. Virtual ground of an op-amp means :

    (A) Terminal is grounded directly

    (B) The terminal is not physically grounded but terminal voltage is zero due to other terminal is connected to the ground due to op-amp properties :

    (C) Both (A) and (B)

    (D) None of the above

35. The gain of an amplifier without feedback is 100 db. If a negative feedback of 3 db is applied, the gain of the amplifier will become ....

    (A) 5 db

    (B) 97 db

    (C) 103 db

    (D) 300 db

36. The output obtained by the rectifier is ....

    (A) Pulsating DC

    (B) Pulsating AC

    (C) Non-pulsating AC

    (D) None of the above

37. Operating point represents ....

    (A) Values of I_C and V_{CE} when signal is applied

    (B) The magnitude of signal

    (C) Zero signal values of I_C and V_{CE}

    (D) None of the above

38. For good stabilsation in voltage divider bias, the current I_1 flowing through R_1 and R_2 should be equal to or greater than :

    (A) $2\,I_B$

    (B) $3I_B$

    (C) $4\,I_B$

    (D) $10\,I_B$

39. In breadkown region .... diode acts like battery.

    (A) Laser

    (B) Zener

    (C) Avalanche

    (D) None of the above

40. The number of stages that can be directly coupled is limited because ....

(A) Change is temperatures cause thermal instability

(B) Circuit becomes heavy and costly

(C) It becomes difficult of basic the circuit

(D) None of the above

41. For audio applications, power amplifiers are placed at ....

(A) Initial Stage

(B) Middle Stage

(C) Both (A) and B

(D) Final Stage

42. Which class of power amplifier conducts for the full duration of the cycle ?

(A) Class A

(B) Class B

(C) Class AB

(D) All mentioned above

43. Which of the following is true as per Barkhausen criteria for sustainable oscillations for amplifier gain of and the feedback β of the feedback network ?

(A) $A \geq \beta$

(B) $A \geq (1 / \beta)$

(C) $A < (1 / \beta)$

(D) $A\beta = 0$

44. Class .... amplifiers are normally operated in push-pull configuration in order to produce an output that is replica of the input.

(A) A

(B) B

(C) c

(D) AB

45. F feedback circuit usually employs .... network.

(A) Capacitive

(B) Resistive

(C) Inductive

(D) None of the above

46. What is the main agenda of Power amplifiers ?

(A) Supply Large Powers

(B) To Amplify Currents

(C) Handle Large Currents

(D) Both (A) and (B)

47. What type of coupling is used in Power Amplifiers ?

(A) Transformer Coupling

(B) Capacitor Coupling

(C) Resistor Coupling

(D) RC Coupling

48. Power amplifiers have .... at output.

   (A) High Resistance

   (B) High Inductance

   (C) Harmonic Distortion

   (D) Distortionless

49. What are the various power transistors ?

   (A) MOSFETs

   (B) Induction Transistors (Static)

   (C) BJTs

   (D) All mentioned above

50. When current feedback (negative) is applied to an amplifier, its output impedance ....

   (A) Remains the same

   (B) Is decreased

   (C) Is increased

   (D) None of the above

51. The process to make the operating point independent of changes in temperature and other variations are known as ....

   (A) Stabilization

   (B) Biasing

   (C) Rectification

   (D) Modulation

52. For a transistor to function as amplifier the DC load is .... than that of AC load.

   (A) Lesser

   (B) More

   (C) Same as

   (D) Can't say

53. Collector his method is also known as .... feedback.

   (A) Self-bias

   (B) Self-biasing with negative

   (C) Self-biasing with positive

   (D) None of the above

54. In order to determine h_{fe} and h_{ie} parameter of a transistor .... is an a.c. short-circuited.

   (A) Input as well as output

   (B) Input

   (C) Output

   (D) None of the above

55. The gain of transformer-coupled amplifier is ....

   (i) low at low frequencies

   (ii) low at high frequencies

   (iii) constant at high frequencies

   (A) I only

   (B) I and II only

   (C) II and III only

   (D) I and III only

56. Darlington pair connection is .... combination.

   (A) CC-CC
   (B) CE-CE
   (C) CE-CC
   (D) CC-CB

57. The dimension of h_{ie} parameter are ....

   (A) Farad
   (B) Ohm
   (C) Mho
   (D) None of the above

58. Which capacitance/s in hybrid π model represent/s the storage of excess minority carries at the base emitter junction ?

   (A) Transitions capacitance
   (B) Diffusion capacitance
   (C) Both (A) and (B)
   (D) None of the above

59. Why do the internal capacitances of transistor at low frequencies treated as open circuits by completely neglecting their effects in analysis ?

   (A) Due to low reactance
   (B) Due to moderate reactance
   (C) Due to high reactance
   (D) None of the above

60. We cannot use h-parameter model in high frequency analysis because ....

   (A) Junction capacitance have to be included in it
   (B) They all can be ignored for high frequencies
   (C) Junction capacitance are not included in it
   (D) AC analysis is difficult for high frequency using it

61. The *h* parameter approach gives correct results for ....

   (A) Large signals only
   (B) Small signals only
   (C) Both small and large signals
   (D) None of the above

62. A transistor behaves as linear device for ....

   (A) Small signals only
   (B) Large signals only
   (C) Both and large signals
   (D) None of the above

63. Emitter Follower is a :

   (A) Current feedback
   (B) Voltage feedback
   (C) Both voltage and current feedback
   (D) None of the above

64. Stability factor should be .... to achieve stability.

(A) Small

(B) Medium

(C) Large

(D) Maximum

65. The change in temperature makes the Q-point to shift because of ....

(A) Change in β

(B) Change in resistance values of the circuit

(C) Change in V_{CC}

(D) Change is I_{CBO}

66. The parameter h_{ie} stand for input impedance is ....

(A) CB arrangement with output shorted

(B) CC arrangement with output shorted

(C) CE arrangement with output shored

(D) None of the above

67. What are the devices used for bias compensation ?

(A) Transistor

(B) Thermistor

(C) Diode

(D) All (A), (B) and (C)

68. What is the most popular method of biasing ?

(A) Collector-feedback bias

(B) Base-resistor bias

(C) Data insufficient

(D) Potential-divider bias

69. If the operating point change, the h parameter of transistor ....

(A) Do not change

(B) May or may not change

(C) Also change

(D) None of the above

70. Q-point lying on the center of the DC load line of the amplifier circuit, these amplifiers are said to be ....

(A) Fixed biased

(B) Midpoint biased

(C) Collector biased

(D) Base biased

71. An emitter followers has .... input impedance.

(A) Zero

(B) Low

(C) High

(D) None of the above

72. A differential amplifier ....

(A) is a part of an Op-amp

(B) has one input and one output

(C) has multiple outputs

(D) Both (A) and (B)

73. OP-Amp is a basic building block of .... type electronic circuits.

(A) Digital

(B) Analog

(C) Both (A) and (B)

(D) None of above

74. A power supply which has voltage regulation of .... is unregulated power supply.

(A) 0%

(B) 5%

(C) 8%

(D) 10%

75. A Zener diode that has very narrow depletion layer will breakdown by ...... mechanism.

(A) Zener

(B) Avalanche

(C) Both avalanche and Zener

(D) None of above

76. A Schmitt trigger circuit achieves hysteresis by utilizing :

(A) The Barkhausen principle 4.

(B) The magnetic properties of a transformer core

(C) Avalanche multiplication in Zener diode

(D) Regenerative positive feedback

77. When a differential amplifier is operated single-ended, ...

(A) both input are connected together

(B) the output is grounded

(C) one output is grounded and signal is applied to the other

(D) the output is not inverted

78. The use of negative feedback ....

(A) makes linear operation possible

(B) reduced the voltage gain of an Op-amp

(C) makes the Op-amp oscillate

(D) answers (A) and (B)

79. The tail current of a differential amplifier is ....

(A) equal to the difference in base currents

(B) half of ether collector current

(C) equal to either collector current

(D) two times either collector current

80. The Op-amp can amplify :

(A) a.c. signals only

(B) d.c. signals only

(C) both a.c. and d.c. signals

(D) neither d.c. nor a.c. signals

81. A voltage follower ....

(A) is non-inverting

(B) has a voltage gain of 1

(C) has no feedback resistor

(D) has all of these

82. A certain non-inverting amplifier has R_i of 1 kΩ and F_f of 100 kΩ. The closed-loop voltage gain is ....
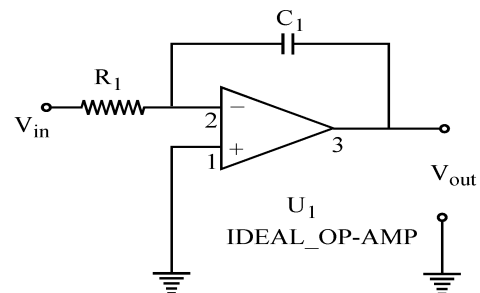
(A) 100,000

(B) 1000

(C) 101

(D) 100

83. With zero volts on both inputs, an Op-amp ideally should have a output ....

(A) equal to the negative supply voltage

(B) equal to the positive supply voltage

(C) equal to zero

(D) equal to CMRR

84. I $A_{DM} = 3500$ and $A_{CM} = 0.35$, the CMRR is ....

(A) 10,000

(B) 1225

(C) 80 dB

(D) Both (A) and (C)

85. What is the output waveform ?

(A) triangle wave

(B) square wave

(C) sawtooth wave

(D) sine wave

86. A certain OP-amp has bias currents of 50 μA. The input offset current is ....

(A) 49.7 μA

(B) 99.3 μA

(C) 700 nA

(D) None of the above

87. An ideal operational amplifier has :

(A) infinite output impedance

(B) infinite bandwidth

(C) zero input impedance

(D) All of the above

88. The Schmitt trigger can be used as which of the following ?

1. Square-wave generator

2. Comparator

3. Astable miltivibrator

Select the correct answer using the code given below.

(A) 1 and 3 only

(B) 1 and 2 only

(C) 2 and 3 only

(D) 1, 2 and 3 only

89. How does an op-amp function with an input resistor connected to the inverting terminal and a diode in the feedback circuit ?

(A) A logarithmic amplifier

(B) An ideal full-wave rectifier

(C) An exponential amplifier

(D) An ideal half-wave rectifier

90. The most commonly used amplifier in sample and hold circuit is :

(A) an reverting amplifier with a gain of 100

(B) an inverting amplifier with a gain of 10

(C) a unity gain non-inverting amplifier

(D) a unity gain inverting amplifier

91. if the differential voltage gain and the common mode voltage gain of a differential amplifier are 48 dB and 2 dB respectively, then its common mode rejection ratio is :

(A) 23 dB

(B) 46 dB

(C) 25 dB

(D) 50 dB

92. Consider the op-amp circuit shown in the figure below.
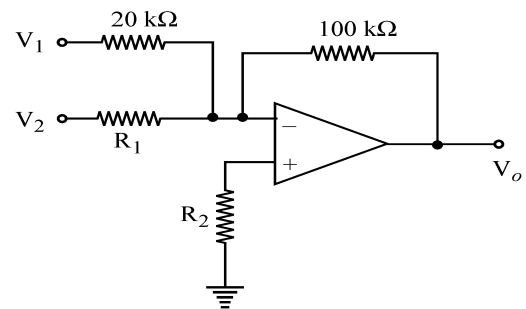
If $V_1 = 0.2$ V, $V_2 = 0.6$ V and V0 = − 7, and the op-amp is ideal, the value of R_1 is :

(A) 10 kW

(B) 5 kW

(C) 15 kW

(D) 20 kW

93. What are the characteristics of an instrumentation amplifier ?

(A) High CMRR

(B) High input resistance

(C) Low noise

(D) All of the above

94. For an Op-amp with negative feedback, the output is ....

   (A) equal to the input

   (B) increased

   (C) fed back to the inverting input

   (D) fed back to the no inverting input

95. The input impedance of a differential amplifier equals r'_e times ....

   (A) β

   (B) R_E

   (C) R_C

   (D) 2β

96. What instrument is used to amplify output signal of transducer ?

   (A) Peaking amplifier

   (B) Instrumentation amplifier

   (C) Differential amplifier

   (D) Bridge amplifier

97. Which among the following is a nonlinear application of op-amp ?

   (A) Comparator

   (B) V to 1 converter

   (C) Instrumentation amplifier

   (D) Precision rectifier

98. How to provide saturation current and temperature compensation in log-amp ?

   (A) Applying input and reference voltage to separate log-amps

   (B) Applying reference voltage alone to two different log-amps

   (C) Applying input and reference voltage to same log-amps

   (D) None of the mentioned

99. For an ideal comparator, what should be the value of the response time ?

   (A) Zero

   (B) Unpredictable

   (C) Infinite

   (D) Unity

100. The figure shown below is a pin diagram of .... instrumentation amplifier.
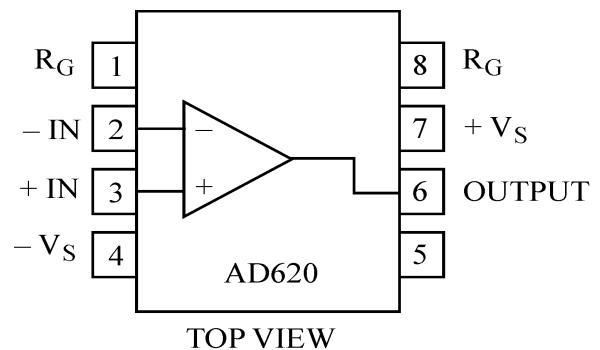
   (A) AD623

   (B) LTC1100

   (C) LT1102

   (D) AD620

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

Example :

Question :

Q. 1 Ⓐ ⬤ Ⓒ Ⓓ
Q. 2 Ⓐ Ⓑ ⬤ Ⓓ
Q. 3 Ⓐ ⬤ Ⓒ Ⓓ

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 ny 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 सही उत्तर छाँटना है। उत्तर को OMR आन्सर-शीट में सम्बन्धित प्रश्न संख्या में निम्न प्रकार भरना है :

उदाहरण :

प्रश्न :

प्रश्न 1 Ⓐ ⬤ Ⓒ Ⓓ
प्रश्न 2 Ⓐ Ⓑ ⬤ Ⓓ
प्रश्न 3 Ⓐ ⬤ Ⓒ Ⓓ

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।