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DO NOT OPEN THE SEAL OF THE BOOKLET UNTIL YOU ARE TOLD TO DO SO

DB 2014
PAPER I
प्रश्न-पत्र I

Test Form No.
टेस्ट फॉर्म सं.
542 PK 6

Time Allowed : 2 Hours
निर्धारित समय : 2 घंटे

Maximum Marks : 200
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 अंग्रेज़ी तथा हिन्दी दोनों में दिये गये हैं ।

INSTRUCTIONS TO CANDIDATES

1. This Booklet contains 200 questions in all comprising the following three tests :
   - Test (i) : General Intelligence and Reasoning (50 Questions)
   - Test (ii) : General Awareness (50 Questions)
   - Test (iii) : Part A : General Engineering (Civil and Structural) (100 Questions)
     OR
     Part B : General Engineering (Electrical) (100 Questions)
     OR
     Part C : General Engineering (Mechanical) (100 Questions)
2. In questions set bilingually in English and Hindi, in case of discrepancy, the English version will prevail.
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.
4. All questions are compulsory and carry equal marks.
5. *The paper carries negative marking, 0·25 marks will be deducted for each wrong answer.*
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*.**
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 signatures 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.
8. Answers must be shown by completely blackening the corresponding ovals 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.
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.
10. The Answer-Sheet must be handed over to the Invigilator before you leave the Examination Hall.
11. **Failure to comply with any of the above instructions will render a candidate liable to such action/penalty as may be deemed fit.**
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.
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.
14. **No rough work is to be done on the Answer-Sheet. Space for rough work has been provided below the questions.**
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."**

उम्मीदवारों के लिए अनुदेश

1. इस पुस्तिका में कुल **200** प्रश्न हैं, जिनमें निम्नलिखित तीन परीक्षण शामिल हैं :
   - परीक्षण (i) : सामान्य बुद्धि और तर्क (50 प्रश्न)
   - परीक्षण (ii) : सामान्य जानकारी (50 प्रश्न)
   - परीक्षण (iii) : भाग क : सामान्य इंजीनियरी (सिविल एवं संरचनात्मक) (100 प्रश्न)
     अथवा
     भाग ख : सामान्य इंजीनियरी (विद्युत) (100 प्रश्न)
     अथवा
     भाग ग : सामान्य इंजीनियरी (यांत्रिक) (100 प्रश्न)
2. अंग्रेज़ी और हिन्दी भाषा में तैयार किए गए द्विभाषी प्रश्नों में कोई विसंगति होने की स्थिति में अंग्रेज़ी विवरण मान्य होगा ।
3. परीक्षण (i) सामान्य बुद्धि और तर्क एवं परीक्षण (ii) सामान्य जानकारी सभी उम्मीदवारों के लिए अनिवार्य है । उम्मीदवारों को आवेदन-पत्र में दिए विकल्प के अनुसार परीक्षण (iii) सामान्य इंजीनियरी का केवल एक ही भाग क सिविल एवं संरचनात्मक अथवा भाग ख विद्युत अथवा भाग ग, यांत्रिक को हल करना होगा अन्यथा आपको ***'शून्य'*** अंक दिया जाएगा ।
4. सभी प्रश्न अनिवार्य हैं तथा सबके बराबर अंक हैं ।
5. *प्रश्न पत्र में नकारात्मक अंकन होगा । हर ग़लत उत्तर के लिए 0·25 अंक काटा जाएगा ।*
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 *तत्काल* इसके बदले दूसरी पुस्तिका ले लें ।**
7. निरीक्षक द्वारा आपको उत्तर-पत्रिका अलग से दी जाएगी । प्रश्नों के उत्तर वास्तव में शुरू करने से पहले आप उत्तर-पत्रिका के Side-I में नियमावली के अनुसार अपना ***नाम, रोल नम्बर, टिकट नम्बर, परीक्षा का नाम जैसे प्रवेश पत्र में दिखाया गया है, जन्म तिथि, टेस्ट फॉर्म संख्या तथा विषय*** अर्थात् सिविल एवं संरचनात्मक या विद्युत या यांत्रिक आदि अवश्य लिखें । प्रश्नों के उत्तर देने से पहले उत्तर-पत्रिका पर निर्धारित स्थान में आप अपने हस्ताक्षर एवं बाएँ हाथ के अंगूठे का निशान भी अवश्य लगाएँ । उपर्युक्त अनुदेशों का पूरी तरह अनुपालन किया जाए, अन्यथा आपकी उत्तर-पत्रिका को जाँचा नहीं जाएगा और ***'शून्य'*** अंक दिया जाएगा ।
8. उत्तर-पत्रिका में सभी उत्तर Side-II में प्रश्न संख्या के सामने दिये गये सम्बन्धित अण्डाकार खानों को केवल काला/नीला बॉल-पॉइंट पेन से पूरी तरह काला करके दिखाएँ । जो अण्डाकार खाने काला/नीला बॉल-पॉइंट पेन से नहीं भरे जाएँगे, उनके लिए कोई अंक नहीं दिया जाएगा ।
9. ओ.एम.आर. उत्तर-पत्रिका में भरी गई कूट सूचना को एक मशीन पढ़ेगी । यदि सूचना अपूर्ण है अथवा आवेदन प्रपत्र में दी गई सूचना से भिन्न है, तो ऐसे अभ्यर्थी को 'शून्य' अंक दिया जाएगा ।
10. परीक्षा-भवन छोड़ने से पहले परीक्षार्थी को उत्तर-पत्रिका-निरीक्षक के हवाले कर देनी चाहिए ।
11. **ऊपर के अनुदेशों में से किसी एक का भी पालन न करने पर उम्मीदवार पर विवेकानुसार कार्यवाही की जा सकती है या दण्ड दिया जा सकता है ।**
12. विभिन्न प्रश्नों के उत्तर देने की विधि इस पुस्तिका के पीछे (पृष्ठ संख्या 80) में छपे हुए निर्देशों में दे दी गई है, इसे आप प्रश्नों के उत्तर देने से पहले ध्यानपूर्वक पढ़ लें ।
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 ।
14. **कोई रफ़ कार्य उत्तर-पत्रिका पर नहीं करना है । रफ़ कार्य के लिए स्थान प्रश्नों के नीचे दिया गया है ।**
15. **"परीक्षा हालों/कमरों में मोबाइल फोन तथा बेतार संचार साधन पूरी तरह निषिद्ध हैं । उम्मीदवारों को उनके अपने हित में सलाह दी जाती है कि मोबाइल फोन/किसी अन्य बेतार संचार साधन को स्विच ऑफ 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 देने सहित ।"**

SEAL

इस पुस्तिका की सील तब तक न खोलें जब तक कहा न जाए

TEST (i) : GENERAL INTELLIGENCE AND REASONING

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

1. CAT : BIG : : DDY : ?
(A) CLL (B) CLM
(C) CML (D) CEP

2. 1 : 1 : : 10 : ?
(A) 12 (B) 110
(C) 210 (D) 1000

3. 7 : 56 : : 5 : ?
(A) 25 (B) 26
(C) 30 (D) 35

4. Uttarakhand : Dehradun : : Mizoram : ?
(A) Aizawl (B) Kohima
(C) Shillong (D) Darjeeling

5. Crime : Court : : Disease : ?
(A) Doctor (B) Medicine
(C) Hospital (D) Treatment

6. YQXP : JBIA : : OVNU : ?
(A) FAGZ (B) HRIS
(C) DKCJ (D) DNEO

7. ADGJ : BEHK : : DGJM : ?
(A) KPUB (B) GJMP
(C) KNQT (D) PSVY

8. ACE : BDF : : GIK : ?
(A) HJL (B) AXP
(C) CFG (D) GFC

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) vwqp (B) yxmn
(C) gfkl (D) cbrs

12. (A) (324, 18) (B) (441, 72)
(C) (117, 81) (D) (186, 14)

13. (A) (11, 121) (B) (25, 625)
(C) (12, 141) (D) (15, 225)

14. (A) Kolkata (B) Vishakhapatnam
(C) Bengaluru (D) Haldia

15. Carrot, Cabbage, Potato, Ginger, Beetroot
(A) Cabbage (B) Carrot
(C) Potato (D) Beetroot

16. (A) HGFE (B) PONM
(C) DCBA (D) MSTU

17. (A) GFI (B) VUX
(C) POR (D) LKM

18. 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

19. 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

20. 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

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

(A) K-64 (B) L-32

(C) M-32 (D) L-64

23. CGJ, KOR, TXA, ?

(A) ACE (B) JDP

(C) FJM (D) UWY

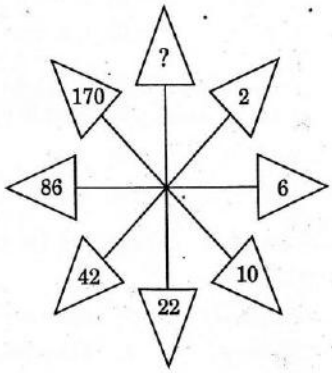
24. CEG, JLN, QSU, ?

(A) QQS (B) TVX

(C) HJL (D) UVW

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

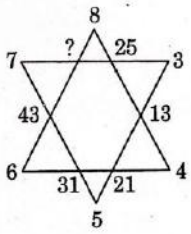
25.



(A) 422 (B) 374

(C) 256 (D) 342

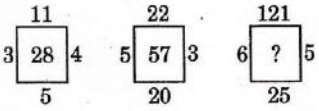
26.



(A) 56 (B) 57

(C) 58 (D) 59

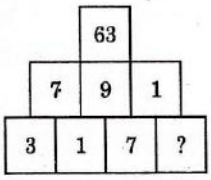
27.



(A) 176 (B) 115

(C) 157 (D) 131

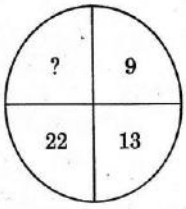
28.



(A) 3 (B) 9

(C) 5 (D) 2

29.



(A) 40 (B) 38

(C) 39 (D) 44

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

NGDEALN

(A) State (B) Country

(C) River (D) Ocean

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31. Find the odd number out :

18, 34, 36, 54

(A) 34 (B) 54

(C) 18 (D) 36

32. 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

33. If A = 1, B = 2 and N = 14, then BEADING = ?

(A) 2154(14)97 (B) 2514(14)79

(C) 25149(14)7 (D) 2154(14)79

34. If A = 1, AGE = 13, then CAR = ?

(A) 19 (B) 20

(C) 21 (D) 22

35. 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

36. If 1 = 1, 2 = 3, 3 = 5 and 4 = 7, then 5 = ?

(A) 9 (B) 7

(C) 5 (D) 8

37. 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

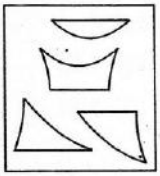
38. Murthy drove from town A to town B. In the first hour, he travelled $\frac{1}{4}$ of the journey. In the next one hour, he travelled $\frac{1}{2}$ of the journey. In the last 30 minutes, he travelled 80 km. Find the distance of the whole journey.

(A) 240 km (B) 300 km

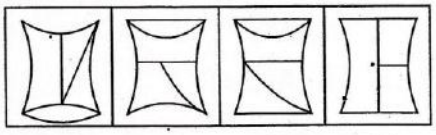
(C) 320 km (D) 360 km

39. Identify the answer figure from which the pieces given in question figure have been cut.

Question figure :

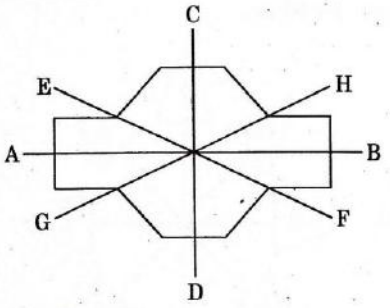


Answer figures :



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

40. 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

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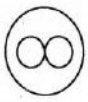
41. Which figure represents the relation among Computer, Internet and Information-Communication Technology ?

(A) 

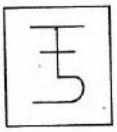
(B) 

(C) 

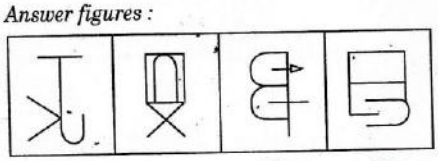
(D) 

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

Question figure :

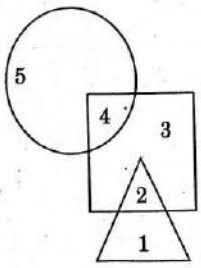


Answer figures :



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

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



(A) 5 (B) 4

(C) 3 (D) 2

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 scrutinization.

(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

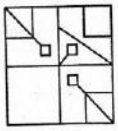
(C) II and IV are strong arguments

(D) I and IV are strong arguments

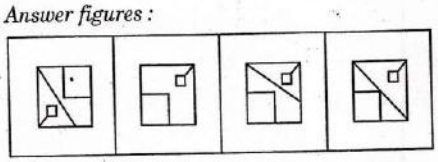
SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

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

46. *Question figure :*

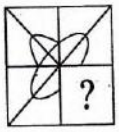


Answer figures :

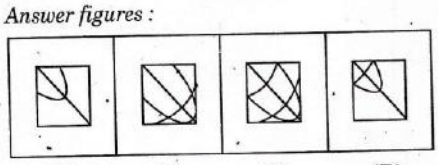


(A) (B) (C) (D)

47. *Question figure :*



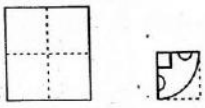
Answer figures :



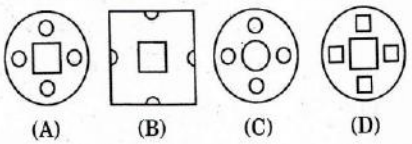
(A) (B) (C) (D)

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. 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	?

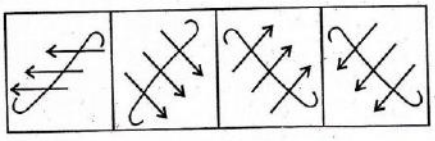
(A) 450 (B) 550

(C) 320 (D) 420

50. 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)

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

TEST (ii) : GENERAL AWARENESS

51. 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

52. Which is the longest dam in India ?
(A) Bhakra-Nangal
(B) Rihand
(C) Hirakud
(D) Nagarjuna Sagar

53. The Thermal Power Plant in Tamil Nadu is
(A) Kundah (B) Ramagundam
(C) Pykara (D) Neyveli

54. 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

55. The famous court poet of Akbar was
(A) Birbal
(B) Tulsidas
(C) Rahim Khan
(D) Bairam Khan

56. Who established four great Mathas at the four corners of India — Sringeri, Puri, Dwaraka and Badrinath ?
(A) Shankara (B) Ramanuja
(C) Madhva (D) Ramananda

57. Temporary wilting occurs in plants due to
(A) Respiration
(B) Transpiration
(C) Photosynthesis
(D) Absorption of water

58. Lichens are a symbiotic association of
(A) Algae and Fungi
(B) Bacteria and Fungi
(C) Bacteria and Algae
(D) Fungi and Higher plants

59. Photophobia is caused by the deficiency of
(A) Vitamin B_1 (B) Vitamin B_2
(C) Vitamin B_4 (D) Vitamin B_6

60. Which of the following is present only in plant cell ?
(A) Cell membrane
(B) Mitochondria
(C) Cell wall
(D) Endoplasmic reticulum

61. The main cause of faulting is
(A) Tension
(B) Wind
(C) Tidal activity
(D) Gravitational force

62. 'Pan American' refers to
(A) North America
(B) South America
(C) Central America
(D) All the above

63. Most primitive living vascular plants are
(A) Brown algae (B) Cycas
(C) Ferns (D) Sphagnum

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

64. The first woman in the world to have climbed Mt. Everest twice is
(A) Bachendri Pal
(B) Molly Chacko
(C) Santosh Yadav
(D) Theresia Kiesl

65. What is the basic foundation of Gandhian thought ?
(A) Political campaigns
(B) Social movements
(C) Religion and morality
(D) Freedom of the individual

66. Amir Khusrau was a famous poet in the court of
(A) Akbar
(B) Shahjahan
(C) Ibrahim Lodhi
(D) Alauddin Khilji

67. A natural phenomenon that becomes harmful due to pollution is
(A) Global warming
(B) Ecological balance
(C) Greenhouse effect
(D) Desertification

68. Decomposers include
(A) Bacteria
(B) Fungi
(C) Both Bacteria and Fungi
(D) Animals

69. Who said about religion that "it is the opium of the masses" ?
(A) Hitler (B) Stalin
(C) Lenin (D) Marx

70. Pt. Shiv Kumar Sharma is an exponent of
(A) Mandolin
(B) Santoor
(C) Sitar
(D) Veena

71. Patanjali is well-known for the compilation of
(A) Yogasutra
(B) Panchatantra
(C) Brahmasutra
(D) Ayurveda

72. Which of the following Presidents of America abolished Slavery ?
(A) Abraham Lincoln
(B) Thomas Jefferson
(C) George Washington
(D) Stanley Jackson

73. Who is the first woman cosmonaut of the world ?
(A) Valentina Tereshkova
(B) Maria Estela Peron
(C) Svetlana Savitskaya
(D) Kay Cottee

74. In the year 1905, Gopal Krishna Gokhale founded the
(A) Servants of India Society
(B) Asiatic Society
(C) Brahmo Samaj
(D) Bharat Sewak Samaj

75. Gandhiji believed that Satyagraha is a weapon of
(A) the poor
(B) the weak
(C) the untouchables
(D) the brave

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

76. 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

77. 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

78. 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

79. 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

80. '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

81. NNP is equal to
(A) GNP + Depreciation
(B) GNP – Depreciation
(C) GNP + Exports
(D) GNP – Exports

82. The Union Public Service Commission of India has been established under
(A) Article 315
(B) Article 320
(C) Article 325
(D) Article 335

83. The Harappans worshipped
(A) Shiva, Parvathi and Vishnu
(B) Mother Goddess and Pashupathi
(C) Vishnu and Mother Goddess
(D) Pashupathi and Vishnu

84. Gandhiji started the Dandi March for
(A) Poorna Swaraj
(B) Home-rule
(C) Protest against the imposition of Salt Tax
(D) Responsible Government

85. 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

86. Which Constitutional Amendment provided Constitutional status to Panchayat Raj Institutions ?
(A) 93rd Amendment
(B) 44th Amendment
(C) 42nd Amendment
(D) 73rd Amendment

87. Who has the power to pardon in case of capital punishment ?
(A) Prime Minister
(B) President
(C) Chief Justice
(D) Attorney General of India

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

88. 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

89. The largest planet in the solar system is
(A) Venus (B) Mars
(C) Jupiter (D) Earth

90. 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

91. Electrocardiograph (ECG) is used to measure
(A) Blood Count
(B) Heart Beat
(C) Temperature
(D) Electricity

92. USB stands for
(A) Unique Serial Bus
(B) Universal Serial Bus
(C) Unary Serial Bus
(D) Universal Secondary Bus

93. The yellow colour of mangoes is due to the presence of
(A) Chlorophyll
(B) Anthocyanin
(C) Anthoxanthin
(D) Carotene

94. Which element produces hydrogen on reaction with strong alkali ?
(A) Si (B) C
(C) P (D) S

95. Which metal does ***not*** react with dilute H_2SO_4 ?
(A) Pb (B) Fe
(C) Zn (D) Mg

96. 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}

97. Salt that dissolves in aqueous ammonia solution is
(A) $HgCl_2$ (B) $PbCl_2$
(C) $Cu(OH)_2$ (D) $Al(OH)_3$

98. Residence time of water molecule in the ocean is
(A) 3·5 years
(B) 3·5 million years
(C) 35 years
(D) 35000 years

99. Biotic environment includes
(A) Producers (B) Consumers
(C) Decomposers (D) All the above

100. In computer network terminology, WAN stands for
(A) World area network
(B) Wide area network
(C) Wide array net
(D) Wireless area network

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

TEST (iii)

PART A : GENERAL ENGINEERING

(CIVIL AND STRUCTURAL)

101. 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

102. 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

103. In a cantilever beam subjected to general loading, the maximum bending moment is at

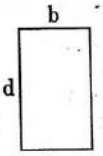
(A) fixed end

(B) free end

(C) mid-span

(D) quarter-span

104.



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) $bd^3/3$

105. 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

106. 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

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

(A) increased content of gypsum

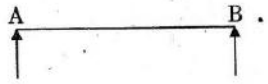
(B) burning at high temperature

(C) increased content of cement

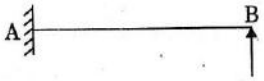
(D) higher content of tricalcium

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

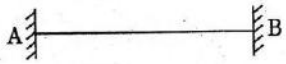
(A)



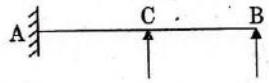
(B)



(C)



(D)



109. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

110. 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

111. 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

112. Generally, strength of concrete is considered negligible/very low in

(A) Compression (B) Tension
(C) Fatigue (D) None of the above

113. 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

114. In concrete, while hand mixing is adopted, excess cement to be added is

(A) 4% (B) 10%
(C) 14% (D) 20%

115. 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

116. A very comfortable type of stair for usage is

(A) straight (B) dog legged
(C) open newel (D) circular

117. 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

118. If τ_v is the nominal shear stress, τ_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.

119. 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

120. 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) $1 - \frac{L_e}{24\,b}$ (B) $1{\cdot}25 - \frac{L_e}{36\,b}$
(C) $1{\cdot}25 - \frac{L_e}{48\,b}$ (D) $1{\cdot}5 - \frac{L_e}{60\,b}$

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

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

(A) 60% (B) 68%

(C) 80% (D) 90%

122. The global warming is caused mainly by

(A) NO_X (B) SO_X

(C) CO_2 (D) O_2

123. 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

124. 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

125. 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^2 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) $V^2/(e+f)\,2g$

126. Camber in the road is provided for

(A) counteracting the centrifugal force

(B) effective drainage

(C) having proper sight distance

(D) avoiding overturning

127. "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

128. 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) $r = \sqrt{A/I}$

129. Strain energy due to axial deformation is given by

(σ : resultant stress
P : axial load
Δ : deformation
ε : strain
E : modulus of elasticity)

(A) $\sigma\varepsilon$ (B) $P\Delta$

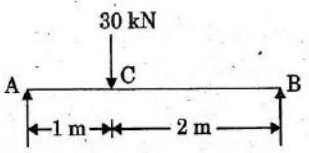
(C) $\sigma^2/2E$ (D) $\frac{1}{2}P\Delta$

130. 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) $WL^2/4$

131.



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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

132. A tie is a
(A) tension member
(B) compression member
(C) flexural member
(D) torsion member

133. The slenderness ratio of lacing bars should ***not*** exceed
(A) 120 (B) 145
(C) 180 (D) 100

134. 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

135. 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

136. 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

137. 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

138. 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

139. The size of a rivet is identified by
(A) diameter of shank
(B) diameter of head
(C) length of shank
(D) shape of head

140. 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

141. Permissible stress may also be known as
(A) ultimate stress
(B) working stress
(C) limit stress
(D) yield stress

142. The maximum permissible stress for power driven field rivet in bearing on rivet is
(A) 100 N/mm^2 (B) 250 N/mm^2
(C) 270 N/mm^2 (D) 300 N/mm^2

143. Bearing stiffeners are designed as
(A) beams (B) beam-ties
(C) ties (D) column

144. 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

145. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

146. The correction to be applied to each 30 m chain for a line measurement along a slope of θ is

(A) $30(1 - \cos\theta)$ (B) $30(1 - \sin\theta)$

(C) $30(1 - \tan\theta)$ (D) $30(1 - \cot\theta)$

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

(A) Flat

(B) Steeply sloped

(C) Vertical cliff

(D) Overhang cliff

148. The length of the tangent of a curve whose radius is R and the angle of deflection Δ is

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

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

149. Radiation, Intersection and Resection are

(A) Compass Surveying Techniques

(B) Chain Surveying Techniques

(C) Levelling Techniques

(D) Plane Table Surveying Techniques

150. 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

151. 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

152. Clay is generally

(A) cohesive

(B) permeable

(C) having large particle size

(D) None of the above

153. 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

154. If whole circle bearing of a line is 210° 0′ 0″, its value in quadrantal bearing system is

(A) S 30° 0′ 0″ W (B) N 30° 0′ 0″ E

(C) S 30° 0′ 0″ E (D) N 30° 0′ 0″ W

155. 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

 SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

156. To prevent segregation, the maximum height for placing concrete, is

(A) 100 cm (B) 125 cm

(C) 150 cm (D) 200 cm

157. Di-calcium silicate (C_2S)

(A) hydrates rapidly

(B) generates less heat of hydration

(C) hardens rapidly

(D) has less resistance to sulphate attack

158. Separation of coarse aggregates from concrete during transportation, is known as

(A) bleeding (B) creeping

(C) segregation (D) evaporation

159. The resistance of an aggregate to wear is known as

(A) impact value

(B) abrasion resistance

(C) shear resistance

(D) crushing resistance

160. 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

161. 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

162. 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

163. 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

164. 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

165. 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

166. The fineness of cement can be found out by sieve analysis using IS sieve number

(A) 20 (B) 10

(C) 9 (D) 6

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

167. The discharge through a V-notch varies
(A) proportional to head (H)
(B) inversely proportional to angle θ
(C) proportional to $H^{5/2}$
(D) inversely proportional to tan θ/2

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

169. 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) $S_p = \frac{eW}{G}$

170. Manometer is a device used for measuring
(A) Velocity (B) Pressure
(C) Density (D) Discharge

171. 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

172. 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

173. 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

174. 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

175. Typically, a hydroelectric plant will have following hydraulic machine :
(A) Hydraulic Turbine
(B) Hydraulic Pump
(C) Electric Motor
(D) None of the above

176. 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

177. The dimension for Angular velocity is
(A) T^2 (B) T^{-1}
(C) T^1 (D) T^{-2}

178. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

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

(A) m^4 (B) m^3

(C) m^2 (D) m

180. 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^2 (B) 157·59 m^2

(C) 165·36 m^2 (D) 170 m^2

181. 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

182. One brick thickness of wall is roughly equal to

(A) 10 cm (B) 15 cm

(C) 20 cm (D) 30 cm

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

(A) Petty work (B) Minor work

(C) Major work (D) Minor project

184. The density of cement is taken to be

(A) 1000 kg/m^3 (B) 1250 kg/m^3

(C) 1440 kg/m^3 (D) 1800 kg/m^3

185. 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

186. The multiplying constant for the tacheometer is, generally, kept as

(A) 100 (B) 20

(C) 40 (D) 60

187. 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

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

(A) $D\left\{\frac{A_0 + A_n}{2} + A_2 + A_4 + A_6 + \ldots A_{n-1}\right\}$

(B) $D\left\{\frac{A_1 + A_n}{2} + A_0 + A_1 + A_3 + \ldots A_{n-1}\right\}$

(C) $D\left\{\frac{A_0 + A_1}{2} + A_1 + A_3 + A_5 + \ldots A_{n-1}\right\}$

(D) $D\left\{\frac{A_0 + A_n}{2} + A_1 + A_2 + A_3 + A_4 + \ldots A_{n-1}\right\}$

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

189. 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) $I = Si / (1 + i)^{n+1}$

190. Mild steel used in RCC structures conforms to

(A) IS : 432 (B) IS : 1566

(C) IS : 1786 (D) IS : 2062

191. 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

192. Which of the following acts as retarder for the concrete ?

(A) Calcium chloride

(B) Calcium lignosulphonate

(C) Calcium stearate

(D) Aluminium powder

193. 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.

194. Strength based classification of bricks is made on the basis of

(A) IS : 3101 (B) IS : 3102

(C) IS : 3495 (D) IS : 3496

195. In paints, methylated spirit, naphtha and turpentine are used as

(A) Base (B) Binder

(C) Solvent (D) Extender

196. 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

197. Under heat and pressure, granite can transform into

(A) quartzite (B) marble

(C) slate (D) gneiss

198. 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

199. Quartzite and marble are by nature

(A) volcanic (B) plutonic

(C) sedimentary (D) metamorphic

200. Most accurate method of estimation is based on

(A) Building cost index estimate

(B) Plinth area estimate

(C) Detailed estimate

(D) Cube rate estimate

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

TEST (iii)

PART B : GENERAL ENGINEERING

(ELECTRICAL)

101. 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

102. 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

103. 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

104. The magnetic material used in permanent magnets is

(A) iron

(B) soft steel

(C) nickel

(D) hardened steel

105. Energy stored in an inductor is given by

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

(C) $\frac{1}{\sqrt{LI}}$ (D) $\frac{1}{2}LI^2$

106. 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

107. 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

108. 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

109. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

110. 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

111. 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

112. 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

113. The acceptable value of grounding resistance to domestic application is

(A) 0·1 Ω (B) 1 Ω

(C) 10 Ω (D) 100 Ω

114. Inside the earth pit, the earthing electrode should be placed

(A) vertical

(B) horizontal

(C) inclined at 45°

(D) inclined at any angle other than 45°

115. The domestic load that has UPF is

(A) Fan

(B) Mixer

(C) Tube

(D) Filament lamp

116. 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

117. Dielectric loss is proportional to

(A) $[\text{frequency}]^{1/2}$ (B) frequency

(C) frequency^2 (D) frequency^3

118. 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

119. The colour of the light given out by a sodium vapour discharge lamp is

(A) pink (B) bluish green

(C) yellow (D) blue

120. The transformer used in a welding set is

(A) step-up transformer

(B) step-down transformer

(C) constant current transformer

(D) booster transformer

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

121. The emf induced in a DC shunt generator is 230 V. The armature resistance is 0·1 Ω. If the armature current is 200 A, the terminal voltage will be

(A) 200 V (B) 210 V

(C) 230 V (D) 250 V

122. 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) $(V_1 - V_2) / V_1$

123. 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

124. 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

125. 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

126. A vacuum cleaner employs _____ motor.

(A) resistance split phase

(B) capacitor start

(C) shaded pole

(D) single phase series

127. 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

128. The commutator of a DC generator acts as

(A) an amplifier

(B) a rectifier

(C) a load

(D) a multiplier

129. Fleming's left hand rule is applicable to

(A) DC generator

(B) DC motor

(C) Alternator

(D) Transformer

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

130. 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

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

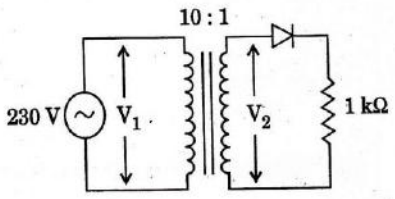
(A) 6 V, 1 mA

(B) 6 V, 2 mA

(C) 12 V, 1 mA

(D) 12 V, 2 mA

132. An AC supply of 230 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 V (B) 32·5 V

(C) 23·0 V (D) 14·54 V

133. 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

134. 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

135. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

136. 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

137. 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

138. 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

139. 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

140. The leakage resistance of a 50 km long cable is 1 MΩ. For a 100 km long cable it will be

(A) 0·5 MΩ (B) 2 MΩ

(C) 0·66 MΩ (D) None of these

141. 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^2' times

(D) reduce by '$1/n^2$' times

142. 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

143. 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

144. 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

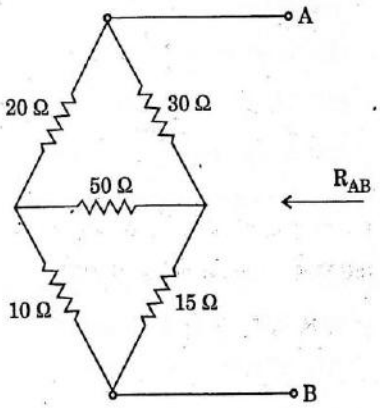
145. Which insulation is most widely used for covering wires/cables used in internal wiring ?

(A) Paper (B) Wood

(C) Glass (D) PVC

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

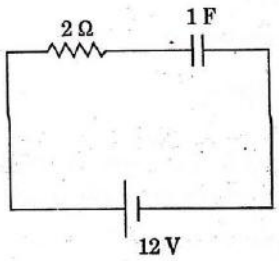
146. Find R_{AB} for the circuit shown in figure.



(A) 18 Ω (B) 30 Ω

(C) 45 Ω (D) 68 Ω

147. 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

148. 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

149. 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) $\frac{R}{\sqrt{LC}}$

150. 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

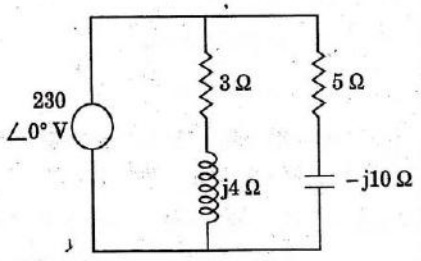
(D) supply frequency is decreased

151. A series circuit has R = 4 Ω, X_L = 12 Ω and X_C = 9 Ω 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

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



(A) 6·67 ℧ (B) 1·87 ℧

(C) 0·16 ℧ (D) 0·08 ℧

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

153. In electrodynamometer 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

154. 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

155. 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

156. 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) Electrodynamometer instrument

157. 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

158. The reactance of 1 farad capacitance when connected to a DC circuit is

(A) infinite. (B) 1 Ω

(C) 0·5 Ω (D) zero ohms

159. A supply voltage of 230 V, 50 Hz is fed to a residential building. Write down its equation for instantaneous value.

(A) 163 sin 314·16 t

(B) 230 sin 314·16 t

(C) 325 sin 314·16 t

(D) 361 sin 314·16 t

160. The AC bridge used for measurement of dielectric loss of capacitor is

(A) Anderson bridge

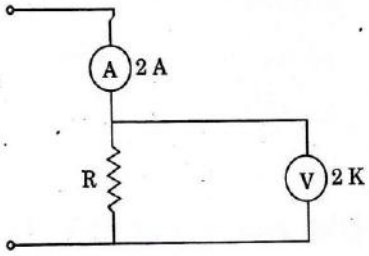
(B) Schering bridge

(C) Wien bridge

(D) Hay's bridge

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

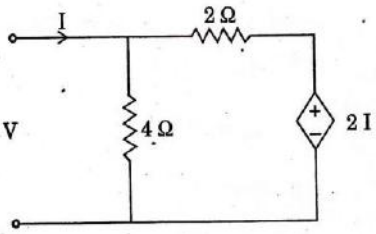
161. A resistance R is measured by ammeter-voltmeter method. The voltmeter reading is 200 V and its internal resistance is 2 K. If the ammeter reading is found to be 2 A, then value of R is



(A) 105·3 Ω (B) 100·0 Ω

(C) 95·3 Ω (D) 90·3 Ω

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



(A) 4/3 Ω (B) 8/3 Ω

(C) 4 Ω (D) 2 Ω

163. 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

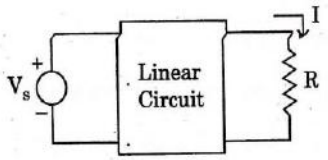
(D) first clockwise and then anticlockwise

164. For the linear circuit shown in figure,

when R = ∞, V = 20 V;

when R = 0, I = 4 A;

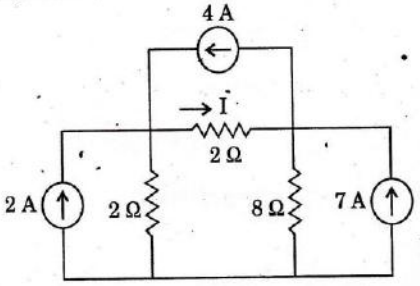
when R = 5 Ω, the current I is



(A) 1 A (B) 2 A

(C) 3 A (D) 4 A

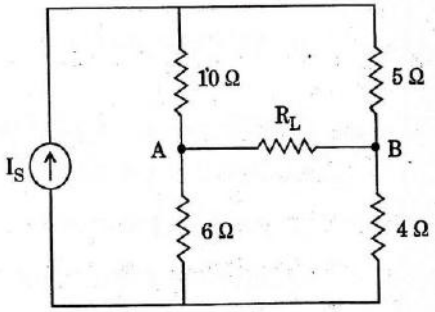
165. The current I in the circuit shown in the figure is



(A) −3·67 A (B) −1 A

(C) 4 A (D) 6 A

166. 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 Ω (B) 6·0 Ω

(C) 10·0 Ω (D) 15·0 Ω

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D

167. 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

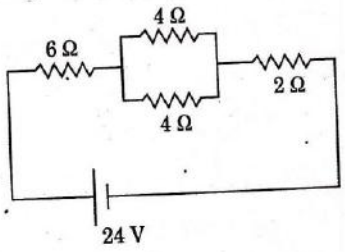
(A) 100 W bulb will be brighter than 200 W bulb

(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

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



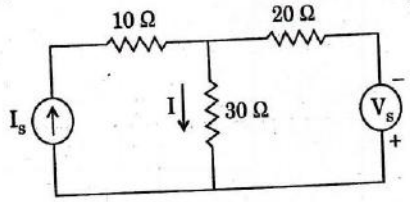
(A) increase very much

(B) decrease

(C) be zero

(D) increase very slightly

169. 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

170. The unit of volume resistivity is

(A) ohm-m^3/m^2

(B) ohm-m^2/m

(C) ohm-gram-m/gram

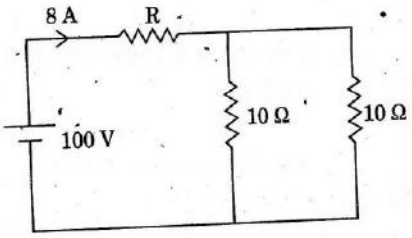
(D) ohm-m^4/m^3

171. 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

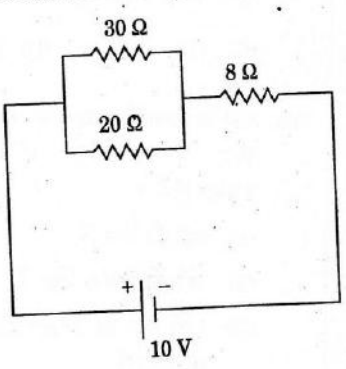
172. In the figure, the value of R is



(A) 2·5 Ω (B) 5·0 Ω

(C) 7·5 Ω (D) 10·0 Ω

173. Power consumed in the given circuit is



(A) 100 watts (B) 5 watts

(C) 20 watts (D) 40 watts

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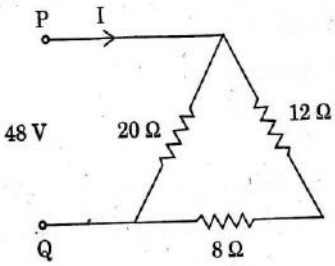
174. For the network shown in the figure, the value of current in 8 Ω resistor is



(A) 4·8 A (B) 2·4 A

(C) 1·5 A (D) 1·2 A

175. 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

176. 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

177. Tesla is same as .

(A) Weber/meter

(B) Weber/(meter)^2

(C) Farad/meter

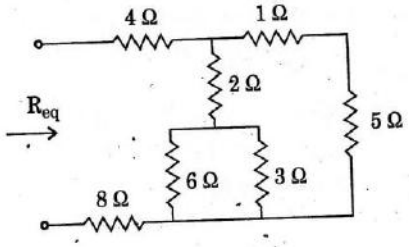
(D) Henry/(meter)^2

178. 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

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



(A) 14·4 Ω (B) 14·57 Ω

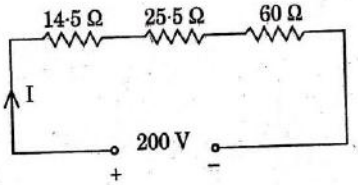
(C) 15·27 Ω (D) 15·88 Ω

180. The SI unit of conductivity is

(A) ohm-m (B) ohm/m

(C) mho-m (D) mho/m

181. Calculate the voltage drop across 14·5 Ω resistance.



(A) 14·5 V (B) 18 V

(C) 29 V (D) 30·5 V

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182. 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

183. 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

184. Damper winding in synchronous motors is used to

(A) suppress hunting

(B) improve power factor

(C) develop reluctance torque

(D) improve the efficiency

185. 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

186. 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

187. At starting, the current through the starting winding (I_s) of single phase induction motor

(A) lags 'V' by 90°

(B) leads 'V' by 90°

(C) is nearly in phase with 'V'

(D) leads 'V' by 75°

188. 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

189. A synchronous motor can be used as synchronous condenser when it is

(A) over excited

(B) over loaded

(C) under excited

(D) under loaded

190. 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

191. 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

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192. The multiplying power of the shunt of a milliammeter is 8. If the circuit current is 200 mA, then current through the meter is

(A) 25 mA (B) 200 mA

(C) 1600 mA (D) 3200 mA

193. 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

194. 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

195. A moving coil instrument has a resistance of 10 Ω and gives full scale deflection at 0·5 V potential difference across it. How can it be adapted to measure a current upto 100 A ?

(A) By connecting shunt resistance of 0·005 Ω across the meter

(B) By connecting shunt resistance of 0·05 Ω across the meter

(C) By connecting shunt resistance of 5 Ω across the meter

(D) By connecting shunt resistance of 10 Ω across the meter

196. 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

197. If K is the phase-to-phase voltage ratio, then the line-to-line voltage ratio in a 3-phase, Y – Δ transformer is

(A) K (B) $K/\sqrt{3}$

(C) $\sqrt{3}\,K$ (D) $\sqrt{3}/K$

198. 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

199. 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

200. A 4-pole, 3-phase induction motor runs at 1440 rpm on a 50 Hz supply. Find the slip speed.

(A) 2940 rpm (B) 1500 rpm

(C) 1440 rpm (D) 60 rpm

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TEST (iii)
PART C : GENERAL ENGINEERING (MECHANICAL)

101. Which law of motion (of Newton) gives the measure of force ?
(A) Newton's first law
(B) Newton's second law
(C) Newton's third law
(D) None of these

102. The shear stress at the centre of a circular shaft under torsion is
(A) maximum
(B) minimum
(C) zero
(D) unpredictable

103. The direction of frictional force acting on a body which can slide on a fixed surface is
(A) in the direction of motion
(B) normal to the direction of motion
(C) unpredictable
(D) opposite to the direction of motion

104. What strength of the material is to be considered for design of a ductile component under cyclic load ?
(A) Ultimate strength
(B) Yield strength
(C) Endurance strength
(D) Fracture strength

105. For any given power and permissible shear stress, the rotational speed of shaft and its diameter are correlated by the expression
(A) ND^3 = constant
(B) ND^2 = constant
(C) ND = constant
(D) $\sqrt{ND}$ = constant

106. The angle turned by a wheel while it starts from rest and accelerates at constant rate of 3 rad/s^2 for an interval of 20 sec is
(A) 900 rad (B) 600 rad
(C) 1200 rad (D) 300 rad

107. Stress due to change in temperature developed in a bar depends upon
(A) coefficient of thermal expansion
(B) thermal conductivity
(C) density
(D) Poisson's ratio

108. Strength of the beam depends on
(A) Bending moment
(B) Density
(C) Section modulus
(D) c.g. of the section

109. 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,
(A) 200, 100 (B) 300, 200
(C) 500, 400 (D) 1000, 900

110. The friction between objects that are stationary is called
(A) static friction
(B) rolling friction
(C) kinetic friction
(D) dynamic friction

111. Fatigue of a component is due to
(A) cyclic load
(B) static load
(C) constant heating
(D) collision

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

112. If V_i be the inlet absolute velocity to blades, V_b be the tangential blade velocity and α 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) $\frac{V_b}{V_i} = \frac{\cos^2 \alpha}{2}$

113. 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

114. 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

115. 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) $m C_p (T_1 + T_2)$

116. Morse test is conducted on

(A) vertical engines

(B) horizontal engines

(C) single cylinder engines

(D) multi cylinder engines

117. 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

118. Higher compression ratio in diesel engine results in

(A) lower temperature

(B) lower pressure

(C) same pressure

(D) higher pressure

119. What salts of calcium and magnesium cause temporary hardness of boiler feed water ?

(A) Chlorides (B) Bicarbonates

(C) Nitrates (D) Sulphites

120. Which of the following does ***not*** relate to steam engine ?

(A) Crank shaft

(B) Cross head

(C) Steam chest

(D) Steam separator

121. Self-ignition temperature of diesel as compared to petrol

(A) is higher

(B) is lower

(C) is same

(D) varies considerably

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122. The binding material used in cemented carbide tools is

(A) Nickel (B) Cobalt

(C) Chromium (D) Carbon

123. 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

124. 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

125. Density of water is maximum at

(A) 0°C (B) 4 K

(C) 4°C (D) 100°C

126. 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

127. The tool material which has high heat and wear resistance is

(A) Ceramics

(B) Cemented carbide

(C) Carbon steels

(D) Medium alloy steel

128. 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

129. Cereals are added to the moulding sand to improve the following :

(A) Porosity

(B) Green strength

(C) Hot strength

(D) Edge hardness

130. Plastic toys are usually produced by using

(A) shell moulding

(B) green sand moulding

(C) plaster moulding

(D) injection moulding

131. Generally used fuel gas in gas welding is

(A) N_2 (B) CO_2

(C) C_2H_2 (D) He

132. 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

133. Which one of the following is an example of solid state welding ?

(A) Gas welding

(B) Arc welding

(C) Thermit welding

(D) Forge welding

134. The shape and size of sand grains affects the following property :

(A) Adhesiveness

(B) Porosity

(C) Refractoriness

(D) Strength

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

135. 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 N/m^2 (B) 1·24 N/m^2

(C) 0·56 N/m^2 (D) 5·6 N/m^2

136. Froude's Number relates to

(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

137. 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

138. 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

139. Mercury does ***not*** wet the glass surface. This property of mercury is due to

(A) adhesion (B) cohesion

(C) surface tension (D) viscosity

140. 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

141. 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

142. 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

143. 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

144. 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

145. 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) $\frac{4fL}{d} \cdot \frac{v^2}{2g}$ (B) $\frac{4fL}{\pi d^2} \cdot \frac{v^2}{2g}$

(C) $\frac{v^2}{2g}$ (D) $\frac{4fL}{\pi d} \cdot \frac{v^2}{2g}$

146. 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

147. 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

148. The discharge of a liquid of kinematic viscosity 4×10^{-2} m^2/s through a 80 mm diameter pipe, is $3200\pi \times 10^{-4}$ m^3/s. The flow is

(A) laminar (B) turbulent

(C) transition (D) critical

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149. *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. $S_{gen} \geq 0$ 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

150. The boiling and freezing points for water are marked on a temperature scale P as 130°P and –20°P respectively. What will be the reading on this scale corresponding to 60°C on Celsius scale ?

(A) 60°P (B) 70°P

(C) 90°P (D) 110°P

151. In a reaction turbine, the heat drop in fixed blade is 8 kJ/kg and total heat drop per stage is 20 kJ/kg. The degree of reaction is

(A) 40% (B) 60%

(C) 66·7% (D) 80%

152. A closed balloon containing 10 kg of helium receives 5 kJ/kg of heat. During this process, the volume of the balloon slowly increases by 0·2 m^3 at constant pressure of 100 kPa. The change in internal energy, in kJ, is

(A) 10 (B) 20

(C) 30 (D) 70

153. 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) $P_A V_A = P_B V_B$

154. 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) $P_2 < P_1$

155. The food compartment of a refrigerator is maintained at 4°C by removing heat from it at a rate of 360 kJ/min. If the required power input to the refrigerator is 2 kW, the COP of the refrigerator is

(A) 2·0 (B) 1/3

(C) 0·5 (D) 3·0

156. 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

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157. A ball is dropped vertically downwards, it hits the floor with a velocity of 9 m/s and bounces to a distance of 1·2 m. Coefficient of restitution between the floor and the ball is

(A) 0·54 (B) zero

(C) 1 (D) 0·27

158. 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

159. If equal and opposite forces applied to a body tend to elongate it, then the stress produced is

(A) tensile stress

(B) bending stress

(C) compressive stress

(D) shear stress

160. What type of contact occurs during meshing of helical gears ?

(A) Point (B) Line

(C) Area (D) Volume

161. 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

162. The contact between cam and follower is to form a

(A) lower pair

(B) higher pair

(C) sliding pair

(D) rolling pair

163. Which of the following is antifriction bearing ?

(A) Needle bearing

(B) Pedestal bearing

(C) Collar bearing

(D) Hydrostatic bearing

164. 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

165. 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

166. 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 be

(A) 10/3 (B) 3/10

(C) 1/3 (D) 1/9

167. 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

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

168. 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

169. 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

170. 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) $2\cos^2\alpha / (1 + 2\cos^2\alpha)$

171. In an isothermal process, the internal energy

(A) always increases

(B) always decreases

(C) increases or decreases

(D) remains constant

172. Which of the following is a boiler mounting ?

(A) Safety valve

(B) Economizer

(C) Superheater

(D) Feed pump

173. 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

174. 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

175. 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

176. The drag coefficient is defined as

(A) $(F_D/A) / (\rho v_0^2)$

(B) $(F_D/A) / (2\rho v_0^2)$

(C) $F_D / (0{\cdot}5\rho v_0^2)$

(D) $F_D / (0{\cdot}5\rho v_0^2 A)$

177. 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

178. 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

179. Octane number of iso-octane is

(A) 50 (B) 70

(C) 0 (D) 100

180. The silencer of an IC engine

(A) reduces noise

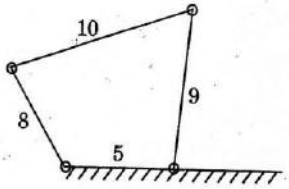
(B) decreases brake specific fuel consumption

(C) increases brake specific fuel consumption

(D) has no effect on efficiency

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

181. 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

182. A slider sliding at 10 cm/s on a link which is rotating at 60 rpm, is subjected to Coriolis acceleration of magnitude, in cm^2/s,

(A) 20π (B) 10π

(C) 40π (D) 80π

183. 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 θ for which delivered torque is equal to mean torque for a single cycle are

(A) 0°, 180°, 360°

(B) 90°, 270°, 360°

(C) 90°, 270°, 180°

(D) 0°, 270°, 360°

184. The shearing strength of a rivet is 50 N/mm^2. If the diameter of the rivet is doubled, then its shearing strength will be

(A) 100 N/mm^2 (B) 200 N/mm^2

(C) 50 N/mm^2 (D) 300 N/mm^2

185. A differential gear in an automobile is a

(A) simple gear train

(B) epicyclic gear train

(C) compound gear train

(D) speed reducer

186. 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

187. The crank shaft turning in a journal bearing forms a

(A) turning pair

(B) sliding pair

(C) rolling pair

(D) helical pair

188. 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

189. Bevel gears are used to transmit rotary motion between two shafts whose axes are

(A) Perpendicular

(B) Parallel

(C) Non-intersecting

(D) Non-coplanar

SPACE FOR ROUGH WORK / रफ़ कार्य के लिए स्थान

190. The coefficient of discharge (c_d) of an orifice varies with

(A) Weber number

(B) Mach number

(C) Reynold's number

(D) Froude number

191. 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) $Re^{-0.25}$

192. 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) $\frac{N\sqrt{Q}}{H^{5/4}}$

193. Pressure intensity inside the water droplets is (where σ – 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) $p = \frac{\sigma}{d}$

194. 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) $Q = \frac{2}{3} c_d L\sqrt{2g}\ (H - H_1)^{3/2}$

195. Low specific speed of a turbine implies that it is

(A) Propeller turbine

(B) Francis turbine

(C) Impulse turbine

(D) Kaplan turbine

196. 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

197. 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

198. Navier – Stokes equations are associated with

(A) Buoyancy

(B) Supersonic flow

(C) Vortex flow

(D) Viscous flow

199. A hydrometer is used to determine

(A) relative humidity

(B) surface tension of liquids

(C) specific gravity of liquids

(D) viscosity of liquids

200. 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

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