

No. JK- 208936

AT-2011

GENERAL ENGINEERING / सामान्य इंजीनियरी

PAPER II / प्रश्न-पत्र-II

Time Allowed : Two Hours

Maximum Marks : 300

निर्धारित समय : दो घण्टे

अधिकतम अंक : 300

Attention :-

1. Paper consists of Part A (Civil and Structural) and Part B (Electrical and Mechanical) and only one Part is to be attempted as per option given in the Application Form. Both Parts A and B consist of 2 Sections each and candidates should attempt 10 questions in all taking 5 questions from each Section, i.e., Section I and Section II of either Part A or Part B. All questions carry equal marks.
2. Each candidate will be given 2 (two) Answer Books. Candidates attempting Part A (Civil and Structural) should attempt Section I (Civil) and Section II (Structural) in separate Answer Books. Similarly, candidates attempting Part B (Electrical and Mechanical) should attempt Section I (Electrical) and Section II (Mechanical) in separate Answer Books.
3. Answers to all questions must be written in one language, i.e. either in English or in Hindi according to the option given by the candidate in his/her Application Form. Candidates are not allowed to write the answers partly in English and partly in Hindi.
4. Candidates must write their Name, Roll No., Ticket No. Name of the Examination and Subject, at the prescribed place, on the cover page of the Answer Book correctly. Candidates must also put their signature on the cover page at the prescribed place. The above instructions must be fully complied with failing which the Answer Book will not be evaluated and zero mark will be awarded.
5. No credit will be given for answers written in a language other than the one opted by the candidate.
6. Necessary tables of IS 456 : 2000 Code of Practice are given at the end of Part A for use of candidates attempting Civil and Structural part.

ध्यान दें/जिए :-

1. प्रश्न-पत्र में भाग क (सिविल एवं संरचनात्मक) और भाग ख (वैद्युत एवं यांत्रिक) हैं और आवेदन-पत्र में दिए गए विकल्प के अनुसार केवल एक भाग का ही उत्तर दिया जाना है। दोनों भागों, क एवं ख, में 2 खण्ड हैं और अभ्यर्थियों को प्रत्येक खण्ड अर्थात् भाग क या भाग ख के खण्ड I तथा खण्ड II में प्रत्येक से 5 प्रश्न लेते हुए कुल 10 प्रश्न करने होंगे। सभी प्रश्नों के अंक बराबर हैं।
2. प्रत्येक अभ्यर्थी को 2 (दो) उत्तर-पुस्तिकाएँ दी जाएँगी। भाग क (सिविल एवं संरचनात्मक) को हल करने वाले अभ्यर्थियों को खण्ड I (सिविल) तथा खण्ड II (संरचनात्मक) को अलग-अलग उत्तर-पुस्तिकाओं में हल करना चाहिए। इसी प्रकार, भाग ख (वैद्युत एवं यांत्रिक) को हल करने वाले अभ्यर्थियों को खण्ड I (वैद्युत) तथा खण्ड II (यांत्रिक) को अलग-अलग उत्तर-पुस्तिकाओं में हल करना चाहिए।
3. सभी प्रश्नों के उत्तर अभ्यर्थी द्वारा अपने आवेदन-पत्र में दिए गए विकल्प के अनुसार किसी एक भाषा में अर्थात् अंग्रेजी या हिन्दी में, दिए जाने चाहिए। अभ्यर्थियों को कुछ उत्तर अंग्रेजी में और कुछ उत्तर हिन्दी में लिखने की अनुमति नहीं है।
4. अभ्यर्थी उत्तर-पुस्तिका के आवरण पृष्ठ पर निर्धारित स्थान में अपना नाम, रोल नंबर, टिकट नंबर, परीक्षा का नाम तथा विषय सही-सही अवश्य लिखें। अभ्यर्थी आवरण पृष्ठ पर निर्धारित स्थान में अपने हस्ताक्षर भी अवश्य करें। उपरोक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा उत्तर-पुस्तिका को नहीं जाँचा जाएगा और शून्य अंक दे दिया जाएगा।
5. अभ्यर्थी द्वारा दिए गए विकल्प की भाषा के अतिरिक्त किसी अन्य भाषा में दिए गए उत्तरों के लिए कोई अंक नहीं दिए जाएँगे।
6. सिविल एवं संरचनात्मक भाग की परीक्षा देने वाले अभ्यर्थियों के प्रयोग के लिए आई.एस. 456 : 2000 प्रेक्टिस कोड की आवश्यक सारणियाँ भाग क के अन्त में दी गई हैं।

AT-2011

[P.T.O.]

**SECTION II**  
**(Mechanical)**

7. (a) The gas in a system receives heat which causes expansion against a constant pressure of 2 bar. An agitator in the system is driven by an electric motor using 100 W. For 4 kJ of heat supplied the volume increase of the system in 30 sec is  $0.06 \text{ m}^3$ . Estimate net change in the energy of the system. 15
- (b) Find the coefficient of performance and heat transfer rate in the condenser of a refrigerator in kJ/h which has a refrigeration capacity of 12000 kJ/h when power input is 0.75 kW. 15
8. (a) What is Air standard cycle? Define, Air standard efficiency and, mention the assumptions involved with Air standard cycle. 15
- (b) Explain the purpose of Cooling system in IC engines. Also mention different types of Cooling systems in brief. 15
9. (a) What is the principle on which Manometer works? Also, explain its various types, with their use in brief. 15
- (b) What is Bernoulli's Theorem? Also mention its assumptions.  
The diameter of a pipe at the section 1 and 2 are 10 cm and 15 cm respectively. Find the discharge through the pipe if the velocity of water flowing through the pipe at section 1 is 5 m/sec. Determine the velocity at section 2. 15
10. (a) A thick cylinder 125 mm inside diameter and 250 mm outside diameter is subjected to an internal fluid pressure of  $50 \text{ N/mm}^2$ . Determine the maximum and minimum intensities of circumferential stress and sketch the distribution of circumferential stress intensity and radial pressure intensity across the section. 15
- (b) Determine the maximum torque that can be safely applied to a shaft of 200 mm diameter if the permissible angle of twist is  $1^\circ$  for a length of 5 m and the permissible shear stress is  $45 \text{ N/mm}^2$ . Take Modulus of Rigidity =  $0.8 \times 10^5 \text{ N/mm}^2$ . 15

11. (a) Explain Tempering process and its classification (Austempering/Isothermal quenching and Martempering/Stepped quenching). 15
- (b) With the help of neat sketch describe arc welding with coated electrode in detail. 15
12. (a) The total tension on the two sides of a belt connecting two pulleys is 2 kN. The minimum angle of embrace of the belt is  $150^\circ$  and coefficient of friction between the belt and the pulley rim is 0.25. Determine the value of the tension on both the tight and the slack side of the belt. Also calculate the power transmitted if the speed of the belt is 600 m/minute. 15
- (b) Draw roller follower – cam mechanism and describe the terminology
- (i) base circle
  - (ii) pitch curve
  - (iii) prime circle
  - (iv) pressure angle and pitch point. 15