IMPORTANT NOTES
महत्वपूर्ण निदेश

(A) Please fill up the OMR Sheet of this Question-Answer Booklet properly before answering.
प्रश्न-उत्तर पत्रकार में प्रश्न तथा उत्तर निभाने से पहले उसके सामने ओ.एम.आर. फॉर्म को मंगल से पहले भर डालें।

(B) The question paper is divided into different unit and parts. The number of questions to be attempted and their marks are indicated in each unit and parts.
प्रश्न-पत्र विभिन्न भागों में विभाजित है। प्रश्न वहीं एक भाग में से किसी भी भाग से अंक लेने के लिए प्रश्नों के संख्या और उनके अंक उस भाग में दिए गए हैं।

(C) Attempt answers either in Hindi or English, not in both. For Language Papers, answer in concerned language and script, unless directed otherwise to write in Hindi or English specifically.
उत्तर अंग्रेज़ी या हिंदी में बताएँ या उसे अंग्रेज़ी या हिंदी में लिखें। प्रश्न-पत्र किसी भी भाग के लिए अंक देने के लिए ही लिखिए, जब तक कि प्रश्न-पत्र के लिए अंक देने के लिए ही हो।

(D) The candidates should not write answers beyond the prescribed limit of words; failing this, marks will be deducted.
अम्शकंपनों को अपने उत्तर निपटानी को केस के साथ से अधिक न होने चाहिए।

(E) Please write answers only in the prescribed space of booklet. Do not write any mark of identity inside the Answer Script (including Paper for rough work) i.e. name, address, telephone number, Name of God etc. or any irrelevant words other than the answer to question. Such act will be treated as unfair means. The Commission may also deduct 5 marks from the marks obtained, if Roll Number is not filled correctly on the O.M.R. Sheet.
किसी भी प्रश्न का उत्तर प्रश्न-पत्र में नियमित रूप से ही लिखिए। प्रश्न-पत्र के रूप में प्रश्न-पत्र के लिे अंक देने के लिए ही लिखिए, जब तक कि प्रश्न-पत्र के लिए अंक देने के लिए ही हो।

(F) Candidates are directed that they should not write (answer) out side the border line in every page. Answer written outside the border line will not be checked by the Examiner.
अपने उत्तर निपटानी को केस के साथ से अधिक न होने चाहिए।

(G) If there is any sort of ambiguity/mistake either of printing or factual nature then out of Hindi and English version of the question, the English version will be treated as standard.
यदि किसी प्रश्न में किसी प्रकार को भूल या तत्कालीन प्रकार को भूल हो तो प्रश्न के हिंदी तथा अंग्रेजी रूपांतरों में से अंग्रेजी रूपांतर को माना गया होगा।

(H) It should be ensured that the Question-Answer Booklet is provided in a sealed envelope to the candidate.
कमांड के लिए सुनिश्चित कर दें कि अंग्रेजी को प्रश्न-पत्र की सामग्री में प्रश्न को भर दिया है।

(I) Candidate should fill up all desired details on this attached OMR sheet of Question-Answer Booklet with blue ball point pen. Please ensure that this OMR Sheet is not torn or damaged.
अंग्रेजी प्रश्न-पत्र के चारों समाप्त इस ओ.एम.आर. फॉर्म पर सभी चाहिए विवरण नीले धारण लिखिए।

(J) This OMR Sheet consists of Two parts, in which some details have to be filled by the candidate.
यह ओ.एम.आर. पत्रकार में चिह्न, जिससे केसिया मूर्ख-फूल है।

(K) If the Question-Answer Booklet is torn or not printed properly, bring it to notice of invigilator and change the Question-Answer booklet, otherwise the candidate will be liable for that.
यदि प्रश्न-पत्र कहीं से केस-फूट या अनुमूलित हो, तो अभिधारक के ध्यान में ला दें तथा उसे बदलाव ले, अन्यथा उसका प्रतिस्पर्धा अम्शकंपन का होगा।

विशेष नोटं:
अथवा किसी दिनों या अवसर में, प्रत्यावृत्ति या आदेश प्राप्त नहीं जाती है क्योंकि वह अंतर्गत सेक्या मूर्ख है। अथवा उस प्राप्त प्रश्न का यह पहला अनुमूलित किया जाता है, तो अभिधारक के ध्यान में ला दें तथा उसे बदलाव ले, अन्यथा उसका उपरिवर्तन अम्शकंपन का होगा।

special Notes:
If there is any wrong information filled by the candidate or any attempt is made to damage it or any marking as Identification is done, then his candidature for the entire examination shall be rejected by the commission, for which he will be liable.
PART - A

Note: Attempt all questions. Answer the following questions in 15 words each. Each question carries 2 marks.

1. If spring of PMMC instrument get damaged, what will be the position of pointer?

2. How many bits will a D/A converter use so that its full scale output voltage is 5 V and its resolution is at the most 10 mV?

3. A digital frequency counter, which has a 3-digit display, gated period of 10 ms is selected to measure an unknown frequency. The reading is 45. What is the frequency of the system?
4. What are the factors that decide the configuration of a data acquisition system?

5. An analog indicating instrument with a scale range of 0-5 V shows a voltage of 2.65 V. The true value of a voltage is 2.70 V. What are the values of absolute error, correction and full scale deflection?

6. Explain voltage regulation.

7. Write down uses of Schottky diode.
8. What do you mean by slew rate of operational amplifier?

9. What is the output voltage of the circuit shown in the figure?

10. An AM transmitter of 1 kW power is fully modulated. Calculate the power transmitted, if it is transmitted as SSB.

11. What are the basic concepts and features of multi-level converters?
12. State how high $\frac{di}{dt}$ and $\frac{dv}{dt}$ protection for thyristor circuit are provided?

13. What is meant by commutation of SCR?

14. What is a current source inverter?

15. Explain LDAX instruction for microprocessor.
16. Find the memory requirement of the 8085 A microprocessor program.
   LX1 B, 2475 H
   LX1 D, 3794 H
   LDAX B
   MOV L, A
   LDAX D
   STAX B
   MOV A, L
   STAX D

17. Describe the basic operations performed by the microprocessor.

18. The response of a second order control system has an overshoot of 30% with damping ratio 0.36 for a step input and the overshoot takes place at 0.05 s after application of the input. Find the value of undamped natural frequency.
19. Describe the number of forward and feedback path with their associated gain in given signal flow diagram.

20. From the given figure, write down state equations in standard form.
PART – B

Note: Answer all the following questions in 50 words each. Each question carries 5 marks.

21. Explain briefly the principle of thermistor and thermocouple.

22. Write down steps for measuring pressure using LVDT.
23. Draw and explain the working of dual slope integrating type digital voltmeter.

24. A diode whose internal resistance is 20 Ω is supplying power to a 1000 Ω load from a 230 V (rms) source of supply.

   Calculate:
   (i) The DC diode voltage
   (ii) The percentage regulation from no load to given load
25. Assuming the Op-Amp to be ideal, derive $V_o/V_s$ for the circuit shown below.
26. Calculate electron and hole concentration for an extrinsic silicon sample having minimum conductivity. Given that $\mu_n = 1350 \text{ cm}^2/\text{V-s}$, $\mu_p = 450 \text{ cm}^2/\text{V-s}$ and the intrinsic carrier concentration $n_i = 1.5 \times 10^{10} \text{ cm}^{-3}$.

27. Describe different turn-on methods for SCR in circuit.
28. Explain in brief the classification of chopper circuit.

29. For 8085 microprocessor, what should generally be the first instruction for an assembly language program containing CALL instruction? What is its significance?
30. What do you mean by interrupt? Describe the type and their effect on microprocessor.

31. Consider a feedback system with characteristic equation

\[ \frac{k}{s(s + 1)(s + 2)} = 0 \]

Compute the angle of the asymptotes of the root locus branches with the real axis of the S-plane. Also, find the centroid and the breakaway points of the root-locus of the system. Assume that ‘k’ varies from ‘0’ to ‘∞’.
32. Determine the open loop transfer function, \( G(s) H(s) \) of a feedback control system, whose bode-magnitude plot characteristic is shown in the figure.
PART - C

Note: Answer the following questions in 100 words each. Each question carries 20 marks.

33. Find the value of $R'$ in the circuit of figure. For generating sinusoidal oscillations, find the frequency of oscillations.
34. The program given below is run on an 8085 microprocessor system. Determine the contents of the registers: PC, SP, B, C, H, L after a halt instruction is executed:

LOC
2000  START LX1 SP, 1000 H
      LX1 H, 2F37H
      XRA A
      MOV A, H
      INX H
      PUSH H
      CZ 20FFH
      JUMP 3000 H
      HLT
20FF  ADD H  RZ  POP B  PUSH B  RM  
3000  HLT
35. Describe Anderson's bridge for measuring low inductance. What are its advantages over Maxwell's bridge used for the same purpose?
36. The state variable representation of a system is given as
\[
\dot{x} = \begin{bmatrix} 0 & 1 \\ 0 & -1 \end{bmatrix} x, \ x(0) = \begin{bmatrix} 1 \\ 0 \end{bmatrix} \text{ and } y = \begin{bmatrix} 0 & 1 \end{bmatrix} \cdot x
\]
Obtain the response \( y(t) \).
37. What is Piezo-electric transducer? Derive the expression of output voltage in the measurement of pressure using piezo-electric crystal.