

# SSC Junior Engineer Exam (25.05.2014)

JN

1312745

DB 2014  
PAPER I  
प्रश्न-पत्र I

Test Form No.  
टेस्ट फॉर्म सं.  
321 GK 4

Time Allowed : 2 Hours

Maximum Marks : 200

निर्धारित समय : 2 घंटे

अधिकतम अंक : 200

Read the following instructions carefully before you begin to answer the questions. This Booklet contains questions in English as well as in Hindi.

प्रश्नों के उत्तर देने से पहले नीचे लिखे अनुदेशों को ध्यान से पढ़ लें। इस पुस्तिका में प्रश्न अंग्रेजी तथा हिन्दी दोनों में दिये गये हैं।

INSTRUCTIONS TO CANDIDATES	उम्मीदवारों के लिए अनुदेश
<p>1. This Booklet contains 200 questions in all comprising the following three tests :</p> <p>Test (i) : General Intelligence and Reasoning (50 Questions)</p> <p>Test (ii) : General Awareness (50 Questions)</p> <p>Test (iii) : Part A : General Engineering (Civil and Structural) (100 Questions)</p> <p>OR</p> <p>Part B : General Engineering (Electrical) (100 Questions)</p> <p>OR</p> <p>Part C : General Engineering (Mechanical) (100 Questions)</p>	<p>1. इस पुस्तिका में कुल 200 प्रश्न हैं, जिनमें निम्नलिखित तीन परीक्षण शामिल हैं :</p> <p>परीक्षण (i) : सामान्य बुद्धि और तर्क (50 प्रश्न)</p> <p>परीक्षण (ii) : सामान्य जागरूकता (50 प्रश्न)</p> <p>परीक्षण (iii) : भाग A : सामान्य इंजीनियरी (विविध एवं संरचनात्मक) (100 प्रश्न)</p> <p>अथवा</p> <p>भाग B : सामान्य इंजीनियरी (विद्युत) (100 प्रश्न)</p> <p>अथवा</p> <p>भाग C : सामान्य इंजीनियरी (यांत्रिक) (100 प्रश्न)</p>
<p>2. In questions set bilingually in English and Hindi, in case of discrepancy, the English version will prevail.</p>	<p>2. अंग्रेजी और हिन्दी भाषा में तैयार किए गए द्विभाषी प्रश्नों में कोई विचंगती होने की स्थिति में अंग्रेजी विवरण मान्य होगा।</p>
<p>3. Test (i) General Intelligence and Reasoning and Test (ii) General Awareness are compulsory for all the candidates. Candidates are required to attempt only one Section in Test (iii) General Engineering i.e. Part A Civil and Structural OR Part B Electrical OR Part C Mechanical as per option in the application form given by the candidates failing which you will be awarded 'ZERO' mark.</p>	<p>3. परीक्षण (i) सामान्य बुद्धि और तर्क एवं परीक्षण (ii) सामान्य जागरूकता सभी उम्मीदवारों के लिए अनिवार्य हैं। उम्मीदवारों को आवेदन-पत्र में दिए विवरण के अनुसार परीक्षण (iii) सामान्य इंजीनियरी का केवल एक ही भाग क विहित एवं संरचनात्मक अथवा भाग B विद्युत अथवा भाग C यांत्रिक को हल करना होगा अन्यथा आपको 'शून्य' अंक दिया जाएगा।</p>
<p>4. All questions are compulsory and carry equal marks.</p>	<p>4. सभी प्रश्न अनिवार्य हैं तथा सबके भार एक-एक हैं।</p>
<p>5. The paper carries negative marking. 0.25 marks will be deducted for each wrong answer.</p>	<p>5. प्रश्न पत्र में ऋणात्मक अंकन होगा। इस प्रश्न पत्र के लिए 0.25 अंक घटाए जाएंगे।</p>
<p>6. Before you start to answer the questions you must check up this Booklet and ensure that it contains all the pages (1-80) and see that no page is missing or repeated. If you find any defect in this Booklet, you must get it replaced immediately.</p>	<p>6. प्रश्नों के उत्तर देने से पहले आप इस पुस्तिका की जाँच करके देख लें कि इसमें पूरे पृष्ठ (1-80) हैं तथा कोई पृष्ठ कम या दुबारा तो नहीं आ गया है। यदि आप इस पुस्तिका में कोई त्रुटि पाएँ, तो तत्पश्चात् इसके बदले दूसरी पुस्तिका ले लें।</p>
<p>7. You will be supplied the Answer-Sheet separately by the Invigilator. Before you actually start answering the questions, you must complete and code the details of Name, Roll Number, Ticket Number, Name of the examination as mentioned in the admission certificate, Date of Birth, Test Form Number and Stream i.e. Civil and Structural OR Electrical OR Mechanical etc., on Side-I of the Answer-Sheet carefully. You must also put your signature and left hand thumb impression on the Answer-Sheet at the prescribed place before you start answering the questions. These instructions must be fully complied with, failing which your Answer-Sheet will not be evaluated and you will be awarded 'ZERO' mark.</p>	<p>7. निरीक्षक द्वारा आपके उत्तर-पत्रिका अलग से दी जाएगी। प्रश्नों के उत्तर प्रारंभ से शुरू करने से पहले आप उत्तर-पत्रिका के Side-I में निम्नलिखित के अनुसार अपना नाम, रोल नम्बर, टिकट नम्बर, परीक्षा का नाम जैसे प्रवेश पत्र में लिखा गया है, जन्म तिथि, टेस्ट फॉर्म संख्या तथा प्रवाह अर्थात् विविध एवं संरचनात्मक या विद्युत या यांत्रिक यदि आवश्यक निर्दिष्ट। प्रश्नों के उत्तर देने से पहले उत्तर-पत्रिका पर निर्धारित स्थान पर आप अपने हस्ताक्षर एवं बाईं हाथ के अंगूठे का निशान भी अवश्य लगाएँ। उक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा आपकी उत्तर-पत्रिका को जाँच नहीं जाएगा और 'शून्य' अंक दिया जाएगा।</p>
<p>8. Answers must be shown by completely blackening the corresponding oval on Side-II of the Answer-Sheet against the relevant question number by Black/Blue Ball-point Pen only. Answers which are not shown by Black/Blue Ball-point Pen will not be awarded any mark.</p>	<p>8. उत्तर-पत्रिका में सभी उत्तर Side-II में प्रश्न संख्या के सामने दिये गये सम्बन्धित अल्पवर्ण चक्रों को केवल काल/नीला बॉल-पॉइंट पेन से पूरी तरह काला करके दिखाएँ। जो उम्मीदवार चक्रे काल/नीला बॉल-पॉइंट पेन से नहीं धरे जायें, उनके लिए कोई अंक नहीं दिया जाएगा।</p>
<p>9. A machine will read the coded information in the OMR Answer-Sheet. In case the information is incomplete or different from the information given in the application form, such candidate will be awarded 'ZERO' mark.</p>	<p>9. ओ.एम.आर. उत्तर-पत्रिका में पूरी तरह कूट सूचना को एक मशीन पढ़ेगी। यदि सूचना अपूर्ण है अथवा आवेदन प्रश्न में दी गई सूचना से भिन्न है, तो ऐसे उम्मीदवारों को 'शून्य' अंक दिया जाएगा।</p>
<p>10. The Answer-Sheet must be handed over to the Invigilator before you leave the Examination Hall.</p>	<p>10. परीक्षा-भवन छोड़ने से पहले परीक्षार्थी को उत्तर-पत्रिका निरीक्षक के हवाले कर देनी चाहिए।</p>
<p>11. Failure to comply with any of the above instructions will render a candidate liable to such action/penalty as may be deemed fit.</p>	<p>11. उपर के अनुदेशों में से किसी एक का भी पालन न करने पर उम्मीदवार पर विवेकानुसार कार्रवाई की जा सकती है या दण्ड दिया जा सकता है।</p>
<p>12. The manner in which the different questions are to be answered has been explained at the back of this Booklet (Page No. 80), which you should read carefully before actually answering the questions.</p>	<p>12. विविध प्रश्नों के उत्तर देने की विधि इस पुस्तिका के पीछे (पृष्ठ संख्या 80) में छाने हुए दिशानिर्देशों में दी गई है, इसे आप प्रश्नों के उत्तर देने से पहले ध्यानपूर्वक पढ़ लें।</p>
<p>13. Answer the questions as quickly and as carefully as you can. Some questions may be difficult and others easy. Do not spend too much time on any question.</p>	<p>13. प्रश्नों के उत्तर जितनी जल्दी हो सके तथा ध्यानपूर्वक दें। कुछ प्रश्न आसान तथा कुछ कठिन हैं। किसी एक प्रश्न पर बहुत अधिक समय न लगाएँ।</p>
<p>14. Rough work is to be done on the Answer-Sheet. Space for rough work has been provided below the questions.</p>	<p>14. कोई भी कठिन प्रश्न-पत्रिका पर नहीं करना है। एक कार्य के लिए स्थान प्रश्नों के नीचे दिया गया है।</p>
<p>15. "Mobile phones and wireless communication devices are completely banned in the examination halls/rooms. Candidates are advised not to keep mobile phones/any other wireless communication devices with them even switching it off, in their own interest. Failing to comply with this provision will be considered as using unfair means in the examination and action will be taken against them including cancellation of their candidature."</p>	<p>15. "परीक्षा हॉल/कक्षाओं में मोबाइल फोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं। उम्मीदवारों को उनके अपने हित में सावधान हो जाना है कि मोबाइल फोन/किसी अन्य बेतार संचार साधन को निष्चलित करके भी अपने पास न रखें। इस प्रावधान का अनुपालन न करने को परीक्षा में अनुचित उपायों का प्रयोग माना जाएगा और उनके विरुद्ध कार्रवाई की जाएगी, उनकी अभ्यर्थिता रद्द कर देते रहित।"</p>

SEAL

**TEST (I) : GENERAL INTELLIGENCE AND REASONING**

**Directions :** In questions no. 1 to 8, select the related word/letters/number from the given alternatives.

1. Uttarakhand : Dehradun :: Mizoram : ?  
(A) Aizawl (B) Kohima  
(C) Shillong (D) Darjeeling
2. Crime : Court :: Disease : ?  
(A) Doctor (B) Medicine  
(C) Hospital (D) Treatment
3. YQXP : JBLA :: OVNU : ?  
(A) FAGZ (B) HRIS  
(C) DKCJ (D) DNEO
4. ADGJ : BEHK :: DGJM : ?  
(A) KPUB (B) GJMP  
(C) KNQT (D) PSVY
5. ACE : BDF :: GIK : ?  
(A) HJL (B) AXP  
(C) CFG (D) GFC
6. CAT : BIG :: DDY : ?  
(A) CLL (B) CLM  
(C) CML (D) CEP
7. 1 : 1 :: 10 : ?  
(A) 12 (B) 110  
(C) 210 (D) 1000
8. 7 : 56 :: 5 : ?  
(A) 25 (B) 26  
(C) 30 (D) 35
9. The following numbers fall in a group. Which one does *not* belong to the group ?  
53, 63, 83, 73  
(A) 53 (B) 63  
(C) 83 (D) 73
10. Which one is the same as Mumbai, Kolkata and Cochin ?  
(A) Delhi (B) Kanpur  
(C) Chennai (D) Sholapur

**Directions :** In questions no. 11 to 17, find the odd word/letters/number pair from the given alternatives.

11. (A) Kolkata (B) Vishakhapatnam  
(C) Bengaluru (D) Haldia
12. Carrot, Cabbage, Potato, Ginger, Beetroot  
(A) Cabbage (B) Carrot  
(C) Potato (D) Beetroot
13. (A) HGFE (B) PONM  
(C) DCBA (D) MSTU
14. (A) GFI (B) VUX  
(C) POR (D) LKM
15. (A) ywqp (B) yxmn  
(C) gfkI (D) cbrs
16. (A) (324, 18) (B) (441, 72)  
(C) (117, 81) (D) (186, 14)
17. (A) (11, 121) (B) (25, 625)  
(C) (12, 141) (D) (15, 225)
18. Find the smallest number which when divided by 25, 40 or 56 has in each case 13 as remainder.  
(A) 1413 (B) 1400  
(C) 1439 (D) 1426
19. Arrange the following words as per order in the dictionary :  
1. Emplane 2. Empower  
3. Embrace 4. Elocution  
5. Equable  
(A) 5, 1, 3, 2, 4 (B) 4, 2, 1, 3, 5  
(C) 4, 3, 1, 2, 5 (D) 4, 5, 2, 3, 1
20. Which one of the given responses would be a meaningful order of the following words ?  
1. Sowing 2. Tilling  
3. Reaping 4. Weeding  
(A) 3, 1, 2, 4 (B) 2, 1, 4, 3  
(C) 1, 2, 4, 3 (D) 1, 3, 2, 4



21. Arrange the colours of the rainbow (in the reverse order) (from the top edge) :

Red, Orange, .....

- |           |           |
|-----------|-----------|
| 1. Blue   | 2. Indigo |
| 3. Yellow | 4. Green  |
| 5. Violet |           |
- (A) 3, 4, 1, 2, 5      (B) 4, 3, 2, 5, 1  
(C) 5, 3, 4, 2, 1      (D) 2, 4, 3, 1, 5

**Directions :** In questions no. 22 to 24, a series is given, with one term missing. Choose the correct alternative from the given ones that will complete the series.

22. CEG, JLN, QSU, ?

- (A) QQS      (B) TVX  
(C) HJL      (D) UVW

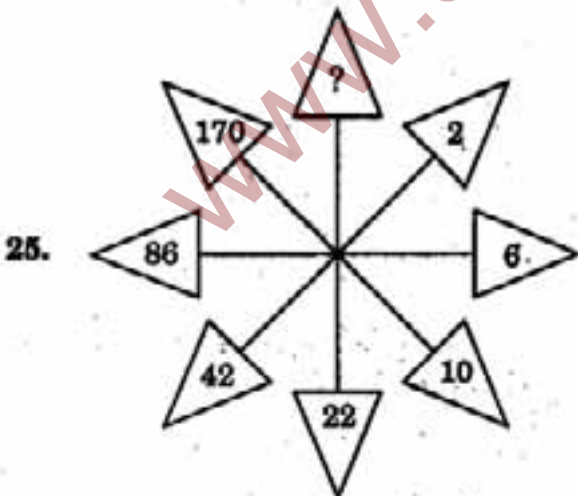
23. B-1, D-2, F-4, H-8, J-16, ?

- (A) K-64      (B) L-32  
(C) M-32      (D) L-64

24. CGJ, KOR, TXA, ?

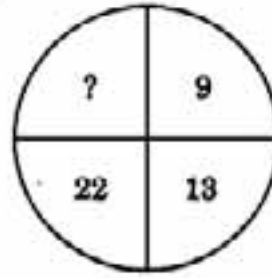
- (A) ACE      (B) JDP  
(C) FJM      (D) UWY

**Directions :** In questions no. 25 to 29, find the missing number from the given responses.



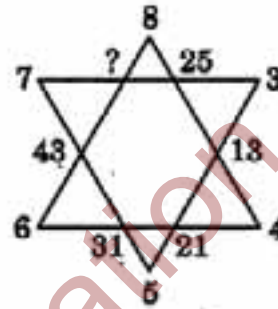
- (A) 422      (B) 374  
(C) 256      (D) 342

26.



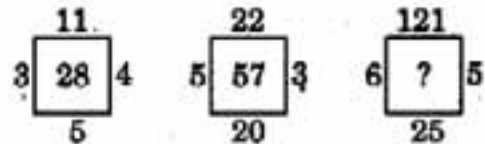
- (A) 40      (B) 38  
(C) 39      (D) 44

27.



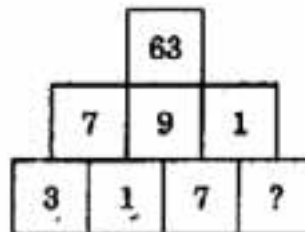
- (A) 56      (B) 57  
(C) 58      (D) 59

28.



- (A) 176      (B) 115  
(C) 157      (D) 131

29.



- (A) 3      (B) 9  
(C) 5      (D) 2

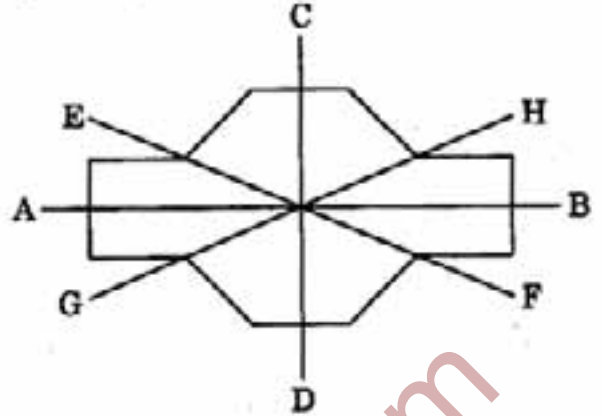
30. Arrange the letters to form a word and suggest what is it.

NGDEALN

- (A) State      (B) Country  
(C) River      (D) Ocean

31. If  $A = 1$ ,  $B = 2$  and  $N = 14$ , then  $2A + 3B + 4N = ?$
- (A) 2154(14)97      (B) 2514(14)79  
(C) 25149(14)7      (D) 2154(14)79
32. If  $A = 1$ ,  $AGE = 13$ , then  $CAR = ?$
- (A) 19      (B) 20  
(C) 21      (D) 22
33. If an electric train runs in the direction from North to South with a speed of 150 km/hr covering 2000 km, then in which direction will the smoke of its engine go ?
- (A)  $N \rightarrow S$       (B)  $S \rightarrow N$   
(C)  $E \rightarrow W$       (D) No direction
34. If  $1 = 1$ ,  $2 = 3$ ,  $3 = 5$  and  $4 = 7$ , then  $5 = ?$
- (A) 9      (B) 7  
(C) 5      (D) 8
35. Find the answer of the following :
- $7 + 3 = 421$   
 $11 + 7 = 477$   
 $9 + 5 = 445$   
 $6 + 2 = ?$
- (A) 444      (B) 412  
(C) 475      (D) 487
36. Find the odd number out :
- 18, 34, 36, 54
- (A) 34      (B) 54  
(C) 18      (D) 36
37. Introducing a girl, Ram said to his son-in-law, "Her brother is the only son of my brother-in-law." Who is the girl of Ram ?
- (A) Sister-in-law      (B) Niece  
(C) Daughter      (D) Sister

38. Which of the following are the lines of symmetry ?



- (A) AB and CD  
(B) EF and GH  
(C) All of the above  
(D) None of the above
39. Murthy drove from town A to town B. In the first hour, he travelled  $\frac{1}{4}$  of the journey. In the next one hour, he travelled  $\frac{1}{2}$  of the journey. In the last 30 minutes, he travelled 80 km. Find the distance of the whole journey.
- (A) 240 km      (B) 300 km  
(C) 320 km      (D) 360 km
40. Identify the answer figure from which the pieces given in question figure have been cut.

Question figure :



Answer figures :



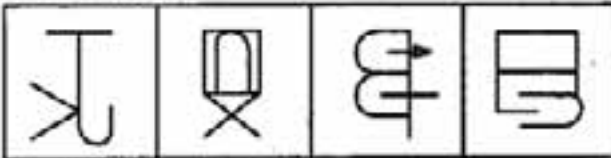
(A)      (B)      (C)      (D)

41. Which of the answer figures is *not* made up only by the components of the question figure ?

Question figure :

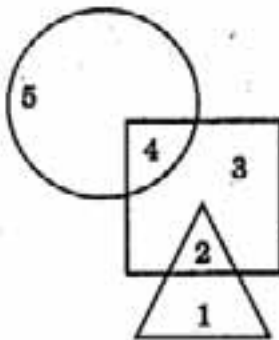


Answer figures :



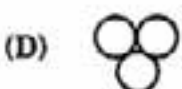
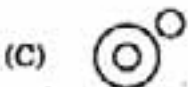
(A) (B) (C) (D)

42. Which of the following numbers is present only in the square and the circle ?



- (A) 5 (B) 4  
(C) 3 (D) 2

43. Which figure represents the relation among Computer, Internet and Information-Communication Technology ?



**Directions :** In questions no. 44 and 45, one or two statements are given, followed by three/four Conclusions/Arguments, I, II, III and IV. You have to consider the statements to be true, even if they seem to be at variance from commonly known facts. You are to decide which of the given Conclusions/Arguments can definitely be drawn from the given statement(s). Indicate your answer.

44. Statements :

1. SAGE is a reputed publisher of both journals and books.
2. All publishing of SAGE is highly qualitative.

Conclusions :

- I. SAGE publishes qualitative articles.
- II. SAGE did not publish lowest quality articles.
- III. SAGE enriches its publications by high acrutinization.

- (A) Only conclusion III  
(B) All conclusions  
(C) Only conclusions I and II  
(D) Only conclusions II and III

45. Statement :

Should little children be loaded with such heavy school bags ?

Arguments :

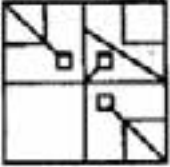
- I. Yes, a heavy bag means more knowledge.
- II. No, heavy school bags spoil the posture of the children.
- III. Yes, children need to be adapted for earning knowledge.
- IV. No, a heavy bag never ensures knowledge gathering.

- (A) I and III appear to be strong arguments  
(B) I and III are poor arguments  
(C) II and IV are strong arguments  
(D) I and IV are strong arguments

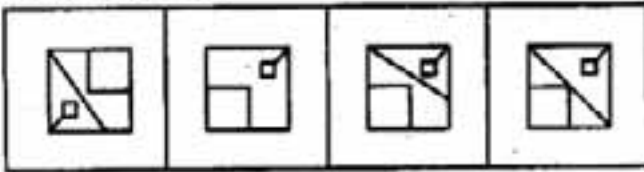


**Directions :** In questions no. 46 and 47, which answer figure will complete the pattern in the question figure ?

46. Question figure :

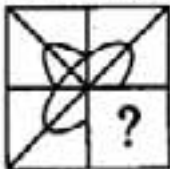


Answer figures :

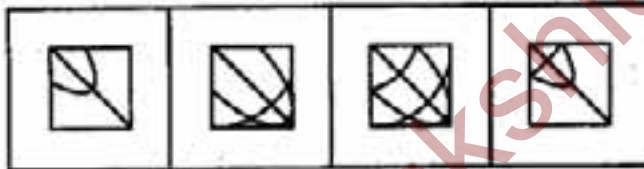


(A) (B) (C) (D)

47. Question figure :



Answer figures :



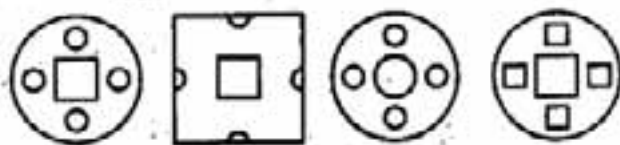
(A) (B) (C) (D)

48. A piece of paper is folded and cut as shown below in the question figures. From the given answer figures, indicate how it will appear when opened.

Question figures :



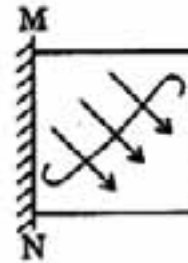
Answer figures :



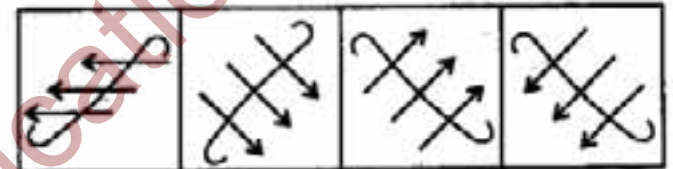
(A) (B) (C) (D)

49. If a mirror is placed on the line MN, then which of the answer figures is the correct image of the question figure ?

Question figure :



Answer figures :



(A) (B) (C) (D)

50. In the following question, a matrix of certain characters is given. These characters follow a certain trend, row-wise or column-wise. Find out this trend and choose the missing character accordingly.

9	10	5
5	6	4
4	6	4
536	660	?

(A) 450 (B) 550  
(C) 320 (D) 420

**TEST (ii) : GENERAL AWARENESS**

51. Classification of Economics into two branches (Macro Economics and Micro Economics) was done by  
(A) J.M. Keynes (B) Milton Friedman  
(C) Ragnar Frisch (D) Adam Smith
52. 'Capital Goods' refers to goods which  
(A) Serve as a source of raising further capital  
(B) Help in the further production of goods  
(C) Directly go into the satisfaction of human wants  
(D) Find multiple uses
53. NNP is equal to  
(A) GNP + Depreciation  
(B) GNP - Depreciation  
(C) GNP + Exports  
(D) GNP - Exports
54. Rate of growth of an economy is measured in terms of  
(A) Per capita income  
(B) Industrial development  
(C) Number of people who have been lifted above the poverty line  
(D) National income
55. The basic characteristic of oligopoly is  
(A) A few sellers, a few buyers  
(B) A few sellers, many buyers  
(C) A few sellers, one buyer  
(D) Many sellers, a few buyers
56. Governor will act on the advice of Council of Ministers while  
(A) Dissolving the Legislative Assembly  
(B) Appointing the Chairman of the State Public Service Commission  
(C) Recommending for President's Rule in the State  
(D) Returning a bill for reconsideration
57. The Supreme Court of India was set up by the  
(A) Regulating Act, 1773  
(B) Pitts India Act, 1784  
(C) Charter Act, 1813  
(D) Charter Act, 1833
58. Which Constitutional Amendment provided Constitutional status to Panchayat Raj Institutions ?  
(A) 93<sup>rd</sup> Amendment  
(B) 44<sup>th</sup> Amendment  
(C) 42<sup>nd</sup> Amendment  
(D) 73<sup>rd</sup> Amendment
59. Who has the power to pardon in case of capital punishment ?  
(A) Prime Minister  
(B) President  
(C) Chief Justice  
(D) Attorney General of India
60. The Union Public Service Commission of India has been established under  
(A) Article 315  
(B) Article 320  
(C) Article 325  
(D) Article 335
61. The Harappans worshipped  
(A) Shiva, Parvathi and Vishnu  
(B) Mother Goddess and Pashupathi  
(C) Vishnu and Mother Goddess  
(D) Pashupathi and Vishnu
62. Gandhiji started the Dandi March for  
(A) Poorna Swaraj  
(B) Home-rule  
(C) Protest against the imposition of Salt Tax  
(D) Responsible Government



63. The famous court poet of Akbar was  
(A) Birbal  
(B) Tulsidas  
(C) Rahim Khan  
(D) Bairam Khan
64. Who established four great Mathas at the four corners of India — Sringeri, Puri, Dwaraka and Badrinath ?  
(A) Shankara (B) Ramanuja  
(C) Madhva (D) Ramananda
65. The local name of Mohenjodaro is  
(A) Mound of the living  
(B) Mound of the great  
(C) Mound of the dead  
(D) Mound of bones
66. Which is the longest dam in India ?  
(A) Bhakra-Nangal  
(B) Rihand  
(C) Hirakud  
(D) Nagarjuna Sagar
67. The Thermal Power Plant in Tamil Nadu is  
(A) Kundah (B) Ramagundam  
(C) Pykara (D) Neyveli
68. Which one of the following regions does *not* come under the Mediterranean type of climate ?  
(A) Iberian Peninsula  
(B) California coast  
(C) Chilean coast  
(D) Eastern coast of South Africa
69. The main cause of faulting is  
(A) Tension  
(B) Wind  
(C) Tidal activity  
(D) Gravitational force
70. 'Pan American' refers to  
(A) North America  
(B) South America  
(C) Central America  
(D) All the above
71. Most primitive living vascular plants are  
(A) Brown algae (B) Cycas  
(C) Ferns (D) Sphagnum
72. Temporary wilting occurs in plants due to  
(A) Respiration  
(B) Transpiration  
(C) Photosynthesis  
(D) Absorption of water
73. Lichens are a symbiotic association of  
(A) Algae and Fungi  
(B) Bacteria and Fungi  
(C) Bacteria and Algae  
(D) Fungi and Higher plants
74. Photophobia is caused by the deficiency of  
(A) Vitamin B<sub>1</sub> (B) Vitamin B<sub>2</sub>  
(C) Vitamin B<sub>4</sub> (D) Vitamin B<sub>6</sub>
75. Which of the following is present only in plant cell ?  
(A) Cell membrane  
(B) Mitochondria  
(C) Cell wall  
(D) Endoplasmic reticulum



76. The yellow colour of mangoes is due to the presence of  
(A) Chlorophyll  
(B) Anthocyanin  
(C) Anthoxanthin  
(D) Carotene
77. Lunar eclipse is caused by shadow of the  
(A) Earth on the Moon  
(B) Moon on the Sun  
(C) Earth on the Sun  
(D) Earth and the Moon on other stars
78. The largest planet in the solar system is  
(A) Venus (B) Mars  
(C) Jupiter (D) Earth
79. Asteroid belt is a region in the solar system that exists between the orbits of  
(A) Venus and Mars  
(B) Mars and Jupiter  
(C) Mercury and Earth  
(D) Jupiter and Uranus
80. Electrocardiograph (ECG) is used to measure  
(A) Blood Count  
(B) Heart Beat  
(C) Temperature  
(D) Electricity
81. USB stands for  
(A) Unique Serial Bus  
(B) Universal Serial Bus  
(C) Unary Serial Bus  
(D) Universal Secondary Bus
82. In computer network terminology, WAN stands for  
(A) World area network  
(B) Wide area network  
(C) Wide array net  
(D) Wireless area network
83. Which element produces hydrogen on reaction with strong alkali ?  
(A) Si (B) C  
(C) P (D) S
84. Which metal does *not* react with dilute  $H_2SO_4$  ?  
(A) Pb (B) Fe  
(C) Zn (D) Mg
85. The unit of rate of reaction is  
(A)  $Mol\ lit^{-1}\ sec^{-1}$   
(B)  $Sec\ mol^{-1}$   
(C)  $Moles\ sec^{-1}$   
(D)  $Joules\ sec^{-1}$
86. Salt that dissolves in aqueous ammonia solution is  
(A)  $HgCl_2$  (B)  $PbCl_2$   
(C)  $Cu(OH)_2$  (D)  $Al(OH)_3$
87. Residence time of water molecule in the ocean is  
(A) 3-5 years  
(B) 3-5 million years  
(C) 35 years  
(D) 35000 years
88. Biotic environment includes  
(A) Producers (B) Consumers  
(C) Decomposers (D) All the above

89. A natural phenomenon that becomes harmful due to pollution is
- (A) Global warming
  - (B) Ecological balance
  - (C) Greenhouse effect
  - (D) Desertification
90. Decomposers include
- (A) Bacteria
  - (B) Fungi
  - (C) Both Bacteria and Fungi
  - (D) Animals
91. Who said about religion that "it is the opium of the masses" ?
- (A) Hitler
  - (B) Stalin
  - (C) Lenin
  - (D) Marx
92. The first woman in the world to have climbed Mt. Everest twice is
- (A) Bachendri Pal
  - (B) Molly Chacko
  - (C) Santosh Yadav
  - (D) Theresia Kiesel
93. What is the basic foundation of Gandhian thought ?
- (A) Political campaigns
  - (B) Social movements
  - (C) Religion and morality
  - (D) Freedom of the individual
94. Amir Khusrau was a famous poet in the court of
- (A) Akbar
  - (B) Shahjahan
  - (C) Ibrahim Lodhi
  - (D) Alauddin Khilji
95. In the year 1905, Gopal Krishna Gokhale founded the
- (A) Servants of India Society
  - (B) Asiatic Society
  - (C) Brahma Samaj
  - (D) Bharat Sewak Samaj
96. Gandhiji believed that Satyagraha is a weapon of
- (A) the poor
  - (B) the weak
  - (C) the untouchables
  - (D) the brave
97. Pt. Shiv Kumar Sharma is an exponent of
- (A) Mandolin
  - (B) Santoor
  - (C) Sitar
  - (D) Veena
98. Patanjali is well-known for the compilation of
- (A) Yogasutra
  - (B) Panchatantra
  - (C) Brahmasutra
  - (D) Ayurveda
99. Which of the following Presidents of America abolished Slavery ?
- (A) Abraham Lincoln
  - (B) Thomas Jefferson
  - (C) George Washington
  - (D) Stanley Jackson
100. Who is the first woman cosmonaut of the world ?
- (A) Valentina Tereshkova
  - (B) Maria Estela Peron
  - (C) Svetlana Savitskaya
  - (D) Kay Cottee



**TEST (iii)**  
**PART A : GENERAL ENGINEERING**  
**(CIVIL AND STRUCTURAL)**

101. Mild steel used in RCC structures conforms to  
(A) IS : 432 (B) IS : 1566  
(C) IS : 1786 (D) IS : 2062
102. Which of the following types of lime is used for plastering and white washing?  
(A) Quick lime  
(B) Slaked lime  
(C) Hydraulic lime  
(D) Fat lime
103. Which of the following acts as retarder for the concrete?  
(A) Calcium chloride  
(B) Calcium lignosulphonate  
(C) Calcium stearate  
(D) Aluminium powder
104. Identify the *wrong* statement.  
(A) Bulking of sand can go up to 40%.  
(B) Bulking of sand is maximum at 4-6% moisture content.  
(C) Bulking of sand is considered in weigh batching of concrete mix.  
(D) Bulking of sand occurs due to free moisture film formation over sand grain.
105. Strength based classification of bricks is made on the basis of  
(A) IS : 3101 (B) IS : 3102  
(C) IS : 3495 (D) IS : 3496
106. In paints, methylated spirit, naphtha and turpentine are used as  
(A) Base (B) Binder  
(C) Solvent (D) Extender
107. Coarse sand has a fineness modulus in the range of  
(A) 2.2 - 2.4 (B) 2.4 - 2.6  
(C) 2.6 - 2.9 (D) 2.9 - 3.2
108. Under heat and pressure, granite can transform into  
(A) quartzite (B) marble  
(C) slate (D) gneiss
109. Aluminium is anodized to protect it from weathering effect by forming a surface coat of  
(A) Aluminium carbide  
(B) Aluminium borate  
(C) Aluminium oxide  
(D) Red lead
110. Quartzite and marble are by nature  
(A) volcanic (B) plutonic  
(C) sedimentary (D) metamorphic
111. Most accurate method of estimation is based on  
(A) Building cost index estimate  
(B) Plinth area estimate  
(C) Detailed estimate  
(D) Cube rate estimate
112. The annual instalment (I) of the sinking fund (S) over n years, at i rate of interest may be calculated from the formula  
(A)  $I = Si / (1 + i)^{n-1}$   
(B)  $I = S (1 + i)^{n-1} / i$   
(C)  $I = S (1 + i)^{n+1} / (1 + i)$   
(D)  $I = Si / (1 + i)^{n+1}$

113. The plan of a building is in the form of a rectangle with centre line dimensions of the outer walls as 10.3 m × 15.3 m. The thickness of the walls in superstructure is 0.3 m. Then its carpet area is

- (A) 150 m<sup>2</sup>                      (B) 157.59 m<sup>2</sup>  
 (C) 165.36 m<sup>2</sup>                    (D) 170 m<sup>2</sup>

114. Pick up the item of work *not* included in the plinth area estimate.

- (A) Wall thickness  
 (B) Room area  
 (C) Verandah area  
 (D) Courtyard area

115. One brick thickness of wall is roughly equal to

- (A) 10 cm                      (B) 15 cm  
 (C) 20 cm                      (D) 30 cm

116. A work costing ₹ 20,000 is termed as

- (A) Petty work                (B) Minor work  
 (C) Major work                (D) Minor project

117. The density of cement is taken to be

- (A) 1000 kg/m<sup>3</sup>                (B) 1250 kg/m<sup>3</sup>  
 (C) 1440 kg/m<sup>3</sup>                (D) 1800 kg/m<sup>3</sup>

118. The damp proof course (D.P.C.) of uniform thickness in a building having walls of different widths is measured in

- (A) m<sup>4</sup>                              (B) m<sup>3</sup>  
 (C) m<sup>2</sup>                              (D) m

119. Volume by Trapezoidal Formula Method is determined by the formula

- (A)  $D \left\{ \frac{A_0 + A_n}{2} + A_2 + A_4 + A_6 + \dots + A_{n-1} \right\}$   
 (B)  $D \left\{ \frac{A_1 + A_n}{2} + A_0 + A_1 + A_3 + \dots + A_{n-1} \right\}$   
 (C)  $D \left\{ \frac{A_0 + A_1}{2} + A_1 + A_3 + A_5 + \dots + A_{n-1} \right\}$   
 (D)  $D \left\{ \frac{A_0 + A_n}{2} + A_1 + A_2 + A_3 + A_4 + \dots + A_{n-1} \right\}$

120. The value of the property at the end of its useful life (without being dismantled) is known as

- (A) Salvage value  
 (B) Scrap value  
 (C) Book value  
 (D) Junk value

121. The multiplying constant for the tachemeter is, generally, kept as

- (A) 100                              (B) 20  
 (C) 40                              (D) 60

122. The fundamental principle of surveying is to work from the

- (A) whole to part  
 (B) part to whole  
 (C) lower level to higher level  
 (D) higher level to lower level



123. Radiation, Intersection and Resection are.

- (A) Compass Surveying Techniques
- (B) Chain Surveying Techniques
- (C) Levelling Techniques
- (D) Plane Table Surveying Techniques

124. Which of the following statements in respect of a map A having scale 1 : 1000 and another map B having scale 1 : 5000 is true ?

- (A) Map A is a large scale map compared to map B.
- (B) Map B is a large scale map compared to map A.
- (C) Map B is a more detailed map compared to map A.
- (D) None of the above

125. The correction to be applied to each 30 m chain for a line measurement along a slope of  $\theta$  is

- (A)  $30(1 - \cos \theta)$       (B)  $30(1 - \sin \theta)$
- (C)  $30(1 - \tan \theta)$       (D)  $30(1 - \cot \theta)$

126. Narrowly spaced contour lines on a map shows that the area is

- (A) Flat
- (B) Steeply sloped
- (C) Vertical cliff
- (D) Overhang cliff

127. The length of the tangent of a curve whose radius is R and the angle of deflection  $\Delta$  is

- (A)  $R \tan \frac{\Delta}{2}$       (B)  $2R \sin \frac{\Delta}{2}$
- (C)  $2R \tan \frac{\Delta}{2}$       (D)  $R \sin \frac{\Delta}{2}$

128. If whole circle bearing of a line is  $210^\circ 0' 0''$ , its value in quadrantal bearing system is

- (A)  $S 30^\circ 0' 0'' W$       (B)  $N 30^\circ 0' 0'' E$
- (C)  $S 30^\circ 0' 0'' E$       (D)  $N 30^\circ 0' 0'' W$

129. The magnetic declination is the difference between

- (A) True Meridian and False Meridian
- (B) False Meridian and True Meridian
- (C) True Meridian and Magnetic Meridian
- (D) Magnetic Meridian and False Meridian

130. A staff reading taken on a point whose elevation is to be determined as a change point is called

- (A) foresight reading
- (B) backsight reading
- (C) intermediate sight
- (D) long sight

131. Clay is generally

- (A) cohesive
- (B) permeable
- (C) having large particle size
- (D) None of the above

132. The ratio  $\frac{\text{Liquid limit} - \text{Water content}}{\text{Plasticity index}}$  for a

soil mass is called

- (A) Liquidity index
- (B) Shrinkage ratio
- (C) Consistency index
- (D) Toughness index

133. The volume of voids to the total volume of soil is known as  
 (A) porosity  
 (B) void ratio  
 (C) air ratio  
 (D) air content

134. A fundamental equation of void ratio ( $e$ ), specific gravity ( $G$ ), water content ( $W$ ) and the degree of saturation ( $S_p$ ) is

(A)  $e = \frac{WG}{S_p}$       (B)  $W = \frac{eG}{S_p}$   
 (C)  $G = \frac{eW}{S_p}$       (D)  $S_p = \frac{eW}{G}$

135. Manometer is a device used for measuring

- (A) Velocity                  (B) Pressure  
 (C) Density                  (D) Discharge

136. Capillarity is due to

- I. surface tension  
 II. cohesion  
 III. viscosity  
 IV. vapour pressure  
 V. weight density of liquid

- (A) II, III                  (B) III  
 (C) I                          (D) II, III, V

137. Flow of water through a passage under atmospheric pressure is called

- (A) Pipe flow  
 (B) Uniform flow  
 (C) Open channel flow  
 (D) Non-uniform flow

138. The discharge through a V-notch varies

- (A) proportional to head ( $H$ )  
 (B) inversely proportional to angle  $\theta$   
 (C) proportional to  $H^{5/2}$   
 (D) inversely proportional to  $\tan \theta/2$

139. The dimension for Angular velocity is

- (A)  $T^2$                       (B)  $T^{-1}$   
 (C)  $T^1$                       (D)  $T^{-2}$

140. Which of the following flow constants does *not* have any unit ?

- (A) Chezy's C  
 (B) Manning's N  
 (C) Both Chezy's C and Manning's N  
 (D) None of the above

141. Each term of the Bernoulli equation represents

- (A) energy per unit weight  
 (B) energy per unit mass  
 (C) energy per unit volume  
 (D) specific energy

142. Pressure in terms of metres of oil (specific gravity = 0.9) equivalent to 4.5 m of water is

- (A) 4.05                      (B) 5.0  
 (C) 3.6                        (D) 0.298

143. Typically, a hydroelectric plant will have following hydraulic machine :

- (A) Hydraulic Turbine  
 (B) Hydraulic Pump  
 (C) Electric Motor  
 (D) None of the above

144. Darcy - Weisbach equation to calculate the head loss due to friction for flow through pipes is applicable when the flow through the pipe can be

- (A) laminar only  
 (B) turbulent only  
 (C) both laminar and turbulent  
 (D) subcritical flow



145. The ratio of the quantity of water stored in the root zone of the crops to the quantity of water actually delivered in the field is known as

- (A) water use efficiency
- (B) water conveyance efficiency
- (C) water application efficiency
- (D) water storage efficiency

146. For unlined canals, the freeboard is measured from the

- (A) full supply level to top of the bank
- (B) top of the bank to bed of the canal
- (C) full supply level to top of the dowel
- (D) None of the above

147. The ruling minimum radius of the curve for ruling design speed  $V$  m/sec, coefficient of friction  $f$ , acceleration due to gravity  $g$  m/sec<sup>2</sup> and superelevation  $e$  is given by

- (A)  $V^2/(e - f)g$
- (B)  $V^2/(f - e)g$
- (C)  $V^2/(e + f)g$
- (D)  $V^2/(e + f)2g$

148. Camber in the road is provided for

- (A) counteracting the centrifugal force
- (B) effective drainage
- (C) having proper sight distance
- (D) avoiding overturning

149. The standard 5-day BOD at 20°C, when compared to ultimate BOD is about

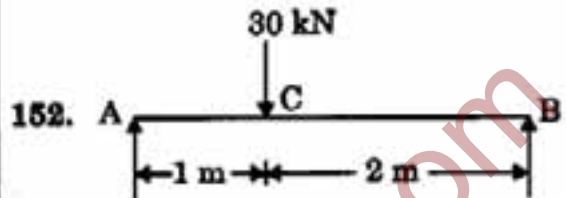
- (A) 60%
- (B) 68%
- (C) 80%
- (D) 90%

150. The global warming is caused mainly by

- (A) NO<sub>x</sub>
- (B) SO<sub>x</sub>
- (C) CO<sub>2</sub>
- (D) O<sub>2</sub>

151. The maximum shear force in a simply supported beam of span  $L$ , subjected to a central point load,  $W$  is given by the following expression :

- (A)  $\frac{W}{2}$
- (B)  $WL$
- (C)  $WL^2/2$
- (D)  $WL^2/4$



For simply supported beam shown in Fig., the magnitude of vertical reaction at 'B' is

- (A) 20 kN
- (B) 18 kN
- (C) 15 kN
- (D) 10 kN

153. "Poisson's ratio" is defined as the ratio of

- (A) lateral strain to linear strain
- (B) linear strain to lateral strain
- (C) lateral stress to linear stress
- (D) linear stress to lateral stress

154. If 'A' is the area of cross-section and 'I' is the moment of inertia of a given plane section, then radius of gyration ( $r$ ) is given by the formula

- (A)  $r = I/A$
- (B)  $r = \sqrt{I/A}$
- (C)  $r = A/I$
- (D)  $r = \sqrt{A/I}$

155. Strain energy due to axial deformation is given by

( $\sigma$  : resultant stress

$P$  : axial load

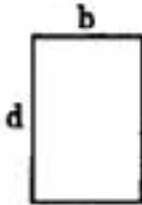
$\Delta$  : deformation

$\epsilon$  : strain

$E$  : modulus of elasticity)

- (A)  $\sigma \epsilon$
- (B)  $PA$
- (C)  $\sigma^2/2E$
- (D)  $\frac{1}{2} PA$

156. In a cantilever beam subjected to general loading, the maximum bending moment is at
- (A) fixed end
  - (B) free end
  - (C) mid-span
  - (D) quarter-span



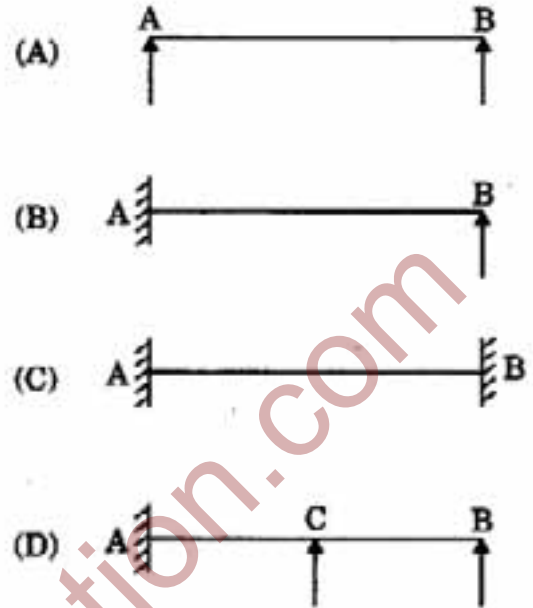
157.

Moment of inertia of rectangular section shown in Fig. about its horizontal centroidal axis is

- (A)  $db^3/12$
  - (B)  $db^3/3$
  - (C)  $bd^3/12$
  - (D)  $bd^3/3$
158. Ratio of length of column to the minimum radius of gyration of the cross-sectional area of the column is known as
- (A) Slenderness ratio
  - (B) Buckling ratio
  - (C) Crippling ratio
  - (D) Compressive ratio
159. A linear force-deformation relation is obtained in materials
- (A) having elastic stress-strain property
  - (B) having plastic stress-strain property
  - (C) following Hooke's law
  - (D) which are rigid elastic materials

160. The property of a material by which it can be beaten or rolled into plates, is called
- (A) malleability
  - (B) ductility
  - (C) plasticity
  - (D) elasticity

161. Which of the beams given in the following Figs. is a determinate beam?



162. The effective slenderness ratio of a cantilever column is

- (A)  $0.5 L/r$
- (B)  $L/r$
- (C)  $\sqrt{2} L/r$
- (D)  $2 L/r$

163. The top diameter, bottom diameter and the height of the steel mould used for slump test are

- (A) 10 cm, 20 cm, 30 cm
- (B) 10 cm, 30 cm, 20 cm
- (C) 20 cm, 10 cm, 30 cm
- (D) 20 cm, 30 cm, 10 cm

164. The early high strength of rapid hardening cement is due to its

- (A) increased content of gypsum
- (B) burning at high temperature
- (C) increased content of cement
- (D) higher content of tricalcium



165. Di-calcium silicate ( $C_2S$ )
- (A) hydrates rapidly
  - (B) generates less heat of hydration
  - (C) hardens rapidly
  - (D) has less resistance to sulphate attack
166. Separation of coarse aggregates from concrete during transportation, is known as
- (A) bleeding
  - (B) creeping
  - (C) segregation
  - (D) evaporation
167. The resistance of an aggregate to wear is known as
- (A) impact value
  - (B) abrasion resistance
  - (C) shear resistance
  - (D) crushing resistance
168. If fineness modulus of a sand is 2.5, it is graded as
- (A) very fine sand
  - (B) fine sand
  - (C) medium sand
  - (D) coarse sand
169. Water-cement ratio is measured \_\_\_\_\_ of water and cement used per cubic metre of concrete.
- (A) volume by volume
  - (B) weight by weight
  - (C) weight by volume
  - (D) volume by weight
170. To prevent segregation, the maximum height for placing concrete, is
- (A) 100 cm
  - (B) 125 cm
  - (C) 150 cm
  - (D) 200 cm
171. An aggregate is said to be flaky, if its least dimension is less than
- (A)  $\frac{2}{3}$  mean dimension
  - (B)  $\frac{1}{2}$  mean dimension
  - (C)  $\frac{3}{5}$  mean dimension
  - (D)  $\frac{3}{4}$  mean diameter
172. The fineness of cement can be found out by sieve analysis using IS sieve number
- (A) 20
  - (B) 10
  - (C) 9
  - (D) 6
173. For batching 1 : 2 : 4 concrete mix by volume the ingredients required per bag (50 kg) of cement are
- (A) 100 litres of fine aggregate : 140 litres of coarse aggregate
  - (B) 100 kg of fine aggregate : 200 kg of coarse aggregate
  - (C) 70 kg of fine aggregate : 140 kg of coarse aggregate
  - (D) 70 litres of fine aggregate : 140 litres of coarse aggregate
174. Bulking is
- (A) increase in volume of sand due to moisture which keeps sand particles apart
  - (B) increase in density of sand due to impurities like clay, organic matter
  - (C) ramming of sand so that it occupies minimum volume
  - (D) compacting of sand
175. The concrete cubes are prepared, cured and tested according to Indian Standards code number
- (A) IS : 515
  - (B) IS : 516
  - (C) IS : 517
  - (D) IS : 518

176. Workability of concrete for a given water content is good if the aggregates are  
 (A) angular aggregates  
 (B) flaky aggregates  
 (C) rounded aggregates  
 (D) irregular aggregates
177. Generally, strength of concrete is considered negligible/very low in  
 (A) Compression (B) Tension  
 (C) Fatigue (D) None of the above
178. As the cement sets and hardens, it generates heat. This is called  
 (A) Heat of hydration  
 (B) Latent heat  
 (C) Heat of vaporisation  
 (D) Sensible heat
179. In concrete, while hand mixing is adopted, excess cement to be added is  
 (A) 4% (B) 10%  
 (C) 14% (D) 20%
180. For constructing road pavements, the type of cement generally used is  
 (A) ordinary Portland cement  
 (B) rapid hardening cement  
 (C) low heat cement  
 (D) blast furnace slag cement
181. A very comfortable type of stair for usage is  
 (A) straight (B) dog legged  
 (C) open newel (D) circular
182. If the area of tension reinforcement provided is less than that required for a balanced section, then the RCC beam is called  
 (A) over reinforced  
 (B) neutral reinforced  
 (C) under reinforced  
 (D) bottom reinforced
183. In limit state of collapse for direct compression, the maximum axial compressive strain in concrete is  
 (A) 0.002 (B) 0.003  
 (C) 0.0035 (D) 0.004
184. A reduction factor  $C_r$  to load carrying capacity for a long column of effective length  $L_e$  and width  $b$  is applied as obtained from following expression :  
 (A)  $1 - \frac{L_e}{24b}$  (B)  $1.25 - \frac{L_e}{36b}$   
 (C)  $1.25 - \frac{L_e}{48b}$  (D)  $1.5 - \frac{L_e}{60b}$
185. A T-beam behaves as a rectangular beam of a width equal to its flange if its neutral axis  
 (A) falls within the flange  
 (B) falls below the flange  
 (C) coincides with the geometrical centre of the beam  
 (D) falls below the centroidal axis of the beam
186. If  $\tau_v$  is the nominal shear stress,  $\tau_c$  is design shear strength of concrete and  $\tau_{c, \max}$  is the maximum design shear strength of concrete, which of the following statements is correct ?  
 (A) If  $\tau_v > \tau_{c, \max}$ , section is to be designed for shear.  
 (B) If  $\tau_v > \tau_{c, \max}$ , minimum shear reinforcement is to be provided.  
 (C) If  $\tau_v < \tau_c$ , minimum shear reinforcement is to be provided.  
 (D) If  $\tau_v > \tau_c$ , minimum shear reinforcement is to be provided.



187. The minimum clear cover (in mm) for the main reinforcement in column, according to IS : 456-2000 is  
 (A) 20 (B) 25  
 (C) 40 (D) 50
188. The diameter of longitudinal bars of a RCC column should never be less than  
 (A) 6 mm (B) 8 mm  
 (C) 10 mm (D) 12 mm
189. In an RCC section of effective depth 'd', if vertical stirrups are provided to resist shear, their maximum spacing measured along the axis of the member as per IS : 456-2000 should *not* exceed  
 (A) 0.25 d (B) 0.50 d  
 (C) 0.75 d (D) 1.00 d
190. For a continuous slab of 3 m × 3.5 m size, the minimum overall depth of slab to satisfy vertical deflection limit is  
 (A) 5 cm (B) 7.5 cm  
 (C) 10 cm (D) 15 cm
191. As per IS : 800, the factor of safety adopted with respect to the yield stress of steels is  
 (A) 1.45 (B) 1.5  
 (C) 1.67 (D) 2.0
192. A tie is a  
 (A) tension member  
 (B) compression member  
 (C) flexural member  
 (D) torsion member
193. The slenderness ratio of lacing bars should *not* exceed  
 (A) 120 (B) 145  
 (C) 180 (D) 100
194. Bearing stiffeners are designed as  
 (A) beams (B) beam-ties  
 (C) ties (D) column
195. The maximum allowable slenderness ratio for members carrying compressive load due to wind and seismic force only is  
 (A) 180 (B) 250  
 (C) 350 (D) 400
196. The throat in a fillet weld is  
 (A) large side of the triangle of the fillet  
 (B) hypotenuse of the triangle of the fillet  
 (C) smaller side of the triangle of the fillet  
 (D) perpendicular distance from the root to the hypotenuse
197. The size of a rivet is identified by  
 (A) diameter of shank  
 (B) diameter of head  
 (C) length of shank  
 (D) shape of head
198. Horizontal stiffeners are needed in plate girders if the thickness of web is less than  
 (A) 6 mm (B) Depth/200  
 (C) Span/500 (D) Flange thickness
199. Permissible stress may also be known as  
 (A) ultimate stress  
 (B) working stress  
 (C) limit stress  
 (D) yield stress
200. The maximum permissible stress for power driven field rivet in bearing on rivet is  
 (A) 100 N/mm<sup>2</sup> (B) 250 N/mm<sup>2</sup>  
 (C) 270 N/mm<sup>2</sup> (D) 300 N/mm<sup>2</sup>

TEST (iii)

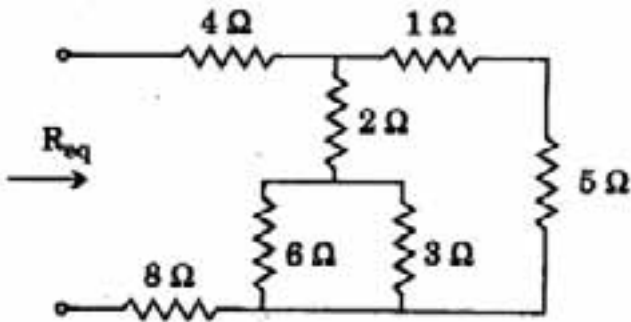
PART B : GENERAL ENGINEERING

(ELECTRICAL)

101. A stove element draws 15 A when connected to 230 V line. How long does it take to consume one unit of energy ?

- (A) 3.45 h (B) 2.16 h  
(C) 1.0 h (D) 0.29 h

102. The  $R_{eq}$  for the circuit shown in figure is

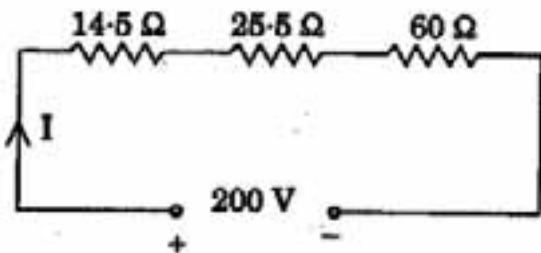


- (A) 14.4 Ω (B) 14.57 Ω  
(C) 15.27 Ω (D) 15.88 Ω

103. The SI unit of conductivity is

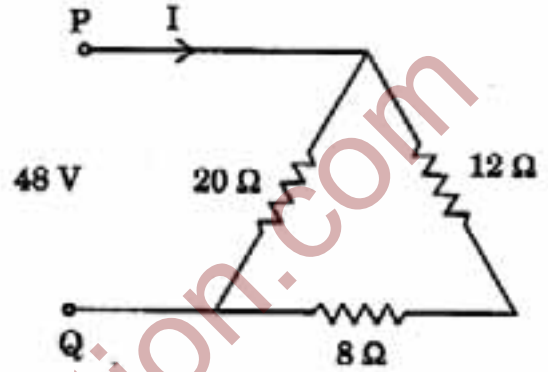
- (A) ohm-m (B) ohm/m  
(C) mho-m (D) mho/m

104. Calculate the voltage drop across 14.5 Ω resistance.



- (A) 14.5 V (B) 18 V  
(C) 29 V (D) 30.5 V

105. For the network shown in the figure, the value of current in 8 Ω resistor is



- (A) 4.8 A (B) 2.4 A  
(C) 1.5 A (D) 1.2 A

106. A piece of oil soaked paper has been inserted between the plates of a parallel plate capacitor. Then the potential difference between the plates will

- (A) increase  
(B) decrease  
(C) remain unaltered  
(D) become zero

107. The current drawn by a tungsten filament lamp is measured by an ammeter. The ammeter reading under steady state condition will be \_\_\_\_\_ the ammeter reading when the supply is switched on.

- (A) same as (B) less than  
(C) greater than (D) double

108. Tesla is same as

- (A) Weber/meter  
(B) Weber/(meter)<sup>2</sup>  
(C) Farad/meter  
(D) Henry/(meter)<sup>2</sup>



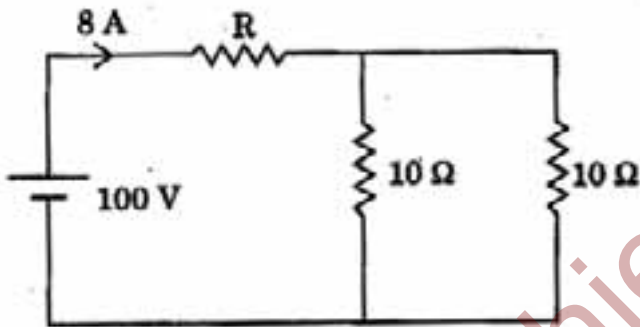
109. The unit of volume resistivity is

- (A) ohm-m<sup>3</sup>/m<sup>2</sup>
- (B) ohm-m<sup>2</sup>/m
- (C) ohm-gram-m/gram
- (D) ohm-m<sup>4</sup>/m<sup>3</sup>

110. Four resistances 2 Ω, 4 Ω, 5 Ω, 20 Ω are connected in parallel. Their combined resistance is

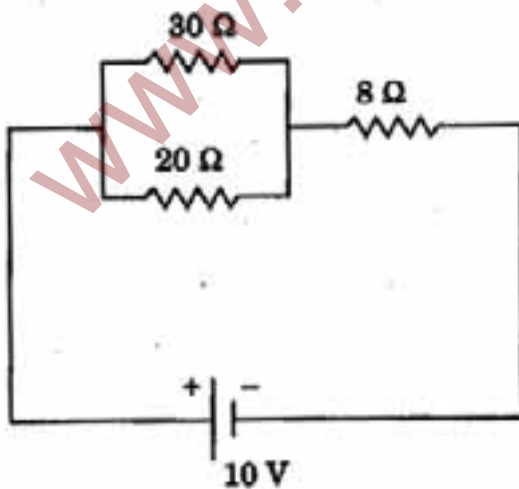
- (A) 1 Ω
- (B) 2 Ω
- (C) 4 Ω
- (D) 5 Ω

111. In the figure, the value of R is



- (A) 2.5 Ω
- (B) 5.0 Ω
- (C) 7.5 Ω
- (D) 10.0 Ω

112. Power consumed in the given circuit is

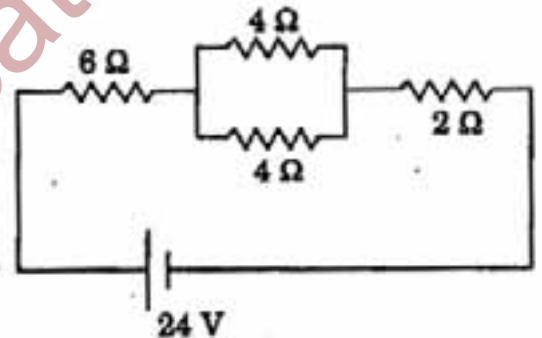


- (A) 100 watts
- (B) 5 watts
- (C) 20 watts
- (D) 40 watts

113. A 200 W, 200 V bulb and a 100 W, 200 V bulb are connected in series and the voltage of 400 V is applied across the series connected bulbs. Under this condition

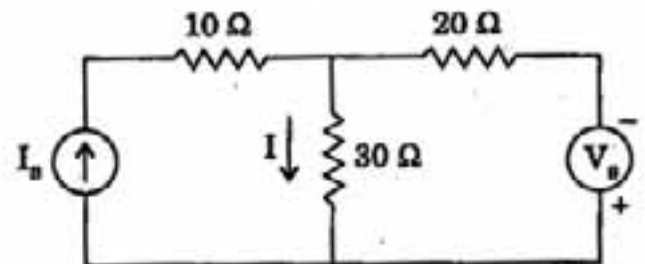
- (A) 100 W bulb will be brighter than 200 W bulb
- (B) 200 W bulb will be brighter than 100 W bulb
- (C) Both the bulbs will have equal brightness
- (D) Both the bulbs will be darker than when they are connected across rated voltage

114. In the network shown, if one of the 4 Ω resistances is disconnected, when the circuit is active, the current flowing now will



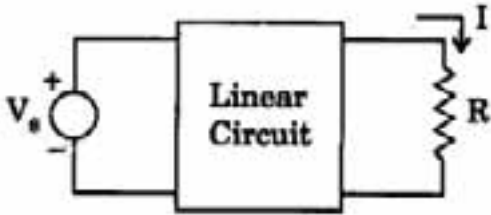
- (A) increase very much
- (B) decrease
- (C) be zero
- (D) increase very slightly

115. For the circuit shown in figure, when  $V_s = 0$ ,  $I = 3$  A. When  $V_s = 200$  V, what will be the value of  $I$ ?



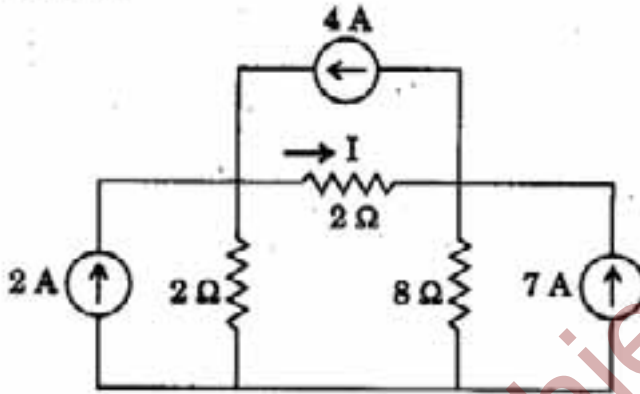
- (A) -4 A
- (B) -1 A
- (C) 1 A
- (D) 7 A

116. For the linear circuit shown in figure,  
 when  $R = \infty$ ,  $V = 20$  V;  
 when  $R = 0$ ,  $I = 4$  A;  
 when  $R = 5 \Omega$ , the current  $I$  is



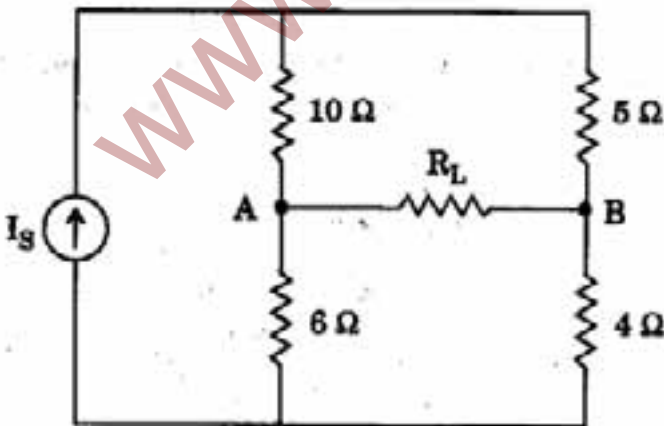
- (A) 1 A                      (B) 2 A  
 (C) 3 A                      (D) 4 A

117. The current  $I$  in the circuit shown in the figure is



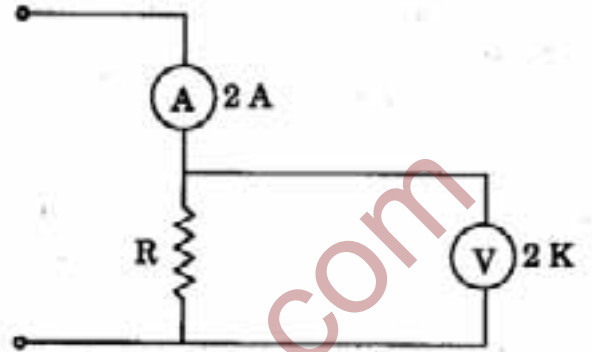
- (A) -3.67 A                  (B) -1 A  
 (C) 4 A                      (D) 6 A

118. In the network shown in the figure, the value of  $R_L$  such that maximum possible power will be transferred to  $R_L$  is



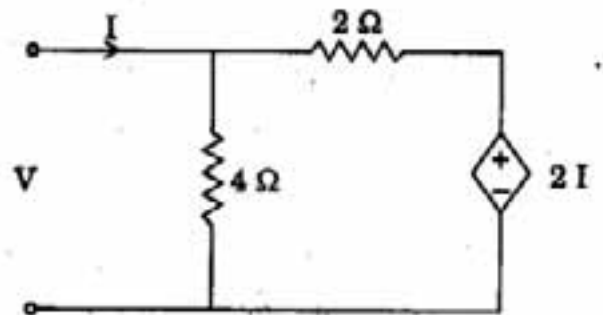
- (A) 5.76  $\Omega$                   (B) 6.0  $\Omega$   
 (C) 10.0  $\Omega$                 (D) 15.0  $\Omega$

119. A resistance  $R$  is measured by ammeter-voltmeter method. The voltmeter reading is 200 V and its internal resistance is 2 K. If the ammeter reading is found to be 2 A, then value of  $R$  is



- (A) 105.3  $\Omega$                 (B) 100.0  $\Omega$   
 (C) 95.3  $\Omega$                 (D) 90.3  $\Omega$

120. The circuit shown in the given figure is equivalent to a load of



- (A) 4/3  $\Omega$                   (B) 8/3  $\Omega$   
 (C) 4  $\Omega$                     (D) 2  $\Omega$

121. The north pole of a magnet is moved away from a metallic ring. The induced current in the ring flows

- (A) clockwise.  
 (B) anticlockwise  
 (C) first anticlockwise and then clockwise  
 (D) first clockwise and then anticlockwise



122. Energy stored in an inductor is given by

- (A)  $\frac{1}{\sqrt{2}} (LI)^2$       (B)  $\frac{1}{2} L^2 I$   
 (C)  $\frac{1}{\sqrt{LI}}$       (D)  $\frac{1}{2} LI^2$

123. A coil with a certain number of turns has a specified time constant. If the number of turns is doubled, its time constant would

- (A) remain unaffected  
 (B) become double  
 (C) become four-fold  
 (D) get halved

124. Hysteresis is the phenomenon in the magnetic circuit by which

- (A) H lags behind B  
 (B) B lags behind H  
 (C) B and H are always same  
 (D) setting up a constant flux is done

125. The flux through each turn of a 100-turn coil is  $(t^3 - 2t)$  mWh, where 't' is in seconds. Find the magnitude of the induced emf at  $t = 2$  s.

- (A) 1 V      (B) 0.8 V  
 (C) 0.4 V      (D) 0.2 V

126. A circuit has inductance of 2 H. If the circuit current changes at the rate of 10 A/sec, then self-induced emf is

- (A) 5 V      (B) 0.2 V  
 (C) 20 V      (D) 10 V

127. The B-H curve for \_\_\_\_\_ will be a straight line passing through the origin.

- (A) air  
 (B) soft iron  
 (C) hardened steel  
 (D) silicon steel

128. Magnetic lines of force coming from a magnet

- (A) intersect at infinity  
 (B) intersect within the magnet  
 (C) cannot intersect at all  
 (D) cancel at pole faces

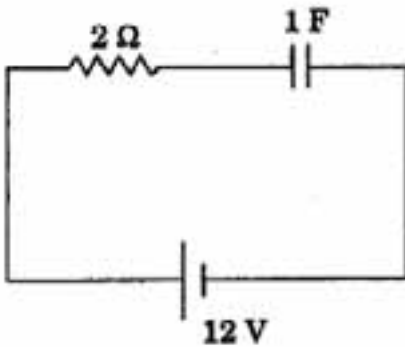
129. The main advantage of temporary magnets is that we can

- (A) change the magnetic flux  
 (B) use any magnetic material  
 (C) decrease the hysteresis loss  
 (D) magnetize without any source

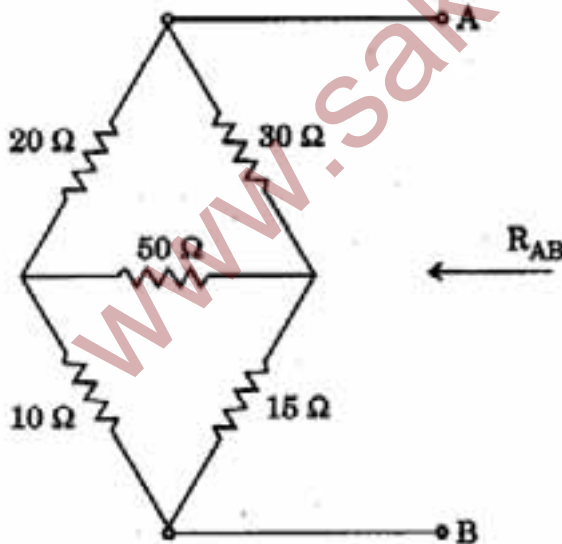
130. The magnetic material used in permanent magnets is

- (A) iron  
 (B) soft steel  
 (C) nickel  
 (D) hardened steel

131. For the circuit shown in figure, the voltage across the capacitor during steady state condition is

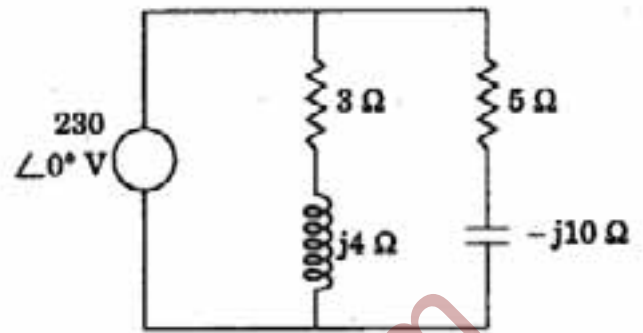


- (A) 0 V (B) 4 V  
(C) 6 V (D) 12 V
132. A current of 5 mA flows in a resistanceless choke from a 200 V alternating source. The energy consumed in the choke is
- (A) 0 J (B) 4.4 J  
(C) 500 J (D) 1000 J
133. Find  $R_{AB}$  for the circuit shown in figure.



- (A) 18 Ω (B) 30 Ω  
(C) 45 Ω (D) 68 Ω

134. Calculate the total susceptance of the circuit shown in figure.



- (A) 6.67 S (B) 1.87 S  
(C) 0.16 S (D) 0.08 S
135. The Q-factor of a parallel resonant circuit is given by
- (A)  $\frac{1}{R} \sqrt{\frac{L}{C}}$  (B)  $\frac{1}{R} \sqrt{\frac{C}{L}}$   
(C)  $\frac{1}{R} \sqrt{1/LC}$  (D)  $\frac{R}{\sqrt{LC}}$
136. In an R-L series circuit, the phase difference between applied voltage and circuit current will increase if
- (A)  $X_L$  is increased  
(B) R is increased  
(C)  $X_L$  is decreased  
(D) supply frequency is decreased
137. A series circuit has  $R = 4 \Omega$ ,  $X_L = 12 \Omega$  and  $X_C = 9 \Omega$  and is supplied with 200 V, 50 Hz. Calculate the power.

- (A) 6400 W (B) 8000 W  
(C) 14,400 W (D) 19,200 W



138. Two sinusoidal currents are given by the equations  $i_1 = 50 \sin(\omega t + \frac{\pi}{4})$  and  $i_2 = 25 \sin(\omega t - \frac{\pi}{6})$ . The phase difference between them is \_\_\_\_\_ degrees.
- (A) 15 (B) 30  
(C) 45 (D) 75
139. The reactance of 1 farad capacitance when connected to a DC circuit is
- (A) infinite (B) 1  $\Omega$   
(C) 0.5  $\Omega$  (D) zero ohms
140. A supply voltage of 230 V, 50 Hz is fed to a residential building. Write down its equation for instantaneous value.
- (A)  $163 \sin 314 \cdot 16 t$   
(B)  $230 \sin 314 \cdot 16 t$   
(C)  $325 \sin 314 \cdot 16 t$   
(D)  $361 \sin 314 \cdot 16 t$
141. The AC bridge used for measurement of dielectric loss of capacitor is
- (A) Anderson bridge  
(B) Schering bridge  
(C) Wien bridge  
(D) Hay's bridge
142. In electro-dynamometer ammeter, the deflection of the pointer is proportional to
- (A) mean of currents in fixed coil and moving coil  
(B) square of the current in moving coil  
(C) RMS value of current in fixed coil  
(D) mean-square of currents in fixed coil and moving coil
143. In which of the following transformers, is the secondary winding always kept closed?
- (A) Current transformer  
(B) Potential transformer  
(C) Power transformer  
(D) Distribution transformer
144. Two holes are drilled in the disc on a diameter of energy-meter to
- (A) increase ventilation  
(B) reduce the weight of disc  
(C) eliminate creeping on no-load  
(D) increase deflecting torque
145. Which of the following instruments has the highest torque/weight ratio among the given instruments?
- (A) Attraction type MI instrument  
(B) Repulsion type MI instrument  
(C) Permanent magnet moving coil instrument  
(D) Electro-dynamometer instrument

146. If current through the operating coil of a moving iron instrument is doubled, the operating force becomes
- (A) one and a half times  
(B) 2 times  
(C) 3 times  
(D) 4 times
147. In moving iron instruments, the iron moves in a direction to cause
- (A) coil inductance to be constant  
(B) mutual inductance to be minimum  
(C) minimum reluctance path  
(D) decrease in the flux passing through it
148. A moving coil instrument has a resistance of  $10 \Omega$  and gives full scale deflection at  $0.5 \text{ V}$  potential difference across it. How can it be adapted to measure a current upto  $100 \text{ A}$  ?
- (A) By connecting shunt resistance of  $0.005 \Omega$  across the meter  
(B) By connecting shunt resistance of  $0.05 \Omega$  across the meter  
(C) By connecting shunt resistance of  $5 \Omega$  across the meter  
(D) By connecting shunt resistance of  $10 \Omega$  across the meter
149. The multiplying power of the shunt of a milliammeter is 8. If the circuit current is  $200 \text{ mA}$ , then current through the meter is
- (A)  $25 \text{ mA}$                       (B)  $200 \text{ mA}$   
(C)  $1600 \text{ mA}$                     (D)  $3200 \text{ mA}$
150. The material to be used in the manufacture of a standard resistor should be of
- (A) low resistivity  
(B) high resistivity and low temperature coefficient  
(C) high temperature coefficient  
(D) low resistivity and high temperature coefficient
151. In a 3-phase induction motor crawling happens at
- (A) any speed  
(B) no-load speed  
(C) odd multiples of fundamental  
(D) even multiples of fundamental
152. A 4-pole, 3-phase induction motor runs at  $1440 \text{ rpm}$  on a  $50 \text{ Hz}$  supply. Find the slip speed.
- (A)  $2940 \text{ rpm}$                       (B)  $1500 \text{ rpm}$   
(C)  $1440 \text{ rpm}$                     (D)  $60 \text{ rpm}$
153. Low voltage windings are placed nearer to the core in the case of concentric windings because
- (A) it reduces hysteresis loss  
(B) it reduces eddy current loss  
(C) it reduces insulation requirement  
(D) it reduces leakage fluxes
154. If  $K$  is the phase-to-phase voltage ratio, then the line-to-line voltage ratio in a 3-phase,  $Y-\Delta$  transformer is
- (A)  $K$                                       (B)  $K/\sqrt{3}$   
(C)  $\sqrt{3} K$                                 (D)  $\sqrt{3}/K$



155. In an autotransformer of voltage ratio  $\frac{V_1}{V_2}$ ,  $V_1 > V_2$ , the fraction of power transferred inductively is proportional to

- (A)  $V_1 / (V_1 + V_2)$
- (B)  $V_2 / V_1$
- (C)  $(V_1 - V_2) / (V_1 + V_2)$
- (D)  $(V_1 - V_2) / V_1$

156. Stepped core is used in transformers in order to reduce

- (A) volume of iron
- (B) volume of copper
- (C) iron loss
- (D) reluctance of core

157. Commutation conditions at full load for large DC machines can be efficiently checked by the

- (A) Brake test
- (B) Swinburne's test
- (C) Hopkinson's test
- (D) Field test

158. The emf induced in a DC shunt generator is 230 V. The armature resistance is 0.1  $\Omega$ . If the armature current is 200 A, the terminal voltage will be

- (A) 200 V
- (B) 210 V
- (C) 230 V
- (D) 250 V

159. The commutator of a DC generator acts as...

- (A) an amplifier
- (B) a rectifier
- (C) a load
- (D) a multiplier

160. Fleming's left hand rule is applicable to

- (A) DC generator
- (B) DC motor
- (C) Alternator
- (D) Transformer

161. Which of the following single phase motors is available with speed as low as one revolution per minute?

- (A) Shaded pole
- (B) Reluctance
- (C) Hysteresis
- (D) Universal

162. A vacuum cleaner employs \_\_\_\_\_ motor.

- (A) resistance split phase
- (B) capacitor start
- (C) shaded pole
- (D) single phase series

163. In capacitor start single phase induction motor, the current in the

- (A) supply lines leads the voltage
- (B) starting winding lags the voltage
- (C) main winding leads the voltage
- (D) starting winding leads the voltage

164. In a single phase induction motor, speed sensitive centrifugal switch is connected in \_\_\_\_\_ winding.
- (A) parallel with main
  - (B) series with main
  - (C) parallel with starting
  - (D) series with starting
165. At starting, the current through the starting winding ( $I_s$ ) of single phase induction motor
- (A) lags 'V' by  $90^\circ$
  - (B) leads 'V' by  $90^\circ$
  - (C) is nearly in phase with 'V'
  - (D) leads 'V' by  $75^\circ$
166. In a single phase induction motor at start, the two revolving fields produce
- (A) unequal torques in the rotor conductors
  - (B) no torque in the rotor conductor
  - (C) equal and opposite torques in the rotor conductors
  - (D) equal torques in same direction in the rotor conductors
167. A synchronous motor can be used as synchronous condenser when it is
- (A) over excited
  - (B) over loaded
  - (C) under excited
  - (D) under loaded
168. Which one of the following methods would give a higher than actual value of regulation of an alternator ?
- (A) ZPF method
  - (B) MMF method
  - (C) EMF method
  - (D) ASA method
169. If the excitation of an alternator operating in parallel with other alternator is increased above the normal value of excitation, its
- (A) power factor becomes more lagging
  - (B) power factor becomes more leading
  - (C) output current decreases
  - (D) output kW decreases
170. In an alternator, the effect of armature reaction is minimum at power factor of
- (A) 0.5 lagging
  - (B) 0.866 lagging
  - (C) 0.866 leading
  - (D) unity
171. Damper winding in synchronous motors is used to
- (A) suppress hunting
  - (B) improve power factor
  - (C) develop reluctance torque
  - (D) improve the efficiency
172. Turbo alternators have rotors of
- (A) small diameter and long axial length
  - (B) large diameter and long axial length
  - (C) large diameter and small axial length
  - (D) small diameter and small axial length
173. Which of the following equipments is used to limit short-circuit current level in a sub-station ?
- (A) Isolators
  - (B) Lightning switch
  - (C) Coupling capacitor
  - (D) Series reactor



174. Power distribution by cable is generally adopted for line length
- (A) less than 10 km
  - (B) above 10 km
  - (C) less than 50 km
  - (D) above 50 km
175. The leakage resistance of a 50 km long cable is 1 M $\Omega$ . For a 100 km long cable it will be
- (A) 0.5 M $\Omega$                       (B) 2 M $\Omega$
  - (C) 0.66 M $\Omega$                       (D) None of these
176. If voltage is increased by 'n' times, the size of the conductor would
- (A) increase by 'n' times
  - (B) reduce by '1/n' times
  - (C) increase by 'n<sup>2</sup>' times
  - (D) reduce by '1/n<sup>2</sup>' times
177. The maximum demand of a consumer is 2 kW and his daily energy consumption is 24 units. His load factor is \_\_\_\_\_ %.
- (A) 24                                      (B) 41.6
  - (C) 50                                      (D) 80
178. A wire placed on the top of a transmission line acts as
- (A) a phase wire
  - (B) neutral
  - (C) a transmission wire
  - (D) ground wire
179. The conductor, by means of which the metal body of an equipment or an application is connected to the earth, is known as
- (A) Neutral continuity conductor
  - (B) Earth discontinuity conductor
  - (C) Earth continuity conductor
  - (D) Neutral discontinuity conductor
180. Which insulation is most widely used for covering wires/cables used in internal wiring ?
- (A) Paper                                      (B) Wood
  - (C) Glass                                      (D) PVC
181. Which of the following types of wiring is preferred for workshop lighting ?
- (A) Casing-Capping wiring
  - (B) Batten wiring
  - (C) Concealed conduit wiring
  - (D) Surface conduit wiring
182. The earthing electrodes should be placed within what distance in meters from the building whose installation system is being earthed ?
- (A) 4    (B) 2.5
  - (C) 1.5    (D) 0.5
183. Supplier's fuse, which is provided in domestic wiring system is
- (A) after the energy meter
  - (B) before the energy meter
  - (C) before distribution board
  - (D) after main switch

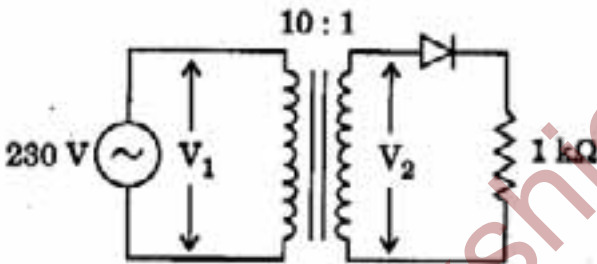
184. As per recommendation of ISI, the maximum number of points of lights, fans and socket outlets that can be connected in one sub-circuit is  
 (A) 8 (B) 10  
 (C) 15 (D) 20
185. In a 3-pin plug  
 (A) all the three pins are of the same size  
 (B) two pins are of the same size but third one is thicker  
 (C) two pins are of the same size but third one is thicker and longer  
 (D) all the three pins are of different sizes
186. The acceptable value of grounding resistance to domestic application is  
 (A)  $0.1 \Omega$  (B)  $1 \Omega$   
 (C)  $10 \Omega$  (D)  $100 \Omega$
187. Inside the earth pit, the earthing electrode should be placed  
 (A) vertical  
 (B) horizontal  
 (C) inclined at  $45^\circ$   
 (D) inclined at any angle other than  $45^\circ$
188. To reduce the cost of the electricity generated  
 (A) the load factor and diversity factor must be low  
 (B) the load factor must be low but diversity factor high  
 (C) the load factor must be high but diversity factor low  
 (D) the load factor and diversity factor must be high
189. The colour of the light given out by a sodium vapour discharge lamp is  
 (A) pink (B) bluish green  
 (C) yellow (D) blue
190. The transformer used in a welding set is  
 (A) step-up transformer  
 (B) step-down transformer  
 (C) constant current transformer  
 (D) booster transformer
191. The domestic load that has UPF is  
 (A) Fan  
 (B) Mixer  
 (C) Tube  
 (D) Filament lamp
192. An industrial consumer has a daily load pattern of 2000 kW, 0.8 lag for 12 hours and 1000 kW UPF for 12 hours. The load factor is  
 (A) 0.5 (B) 0.75  
 (C) 0.6 (D) 2.0
193. Dielectric loss is proportional to  
 (A)  $[\text{frequency}]^{1/2}$  (B) frequency  
 (C)  $\text{frequency}^2$  (D)  $\text{frequency}^3$
194. Which of the following applications needs frequent starting and stopping of electric motor?  
 (A) Air-conditioner  
 (B) Lifts and hoists  
 (C) Grinding mill  
 (D) Paper mill



195. In a CE (common emitter) transistor,  $V_{CC} = 12\text{ V}$  and the zero signal collector current is  $1\text{ mA}$ . Determine the operating point when collector load ( $R_C$ ) is  $6\text{ k}\Omega$ .

- (A)  $6\text{ V}, 1\text{ mA}$
- (B)  $6\text{ V}, 2\text{ mA}$
- (C)  $12\text{ V}, 1\text{ mA}$
- (D)  $12\text{ V}, 2\text{ mA}$

196. An AC supply of  $230\text{ V}$  is applied to half-wave rectifier through transformer of turns ratio  $10 : 1$  as shown in figure. Determine the peak inverse voltage across the diode.



- (A)  $37.6\text{ V}$
- (B)  $32.5\text{ V}$
- (C)  $23.0\text{ V}$
- (D)  $14.54\text{ V}$

197. The potential barrier existing across pn junction

- (A) prevents flow of minority carriers
- (B) prevents flow of majority carriers
- (C) prevents total recombination of holes and electrons
- (D) prevents neutralisation of acceptor and donor ions

198. The technique of adding a precise amount of time between the trigger point and the beginning of the scope sweep in a CRO is known as

- (A) Free running sweep
- (B) Delayed sweep
- (C) Triggered sweep
- (D) Non-sawtooth sweep

199. In a CRO, a sinusoidal waveform of a certain frequency is displayed. The value of the quantity that can be made out by observation is

- (A) RMS value of the sine wave
- (B) average value of the sine wave
- (C) form factor of the sine wave
- (D) peak-peak value of the sine wave

200. In a Cathode Ray Tube, the focussing anode is located

- (A) after accelerating anode
- (B) between pre-accelerating and accelerating anodes
- (C) before pre-accelerating anode
- (D) just after electron-gun

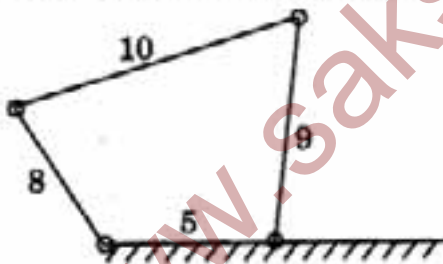
**TEST (III)**  
**PART C : GENERAL ENGINEERING**  
**(MECHANICAL)**

101. The twining moment (T) delivered by a flywheel with respect to its angular displacement is given by the following expression :

$$T = 14000 + 7000 \sin \theta$$

The values of  $\theta$  for which delivered torque is equal to mean torque for a single cycle are

- (A)  $0^\circ, 180^\circ, 360^\circ$   
 (B)  $90^\circ, 270^\circ, 360^\circ$   
 (C)  $90^\circ, 270^\circ, 180^\circ$   
 (D)  $0^\circ, 270^\circ, 360^\circ$
102. The shearing strength of a rivet is  $50 \text{ N/mm}^2$ . If the diameter of the rivet is doubled, then its shearing strength will be
- (A)  $100 \text{ N/mm}^2$       (B)  $200 \text{ N/mm}^2$   
 (C)  $50 \text{ N/mm}^2$       (D)  $300 \text{ N/mm}^2$
103. Figure shows a four bar chain and the number indicates the respective link lengths in cm. The type of the mechanism is known as



- (A) slider crank  
 (B) double crank  
 (C) crank rocker  
 (D) double rocker
104. A slider sliding at  $10 \text{ cm/s}$  on a link which is rotating at  $60 \text{ rpm}$ , is subjected to Coriolis acceleration of magnitude, in  $\text{cm}^2/\text{s}$ ,
- (A)  $20\pi$       (B)  $10\pi$   
 (C)  $40\pi$       (D)  $80\pi$

105. Name the mechanism in which the Coriolis component of acceleration is to be considered
- (A) Quick return motion mechanism  
 (B) Four-bar mechanism  
 (C) Slider crank mechanism  
 (D) Beam engine
106. Bevel gears are used to transmit rotary motion between two shafts whose axes are
- (A) Perpendicular  
 (B) Parallel  
 (C) Non-intersecting  
 (D) Non-coplanar
107. A differential gear in an automobile is a
- (A) simple gear train  
 (B) epicyclic gear train  
 (C) compound gear train  
 (D) speed reducer
108. Creep in belt drive is due to
- (A) weak material of the belt  
 (B) weak material of the pulley  
 (C) uneven extensions and contractions of the belt when it passes from tight to slack side  
 (D) expansion of the belt
109. The crank shaft turning in a journal bearing forms a
- (A) turning pair  
 (B) sliding pair  
 (C) rolling pair  
 (D) helical pair



110. What type of contact occurs during meshing of helical gears ?  
(A) Point (B) Line  
(C) Area (D) Volume
111. Which one of the following drives is used for transmitting power without slip ?  
(A) Belt drives  
(B) Rope drives  
(C) Cone pulleys  
(D) Chain drives
112. The contact between cam and follower is to form a  
(A) lower pair  
(B) higher pair  
(C) sliding pair  
(D) rolling pair
113. Which of the following is antifriction bearing ?  
(A) Needle bearing  
(B) Pedestal bearing  
(C) Collar bearing  
(D) Hydrostatic bearing
114. Helical gears have their teeth  
(A) inclined to wheel rim  
(B) straight over the wheel rim  
(C) curved over the wheel rim  
(D) cut on the surfaces of the frusta of cones
115. When the speed of governor increases, then  
(A) height of governor and radius of rotation increase  
(B) height of governor and radius of rotation decrease  
(C) height of governor decreases but radius of rotation increases  
(D) height of governor increases but radius of rotation decreases
116. A body of weight 30 N rests on a horizontal floor. A gradually increasing horizontal force is applied to the body which just starts moving when the force is 9 N. The coefficient of friction between the body and the floor will  
(A)  $10/3$  (B)  $3/10$   
(C)  $1/3$  (D)  $1/9$
117. A body of weight  $W$  is placed on a rough inclined plane. The inclination of the plane with the horizontal is less than the angle of friction. The body will  
(A) be in equilibrium  
(B) move downwards  
(C) move upwards  
(D) None of the above
118. A ball is dropped vertically downwards, it hits the floor with a velocity of 9 m/s and bounces to a height of 1.2 m. Coefficient of restitution between the floor and the ball is  
(A) 0.54 (B) zero  
(C) 1 (D) 0.27
119. For a material with Poisson's ratio 0.25, the ratio of modulus of rigidity to modulus of elasticity will be  
(A) 0.4 (B) 1.2  
(C) 2.0 (D) 3.6
120. If equal and opposite forces are applied to a bar to tend to elongate it, then the stress produced is  
(A) tensile stress  
(B) bending stress  
(C) compressive stress  
(D) shear stress

121. The direction of frictional force acting on a body which can slide on a fixed surface is
- in the direction of motion
  - normal to the direction of motion
  - unpredictable
  - opposite to the direction of motion
122. What strength of the material is to be considered for design of a ductile component under cyclic load ?
- Ultimate strength
  - Yield strength
  - Endurance strength
  - Fracture strength
123. For any given power and permissible shear stress, the rotational speed of shaft and its diameter are correlated by the expression
- $ND^3 = \text{constant}$
  - $ND^2 = \text{constant}$
  - $ND = \text{constant}$
  - $\sqrt{ND} = \text{constant}$
124. Which law of motion (of Newton) gives the measure of force ?
- Newton's first law
  - Newton's second law
  - Newton's third law
  - None of these
125. The shear stress at the centre of a circular shaft under torsion is
- maximum
  - minimum
  - zero
  - unpredictable
126. The friction between objects that are stationary is called
- static friction
  - rolling friction
  - kinetic friction
  - dynamic friction
127. Fatigue of a component is due to
- cyclic load
  - static load
  - constant heating
  - collision
128. The angle turned by a wheel while it starts from rest and accelerates at constant rate of  $3 \text{ rad/s}^2$  for an interval of 20 sec is
- 900 rad
  - 600 rad
  - 1200 rad
  - 300 rad
129. Stress due to change in temperature developed in a bar depends upon
- coefficient of thermal expansion
  - thermal conductivity
  - density
  - Poisson's ratio
130. Strength of the beam depends on
- Bending moment
  - Density
  - Section modulus
  - c.g. of the section
131. A reversible heat engine working at the rate of 100 kW has an efficiency of 20%. The magnitudes of heat transfer rate from the source and to the sink in kW would be, respectively,
- 200, 100
  - 300, 200
  - 500, 400
  - 1000, 900



132. The boiling and freezing points for water are marked on a temperature scale P as  $130^{\circ}\text{P}$  and  $-20^{\circ}\text{P}$  respectively. What will be the reading on this scale corresponding to  $60^{\circ}\text{C}$  on Celsius scale ?

- (A)  $60^{\circ}\text{P}$                       (B)  $70^{\circ}\text{P}$   
(C)  $90^{\circ}\text{P}$                       (D)  $110^{\circ}\text{P}$

133. In a reaction turbine, the heat drop in fixed blade is  $8 \text{ kJ/kg}$  and total heat drop per stage is  $20 \text{ kJ/kg}$ . The degree of reaction is

- (A) 40%                      (B) 60%  
(C) 66.7%                      (D) 80%

134. A closed balloon containing  $10 \text{ kg}$  of helium receives  $5 \text{ kJ/kg}$  of heat. During this process, the volume of the balloon slowly increases by  $0.2 \text{ m}^3$  at constant pressure of  $100 \text{ kPa}$ . The change in internal energy, in  $\text{kJ}$ , is

- (A) 10                      (B) 20  
(C) 30                      (D) 70

135. Assertion (A) :

If a hot metal ball is quenched in a liquid of low temperature, heat transfer will take place from metal ball to liquid and not in the reverse direction.

Reason (R) :

Heat transfer process from hot metal ball to liquid at lower temperature complies with the increase of entropy principle i.e.  $S_{\text{gen}} \geq 0$  and the reverse process does not.

- (A) Both A and R are true and R is the correct explanation of A  
(B) Both A and R are true, but R is *not* the correct explanation of A  
(C) A is true, but R is false  
(D) R is true, but A is false

136. The food compartment of a refrigerator is maintained at  $4^{\circ}\text{C}$  by removing heat from it at a rate of  $360 \text{ kJ/min}$ . If the required power input to the refrigerator is  $2 \text{ kW}$ , the COP of the refrigerator is

- (A) 2.0                      (B)  $1/3$   
(C) 0.5                      (D) 3.0

137. For a 4-stroke diesel engine, the compression ratio is  $21 : 1$  and the cut-off ratio is  $2 : 1$ . What is its expansion ratio ?

- (A)  $7 : 1$                       (B)  $10.5 : 1$   
(C)  $12 : 1$                       (D)  $19 : 1$

138. A gas in a container A is in thermal equilibrium with another gas of the same mass in container B. If the corresponding pressures and volumes are denoted by suffixes A and B, then which of the following statements is true ?

- (A)  $P_A \neq P_B, V_A = V_B$   
(B)  $P_A = P_B, V_A \neq V_B$   
(C)  $\frac{P_A}{V_A} = \frac{P_B}{V_B}$   
(D)  $P_A V_A = P_B V_B$

139. A liquid flows from low level  $Z_1$ , pressure  $P_1$  to a higher level  $Z_2$ , pressure  $P_2$ . It can be concluded

- (A) first law of thermodynamics has been violated  
(B) second law of thermodynamics has been violated  
(C)  $Z_2 < Z_1$   
(D)  $P_2 < P_1$

140. In diesel engines, the duration between the time of injection and ignition, is known as  
 (A) pre-ignition period  
 (B) delay period  
 (C) ignition period  
 (D) burning period
141. The process of supplying the intake air to the engine cylinder at a density more than the density of the surrounding atmosphere is known as  
 (A) scavenging  
 (B) detonation  
 (C) supercharging  
 (D) polymerisation
142. Which of the following expressions gives the entropy change in an isobaric heating process from  $T_1$  to  $T_2$  ?  
 (A)  $m C_p \ln \frac{T_2}{T_1}$   
 (B)  $m C_p (T_2 - T_1)$   
 (C)  $m C_p (T_2 - T_1) / T_0$   
 (D)  $m C_p (T_1 + T_2)$
143. If  $V_i$  be the inlet absolute velocity to blades,  $V_b$  be the tangential blade velocity and  $\alpha$  be the nozzle angle, then for maximum blade efficiency for single-stage impulse turbine  
 (A)  $\frac{V_b}{V_i} = \cos \alpha$   
 (B)  $\frac{V_b}{V_i} = \frac{\cos \alpha}{2}$   
 (C)  $\frac{V_b}{V_i} = \cos^2 \alpha$   
 (D)  $\frac{V_b}{V_i} = \frac{\cos^2 \alpha}{2}$
144. Which of the following does **not** relate to steam engine ?  
 (A) Crank shaft  
 (B) Cross head  
 (C) Steam chest  
 (D) Steam separator
145. Self-ignition temperature of diesel as compared to petrol  
 (A) is higher  
 (B) is lower  
 (C) is same  
 (D) varies considerably
146. Morse test is conducted on  
 (A) vertical engines  
 (B) horizontal engines  
 (C) single cylinder engines  
 (D) multi cylinder engines
147. In spark ignition (SI) engines, the possibility of knocking can be reduced by  
 (A) increasing compression ratio  
 (B) decreasing compression ratio  
 (C) increasing the coolant temperature  
 (D) advancing the spark timing
148. Higher compression ratio in diesel engine results in  
 (A) lower temperature  
 (B) lower pressure  
 (C) same pressure  
 (D) higher pressure
149. What salts of calcium and magnesium cause temporary hardness of boiler feed water ?  
 (A) Chlorides (B) Bicarbonates  
 (C) Nitrates (D) Sulphites



150. In an isothermal process, the internal energy of a gas
- (A) always increases  
(B) always decreases  
(C) increases or decreases  
(D) remains constant
151. Which of the following is a boiler mounting ?
- (A) Safety valve  
(B) Economizer  
(C) Superheater  
(D) Feed pump
152. Which part of a petrol engine would need modifications if the engine is to be made to run on LPG ?
- (A) Piston (B) Crank shaft  
(C) Valves (D) Carburettor
153. An adiabatic process in a thermodynamic system is one in which there is
- (A) a limited heat transfer to or from the system through the boundary  
(B) no heat transfer to or from the system through the boundary  
(C) no energy transfer to or from the system through the boundary  
(D) no internal energy change in the system
154. A device used to increase the temperature of saturated steam without raising its pressure is called
- (A) fusible plug (B) blow off cock  
(C) economiser (D) superheater
155. Maximum diagram efficiency for Parson's reaction turbine is given by
- (A)  $2 \cos^2 \alpha / (1 + \cos \alpha)$   
(B)  $\cos^2 \alpha / (1 + 2 \cos \alpha)$   
(C)  $\cos^2 \alpha / (1 + 2 \cos^2 \alpha)$   
(D)  $2 \cos^2 \alpha / (1 + 2 \cos^2 \alpha)$
156. The delay period in a petrol engine is of the order of
- (A) 0.001 sec (B) 0.002 sec  
(C) 0.01 sec (D) 0.05 sec
157. Octane number of iso-octane is
- (A) 50 (B) 70  
(C) 0 (D) 100
158. The silencer of an IC engine
- (A) reduces noise  
(B) decreases brake specific fuel consumption  
(C) increases brake specific fuel consumption  
(D) has no effect on efficiency
159. The compression ratio for a practical diesel engine usually lies in the range
- (A) 5 - 7 (B) 7 - 9  
(C) 10 - 15 (D) 16 - 22
160. For a four-cylinder engine, the firing order for evenness of torque is
- (A) 1 - 2 - 3 - 4 (B) 1 - 3 - 2 - 4  
(C) 1 - 4 - 3 - 2 (D) 1 - 3 - 4 - 2
161. The drag coefficient is defined as
- (A)  $(F_D/A) / (\rho v_0^2)$   
(B)  $(F_D/A) / (2 \rho v_0^2)$   
(C)  $F_D / (0.5 \rho v_0^2)$   
(D)  $F_D / (0.5 \rho v_0^2 A)$
162. The length of the divergent portion of venturimeter in comparison to convergent portion is
- (A) same  
(B) more  
(C) less  
(D) depending upon the type of flow

163. Froude's Number relates to [www.sakshieducation.com](http://www.sakshieducation.com)
- (A) inertia force and gravity force  
 (B) inertia force and pressure force  
 (C) inertia force and surface tension force  
 (D) inertia force and elastic force
164. In pitot-tube the velocity of flow at a point is reduced to zero. That point is called as
- (A) stagnation point  
 (B) critical point  
 (C) metacentre  
 (D) equilibrium point
165. The velocity distribution in a pipe flow is parabolic if the flow is
- (A) uniform, turbulent  
 (B) uniform, laminar  
 (C) non-uniform, steady  
 (D) rotational, compressible
166. Mercury does *not* wet the glass surface. This property of mercury is due to
- (A) adhesion (B) cohesion  
 (C) surface tension (D) viscosity
167. Loss of head due to friction in a uniform diameter pipe with viscous flow is
- (A)  $Re$  (B)  $1/Re$   
 (C)  $4/Re$  (D)  $16/Re$
168. Maximum theoretical efficiency of Pelton wheel is obtained when the ratio of bucket speed to jet speed is
- (A) 0.26 (B) 0.98  
 (C) 0.46 (D) 0.58
169. The velocity distribution for flow over a flat plate is given by  $u = (y - y^2)$  in which  $u$  is velocity in metres per second at a distance  $y$  metres above the plate. What is the shear stress value at  $y = 0.15$  m? The dynamic viscosity of fluid is 8.0 poise.
- (A)  $12.4 \text{ N/m}^2$  (B)  $1.24 \text{ N/m}^2$   
 (C)  $0.56 \text{ N/m}^2$  (D)  $5.6 \text{ N/m}^2$
170. A hydraulic turbine runs at 240 rpm under a head of 9 m. What will be the speed (in rpm) of the turbine if operating head is 16 m?
- (A) 320 (B) 426  
 (C) 264 (D) 230
171. The discharge of a liquid of kinematic viscosity  $4 \times 10^{-2} \text{ m}^2/\text{s}$  through a 80 mm diameter pipe is  $3200\pi \times 10^{-4} \text{ m}^3/\text{s}$ . The flow is
- (A) laminar (B) turbulent  
 (C) transition (D) critical
172. The velocity at a point on the crest of a model dam was measured to be 1 m/s. The corresponding prototype velocity for a linear scale ratio of 25, in m/s, is
- (A) 25 (B) 2.5  
 (C) 5 (D) 0.04
173. Pressure force on the 15 cm diameter headlight of an automobile travelling at 0.25 m/s is
- (A) 10.4 N (B) 6.8 N  
 (C) 4.8 N (D) 3.2 N
174. A piece of metal of specific gravity 7 floats in mercury of specific gravity 13.6. What fraction of its volume is under mercury?
- (A) 0.5 (B) 0.4  
 (C) 0.515 (D) 0.415
175. The friction head lost due to flow of a viscous fluid through a circular pipe of length  $L$  and diameter  $d$  with a velocity  $v$  and pipe Fanning friction factor  $f$  is
- (A)  $\frac{4 f L}{d} \cdot \frac{v^2}{2g}$  (B)  $\frac{4 f L}{\pi d^2} \cdot \frac{v^2}{2g}$   
 (C)  $\frac{v^2}{2g}$  (D)  $\frac{4 f L}{\pi d} \cdot \frac{v^2}{2g}$
176. The ratio of pressures between two points A and B located respectively at depths 0.5 m and 2 m below a constant level of water in a tank is
- (A) 1 : 1 (B) 1 : 2  
 (C) 1 : 4 (D) 1 : 16



177. Using Blasius equation, the friction factor for turbulent flow through pipes varies as  
 (A)  $Re^{-1}$  (B)  $Re^{-0.5}$   
 (C)  $Re^{-0.33}$  (D)  $Re^{-0.25}$
178. The specific speed ( $N_S$ ) of a centrifugal pump is given by  
 (A)  $\frac{N\sqrt{Q}}{H^{2/3}}$  (B)  $\frac{N\sqrt{Q}}{H^{3/4}}$   
 (C)  $\frac{N\sqrt{Q}}{H}$  (D)  $\frac{N\sqrt{Q}}{H^{5/4}}$
179. Pressure intensity inside the water droplets is (where  $\sigma$  – surface tension  
 d – diameter of bubble)  
 (A)  $p = \frac{8\sigma}{d}$  (B)  $p = \frac{2\sigma}{d}$   
 (C)  $p = \frac{4\sigma}{d}$  (D)  $p = \frac{\sigma}{d}$
180. The length of a rectangular weir is L and height  $H_1$ . The maximum depth of water on the upstream side of the weir is H. Flow rate over the notch (Q) is  
 (A)  $Q = \frac{2}{3} c_d L \sqrt{2g} H^{5/2}$   
 (B)  $Q = \frac{2}{3} c_d L \sqrt{2g} (H - H_1)^{5/2}$   
 (C)  $Q = \frac{2}{3} c_d L \sqrt{2g} H^{3/2}$   
 (D)  $Q = \frac{2}{3} c_d L \sqrt{2g} (H - H_1)^{3/2}$
181. The coefficient of discharge ( $c_d$ ) of an orifice varies with  
 (A) Weber number  
 (B) Mach number  
 (C) Reynold's number  
 (D) Froude number
182. A hydrometer is used to determine  
 (A) relative humidity  
 (B) surface tension of liquids  
 (C) specific gravity of liquids  
 (D) viscosity of liquids
183. In flow through a pipe, the transition from laminar to turbulent flow does *not* depend on  
 (A) velocity of the fluid  
 (B) density of the fluid  
 (C) length of the pipe  
 (D) diameter of the pipe
184. Low specific speed of a turbine implies that it is  
 (A) Propeller turbine  
 (B) Francis turbine  
 (C) Impulse turbine  
 (D) Kaplan turbine
185. Flow of water in a pipe about 3 metres in diameter can be measured by  
 (A) Orifice plate (B) Venturi  
 (C) Pitot tube (D) Nozzle
186. In a pitot tube, at the stagnation point  
 (A) pressure is zero  
 (B) total energy is zero  
 (C) pressure head is equal to velocity  
 (D) all the velocity head is converted into pressure head
187. Navier – Stokes equations are associated with  
 (A) Buoyancy  
 (B) Supersonic flow  
 (C) Vortex flow  
 (D) Viscous flow

188. The water hammer pressure in a pipe can be reduced by  
(A) using pipe of greater diameter  
(B) using a more elastic pipe  
(C) using pipe of greater wall thickness  
(D) increasing the velocity of pressure wave
189. When a fluid is in motion, the pressure at a point is same in all directions. Then the fluid is  
(A) Real fluid  
(B) Newtonian fluid  
(C) Ideal fluid  
(D) Non-Newtonian fluid
190. Density of water is maximum at  
(A) 0°C (B) 4 K  
(C) 4°C (D) 100°C
191. The ability of a tool material to resist shock or impact forces is known as  
(A) wear resistance  
(B) toughness  
(C) red hardness  
(D) machinability
192. The tool material which has high heat and wear resistance is  
(A) Ceramics  
(B) Cemented carbide  
(C) Carbon steels  
(D) Medium alloy steel
193. To improve the surface finish of castings, the following additive is used in the moulding sand :  
(A) Resins (B) Oils  
(C) Wood flour (D) Sea coal
194. The binding material used in cemented carbide tools is  
(A) Nickel (B) Cobalt  
(C) Chromium (D) Carbon
195. Which one of the following is an example of solid state welding ?  
(A) Gas welding  
(B) Arc welding  
(C) Thermit welding  
(D) Forge welding
196. The shape and size of sand grains affects the following property :  
(A) Adhesiveness  
(B) Porosity  
(C) Refractoriness  
(D) Strength
197. Cereals are added to the moulding sand to improve the following :  
(A) Porosity  
(B) Green strength  
(C) Hot strength  
(D) Edge hardness
198. Plastic toys are usually produced by using  
(A) shell moulding  
(B) green sand moulding  
(C) plaster moulding  
(D) injection moulding
199. Generally used fuel gas in gas welding is  
(A) N<sub>2</sub> (B) CO<sub>2</sub>  
(C) C<sub>2</sub>H<sub>2</sub> (D) He
200. Spot welding, projection welding and seam welding belong to the category of  
(A) electric resistance welding  
(B) forge welding  
(C) thermit welding  
(D) arc welding



**MANNER IN WHICH ANSWERS ARE TO BE GIVEN**

**उत्तर देने की विधि**

**Directions :** Each question or incomplete statement is followed by four alternative suggested answers or completions. In each case, you are required to select the one that correctly answers the question or completes the statement and blacken [●] appropriate oval A, B, C or D by Black/Blue Ball-point pen against the question concerned in the Answer-Sheet.

The following example illustrates the manner in which the questions are required to be answered.

**Example :**

**Question No. 'Q' —**

Out of the four words given below, three are alike in some way and one is different. Find the ODD word :

- (A) Girl
- (B) Boy
- (C) Woman
- (D) Chair

**Explanation :** In the above example, the correct answer is 'Chair' and this answer has been suggested at 'D'. Accordingly, the answer is to be indicated by blackening [●] the oval by Black/Blue Ball-point pen in column 'D' against Question No. 'Q' in the manner indicated below :

**Question No. 'Q'**

- (A) (B) (C) (D) ●

There is only one correct answer to each question. You should blacken [●] the oval of the appropriate column, viz., A, B, C or D. If you blacken [●] more than one oval against any one question, the answer will be treated as wrong. If you wish to cancel any answer, you should completely erase that black mark in the oval in the Answer-Sheet, and then blacken the oval of revised response.

You are NOT required to mark your answers in this Booklet. All answers must be indicated in the Answer-Sheet only.

**निर्देश :** प्रत्येक प्रश्न अथवा प्रत्येक अधूरे कथन के बाद चार उत्तर अथवा पूरे कथन सुझाए गए हैं। प्रत्येक दशा में आपको किसी एक को चुनना है जो प्रश्न का सही उत्तर दे अथवा कथन को पूरा करे और आपको उत्तर-पत्रिका में उपयुक्त अण्डाकार खाने A, B, C या D को काला/नीला बॉल-पॉइंट पेन से काला [●] करना है।

नीचे दिए गए उदाहरण से स्पष्ट हो जाएगा कि उत्तर किस प्रकार दिए जाने हैं।

**उदाहरण :**

**प्रश्न सं. 'क्यू' —**

नीचे दिए हुए चार शब्दों में तीन कुछ मिलते-जुलते हैं, तथा एक कुछ अलग किस्म का है। वह अलग किस्म का शब्द बताएँ :

- (A) लड़की
- (B) लड़का
- (C) महिला
- (D) कुर्सी

**स्पष्टीकरण :** ऊपर के उदाहरण में सही उत्तर 'कुर्सी' है और यह उत्तर 'D' में सुझाया गया है। अतः प्रश्न सं. 'क्यू' के सामने कॉलम 'D' के अण्डाकार खाने को काला/नीला बॉल-पॉइंट पेन से पूर्णतया काला [●] करके उत्तर नीचे बताई विधि के अनुसार दिया जाना है :

**प्रश्न सं. 'क्यू'**

- (A) (B) (C) (D) ●

प्रत्येक प्रश्न का केवल एक ही सही उत्तर है। आपको समुचित कॉलम अर्थात् A, B, C या D के अण्डाकार खाने को काला [●] करना है। यदि आप किसी प्रश्न के सामने एक से अधिक अण्डाकार खाने को भरेंगे [●], तो आपका उत्तर ग़लत माना जाएगा। यदि आप किसी उत्तर को रद्द करना चाहते हैं, तो आप उत्तर-पत्रिका के उस अण्डाकार खाने से काले निशान को पूरी तरह से मिटा दें और तब बदले हुए उत्तर के लिए अण्डाकार खाने को काला कर दें।

इस पुस्तिका के अन्दर आपको उत्तर अंकित नहीं करने हैं। सभी उत्तर केवल उत्तर-पत्रिका में ही दें।

SEAL