RSAE/2025/M

Series : **A**

GENERAL STUDIES AND MECHANICAL ENGINEERING

प्रश्न-पुस्तिका क्रम संख्या Question Booklet Sl. No.
3551109

अनुक्रमांक
Roll No.

परीक्षार्थी अपना अनुक्रमांक दिए गए खानों में लिखें।
Candidate should write his/her Roll No. in the given boxes.

मुद्रित पृष्ठों की संख्या/No. of Printed Pages : 32

कुल प्रश्नों की संख्या/Total No. of Questions : 150

समय/Time : 3 घण्टे/Three Hours

पूर्णांक/Total Marks : 450

परीक्षार्थियों के लिए निर्देश

1. परीक्षा प्रारम्भ होने के तुरन्त बाद, आप इस प्रश्न-पुस्तिका की पड़ताल अवश्य कर लें, कि इसमें कोई बिना छपा, फटा या छूटा हुआ पृष्ठ अथवा प्रश्नांश, आदि न हो। यदि ऐसा है, तो वीक्षक से तत्काल संपर्क कर प्रश्न-पुस्तिका बदल लेवें।
2. यह प्रश्न-पुस्तिका सम्मिलित रूप से दो खंडों में विभाजित हैं। खंड - 'अ' तथा खंड - 'ब'।
3. खंड - 'अ' के प्रश्न सामान्य अध्ययन से संबंधित है, जिसमें कुल 50 प्रश्न है, सभी प्रश्न हिन्दी तथा अंग्रेजी भाषा में हैं। सभी प्रश्न अनिवार्य हैं।
4. खंड - 'ब' संबंधित विषय से है। जिसमें कुल 100 प्रश्न है। सभी प्रश्न केवल अंग्रेजी भाषा में हैं। सभी प्रश्न अनिवार्य हैं।
5. सभी प्रश्नों के अंक समान हैं। प्रत्येक सही उत्तर के लिए 03 अंक प्रदान किए जायेंगे। ऋणात्मक मूल्यांकन का प्रावधान है। प्रत्येक गलत उत्तर के लिए 01 अंक काटा जायेगा।
6. प्रदत्त उत्तर-पत्र (ओ.एम.आर.) पर दिए गए निर्देशों को ध्यानपूर्वक पढ़ें तथा अपने उत्तर तदनुसार अंकित करें।
7. कृपया उत्तर-पत्र (ओ.एम.आर.) पर निर्धारित स्थानों पर आवश्यक प्रविष्टियाँ करें, अन्यत्र स्थानों पर नहीं।
8. परीक्षार्थी सभी रफ़ कार्य प्रश्न-पुस्तिका के अंतिम पृष्ठ पर निर्धारित स्थान पर ही करें, अन्यत्र कहीं नहीं तथा उत्तर-पत्र (ओ.एम.आर.) पर भी नहीं।
9. यदि खंड - 'अ' के किसी प्रश्न में किसी प्रकार की कोई मुद्रण या तथ्यात्मक प्रकार की त्रुटि हो, तो प्रश्न के हिन्दी तथा अंग्रेजी रूपांतरों में से हिन्दी रूपांतर को मानक माना जाएगा।

INSTRUCTIONS TO THE CANDIDATES

1. Immediately after the commencement of the examination, you should check that this Question Booklet does not have any unprinted or torn or missing pages or items etc. If so, immediately contact the Invigilator and get it replaced with another Question Booklet.
2. This combined Question Booklet is divided in two Sections. Section – 'A' and Section – 'B'.
3. Section – 'A' contains **50** questions of General Studies. **All** Questions are in Hindi and English Language. **All** questions are compulsory.
4. Section – 'B' contains **100** questions of Concerned Subject. **All** Questions are only in English Language. **All** questions are compulsory.
5. **All** questions carry equal marks. **Three** marks for each correct answer. There is provision of **Negative Markings**. For each wrong answer, **one** mark will be deducted.
6. Read carefully the instructions given on the Answer Sheet (OMR) supplied and indicate your answers accordingly.
7. Kindly make necessary entries on the Answer Sheet (OMR) at the places indicated and nowhere else.
8. Examinee should do all rough work on the space meant for rough work on page given at the end of the Question Booklet and nowhere else, not even on the Answer Sheet (OMR).
9. If there is any sort of mistake either of printing or of factual nature in any question of Section – 'A', then out of the Hindi and English versions of the question, the Hindi version will be treated as standard.

खंड – अ

सामान्य अध्ययन

1. मालवा पठार की दक्षिणी सीमा किस भू-आकृतिक विशेषता को परिभाषित करती है ?

   (A) विन्ध्यन श्रेणी

   (B) सतपुड़ा श्रेणी

   (C) अरावली श्रेणी

   (D) दकन पठार

2. मध्य प्रदेश के बुन्देलखंड क्षेत्र की सबसे महत्वपूर्ण भू-आकृतिक विशेषता है

   (A) अवशिष्ट पहाड़ियाँ

   (B) अपरदित सतहें

   (C) जलोढ़ मैदान

   (D) शंक्वाकार पहाड़ियाँ

3. काली मिट्टी में किस तत्व की मात्रा कम होती है ?

   (A) लोहे और चूने

   (B) फास्फोरस और नाइट्रोजन

   (C) कार्बन और हाइड्रोजन

   (D) सल्फर और जिंक

4. मध्य प्रदेश में उष्णआर्द्र पतझड़ वन किन जिलों में पाये जाते हैं ?

   (A) मुरैना, शिवपुरी, ग्वालियर

   (B) बालाघाट, मंडला, शहडोल

   (C) पन्ना, टीकमगढ़, छतरपुर

   (D) मंदसौर, धार, भिंड

5. राजघाट बांध किस नदी पर बनाया गया है ?

   (A) नर्मदा

   (B) बेतवा

   (C) सिंध

   (D) चम्बल

6. बैगा जनजाति मध्य प्रदेश के निम्न में से किस जिले में निवास करती है ?

   (A) झाबुआ

   (B) छिंदवाड़ा

   (C) होशंगाबाद

   (D) डिंडोरी

SECTION – A
GENERAL STUDIES

1. The Southern Boundary of the Malwa Plateau is defined by which geomorphological feature ?

   (A) Vindhyan range

   (B) Satpura range

   (C) Aravali range

   (D) Deccan plateau

2. The most significant geomorphological feature of the Bundelkhand region in Madhya Pradesh

   (A) Residual hills

   (B) Erosion surfaces

   (C) Alluvial plains

   (D) Conical hills

3. Which element is less in black soil ?

   (A) Iron and lime

   (B) Phosphorus and nitrogen

   (C) Carbon and hydrogen

   (D) Sulfur and zinc

4. In which districts are tropical moist deciduous forests found in Madhya Pradesh ?

   (A) Murena, Shivpuri, Gwalior

   (B) Balaghat, Mandala, Shahdol

   (C) Panna, Tikamgarh, Chattarpur

   (D) Mandsaur, Dhar, Bhind

5. On which river is the Rajghat Dam built ?

   (A) Narmada

   (B) Betwa

   (C) Sindh

   (D) Chambal

6. In which of the following districts of Madhya Pradesh does the Baiga tribe reside ?

   (A) Jhabua

   (B) Chindwara

   (C) Hoshangabad

   (D) Dindori

7. निम्न में से कौन-सी मध्य प्रदेश की विशेष पिछड़ी जनजाति है ?

(A) सहरिया

(B) गोंड

(C) भील

(D) कोल

8. कोरकू जनजाति मुख्य रूप से पाई जाती है

(A) झाबुआ

(B) बैतूल

(C) शहडोल

(D) गुना

9. 2011 की जनगणना के अनुसार, मध्य प्रदेश की कुल जनसंख्या में अनुसूचित जनजाति की संख्या का प्रतिशत था

(A) 21.09

(B) 22.01

(C) 21.20

(D) 22.50

10. सहरिया जनजाति मुख्य रूप से निम्न में से किस जिले में निवास करती है ?

(A) झाबुआ

(B) खरगोन

(C) शिवपुरी

(D) खण्डवा

11. निम्नलिखित में से कौन-सी ई-गवर्नेंस परियोजना, मध्य प्रदेश सरकार द्वारा शुरू की गई थी ?

(A) लोक मित्र

(B) नई दिशा

(C) ज्ञानदूत

(D) जन मित्र

12. डेटा भंडारण की वह विधि, जिसमें लचीली सेल्युलाइड जैसी सामग्री का एक लूप शामिल होता है, जो कि डेटा को विद्युत चुम्बकीय आवेश के रूप में संग्रहीत कर सकता है, उसे कहा जाता है

(A) टेप भंडारण (TS)

(B) फ्लॉपी डिस्क (FD)

(C) ऑप्टिकल डिस्क (CD)

(D) हार्ड डिस्क (HD)

13. सीपीयू के संबंध में, कंप्यूटर मेमोरी को पदानुक्रम के अनुसार ऐसे व्यवस्थित किया जाता है

(A) प्राथमिक मेमोरी → द्वितीयक मेमोरी → प्रोसेसर रजिस्टर → कैश मेमोरी

(B) प्रोसेसर रजिस्टर → कैश मेमोरी → प्राथमिक मेमोरी → द्वितीयक मेमोरी

(C) कैश मेमोरी → प्रोसेसर रजिस्टर → प्राथमिक मेमोरी → द्वितीयक मेमोरी

(D) प्राथमिक मेमोरी → कैश मेमोरी → द्वितीयक मेमोरी → प्रोसेसर रजिस्टर

7. Which of the following is the special backward tribes of Madhya Pradesh ?

(A) Saharia

(B) Gond

(C) Bhil

(D) Kol

8. The Korku tribe is mainly found in

(A) Jhabua

(B) Betul

(C) Shahdol

(D) Guna

9. According to the 2011 Census, the percentage of Scheduled Tribe population in the total population of Madhya Pradesh was

(A) 21.09

(B) 22.01

(C) 21.20

(D) 22.50

10. Saharia tribe mainly resides in which of the following districts ?

(A) Jhabua

(B) Khargone

(C) Shivpuri

(D) Khandwa

11. Which of the following e-governance project was started by the Government of Madhya Pradesh ?

(A) Lok Mitra

(B) Nai Disha

(C) Gyandoot

(D) Jan Mitra

12. Method of data storage consisting of a loop of flexible celluloid like material that can store data in the form of electro-magnetic charges, is known as

(A) Tape Storage (TS)

(B) Floppy Disks (FD)

(C) Optical Disks (CD)

(D) Hard Disks (HD)

13. With respect to CPU, the computer memory hierarchy is organised as follows

(A) Primary Memory → Secondary Memory → Processor Registers → Cache Memory

(B) Processor Registers → Cache Memory → Primary Memory → Secondary Memory

(C) Cache Memory → Processor Registers → Primary Memory → Secondary Memory

(D) Primary Memory → Cache Memory → Secondary Memory → Processor Registers

14. निम्नलिखित में से कौन-सा 'मशीन लर्निंग' का एक प्रकार नहीं है ?

(A) सुपरवाइज्ड लर्निंग

(B) अनसुपरवाइज्ड लर्निंग

(C) रीफर्बिश्ड लर्निंग

(D) रीइनफोर्समेंट लर्निंग

15. कृत्रिम इंटेलिजेंस (ए.आई.) में प्रगति के साथ, एक नई चुनौतीपूर्ण घटना सामने आई है, जो कि उन ऑडियो, वीडियो या छवियों को इंगित करती है, जो कि ए.आई. द्वारा उत्पन्न होती हैं, जबकि वे वास्तविक दुनियाँ में कभी अस्तित्व में नहीं थीं । इसे कहा जाता है

(A) डीप फेक (Deep fake)

(B) के - एनॉनिमिटी (K – anonymity)

(C) एल - डाइवर्सिटी (L – diversity)

(D) बायसस इन ए. आई. (Biases in AI)

16. किस पुराविद ने हथनोरा में मानव खोपड़ी जीवाश्म की खोज की थी ?

(A) मनोरंजन घोष

(B) अरुण सोनकिया

(C) वी. एस. वाकणकर

(D) के. डी. वाजपेयी

17. नागवंश के संस्थापक वृषनाग ने किस स्थान पर अपने वंश की स्थापना की थी ?

(A) उज्जैनी

(B) ग्वालियर

(C) विदिशा

(D) जबलपुर

18. प्रसिद्ध कवि और नाटककार राजशेखर किस कलचुरि राजा का आश्रय प्राप्त था ?

(A) युवराज देव

(B) कोकल्ल

(C) बालहर्ष

(D) कर्ण

19. किस मुस्लिम सेनापति ने परमार शासक महलकदेव को परास्त उज्जैन पर अधिकार कर लिया था ?

(A) मीर ख़्वाजा

(B) आईन-उल-मुल्क

(C) हुशंगा शाह

(D) खान मुहम्मद शाह

20. निमाड़ के फारूकी वंश का संस्थापक कौन था ?

(A) मलिक राजा

(B) दिलावर खान

(C) नासिर खान

(D) मुहम्मद शाह

14. Which of the following is **not** a type of 'Machine Learning' ?

(A) Supervised Learning

(B) Unsupervised Learning

(C) Refurbished Learning

(D) Reinforcement Learning

15. With the advancements in Artificial Intelligence (AI) a new challenging phenomenon has emerged which refer to those audio, video or images that are generated by AI and it never actually existed in the real world. This is known as

(A) Deep fake

(B) K – anonymity

(C) L – diversity

(D) Biases in AI

16. Which archaeologist discovered the human skull fossil from Hathnora ?

(A) Manoranjan Ghosh

(B) Arun Sonkia

(C) V. S. Wakankar

(D) K. D. Vajpai

17. At which place did Vrishnag, the founder of the Naga dynasty, established his dynasty ?

(A) Ujjaini

(B) Gwalior

(C) Vidisha

(D) Jabalpur

18. The famous poet and dramatist Rajashekhar received the patronage of which Kalchuri king ?

(A) Yuvraj dev

(B) Kokalla

(C) Balharsh

(D) Karna

19. Which Muslim commander defeated the Parmar ruler Mahalakdev and captured Ujjain ?

(A) Mir Khwaza

(B) Ain-ul-Mulk

(C) Husang Shah

(D) Khan Mohammad Shah

20. Who was the founder of the Faruki dynasty of Nimar ?

(A) Malik Raja

(B) Dilawar Khan

(C) Nasir Khan

(D) Mohammad Shah

21. साहित्य में 2025 का नोबेल पुरस्कार किसे मिला है ?

(A) एनी एर्नो

(B) हान कांग

(C) लास्जलो क्रास्जनाहोरकाई

(D) लुईस ग्लूक

22. कौन बिना अतिरिक्त ऑक्सीजन के माउंट एवरेस्ट से सफलतापूर्वक स्की करते हुए नीचे उतरने वाला पहला व्यक्ति बना ?

(A) रेनहोल्ड मेस्नर

(B) अंद्रज़ेज बर्गिएल

(C) बार्तेक बर्गिएल

(D) डोनाल्ड टस्क

23. 2030 के कॉमनवेल्थ गेम्स भारत के किस शहर में आयोजित होने की घोषणा की गई है ?

(A) नई दिल्ली

(B) मुंबई

(C) अहमदाबाद

(D) चेन्नई

24. "सरग-नरक यां छे" नामक उपन्यास के लेखक कौन है ?

(A) माखनलाल चतुर्वेदी

(B) बालकवि बैरागी

(C) राम नारायण उपाध्याय

(D) जगदीश चन्द्र जोशीला

25. भारत का पहला प्रधानमंत्री मेगा इंटीग्रेटेड टेक्सटाइल रीज़न एंड अपैरल (पीएम मित्र) पार्क मध्य प्रदेश के किस जिले में स्थापित किया जा रहा है ?

(A) इन्दौर

(B) खरगोन

(C) उज्जैन

(D) धार

26. मध्य प्रदेश, उत्तर प्रदेश और बिहार की सम्मिलित अन्तर्राज्यीय परियोजना कौन-सी है ?

(A) हरसी परियोजना

(B) बाणसागर परियोजना

(C) राजघाट परियोजना

(D) सिंध परियोजना

21. Who has been awarded the Nobel Prize in Literature 2025 ?

(A) Annie Ernaux

(B) Han Kang

(C) Laszlo Krasznahorkai

(D) Louise Gluck

22. Who became the first person to successfully ski down Mount Everest without supplemental oxygen ?

(A) Reinhold Messner

(B) Andrzej Bargiel

(C) Bartek Bargiel

(D) Donald Tusk

23. In which Indian city has it been announced that the 2030 Commonwealth Games will be held ?

(A) New Delhi

(B) Mumbai

(C) Ahmedabad

(D) Chennai

24. Who is the author of the novel "Sarag-Narak Yan Che" ?

(A) Makhanlal Chaturvedi

(B) Balkavi Bairagi

(C) Ram Narayan Upadhyay

(D) Jagdish Chandra Joshila

25. In which district of Madhya Pradesh is India's first Pradhan Mantri Mega Integrated Textile Region and Apparel (PM MITRA) Park being established ?

(A) Indore

(B) Khargone

(C) Ujjain

(D) Dhar

26. Which is the combined inter-state project of Madhya Pradesh, Uttar Pradesh and Bihar ?

(A) Harsi Project

(B) Bansagar Project

(C) Rajghat Project

(D) Sindh Project

27. चाँदनी ताप विद्युत केन्द्र की स्थापना कहाँ की गई है ?

(A) छिन्दवाड़ा

(B) देवास

(C) अमलाई

(D) नेपानगर

28. अमरकण्टक ताप विद्युत गृह किस क्षेत्र में स्थित है ?

(A) बैढ़न

(B) बुढ़ार

(C) चचाई

(D) पाथर खेडा

29. 2011 की जनगणना के अनुसार मध्य प्रदेश में नगरीय जनसंख्या का प्रतिशत क्या है ?

(A) 21 से 23 प्रतिशत

(B) 24 से 26 प्रतिशत

(C) 27 से 29 प्रतिशत

(D) 30 से 32 प्रतिशत

30. निम्न में से मध्य प्रदेश का कौन-सा जिला उत्तर प्रदेश तथा छत्तीसगढ़ दोनों के साथ अपनी सीमाएँ साझा करता है ?

(A) अनुपपुर

(B) सिंगरौली

(C) रीवा

(D) शहडोल

31. मध्य प्रदेश पंचायत उपबंध (अनुसूचित क्षेत्रों पर विस्तार) नियम 2022 (पेसा एक्ट) के किस नियम के अन्तर्गत ग्राम सभा को कपट द्वारा अन्तरित अनुसूचित जनजाति की भूमि की वापसी का अधिकार है ?

(A) नियम – 19

(B) नियम – 20

(C) नियम – 21

(D) नियम – 22

32. राज्य स्तरीय कोल जनजाति विकास अभिकरण जिसका नाम परिवर्तित कर कोल जनजाति विकास प्राधिकरण कर दिया गया है, इसका गठन किस वर्ष में किया गया ?

(A) वर्ष 2009

(B) वर्ष 2010

(C) वर्ष 2011

(D) वर्ष 2012

33. प्रधानमंत्री जनजाति न्याय महाअभियान (पी.एम.जनमन-2) के अन्तर्गत वर्ष 2024-25 में मध्य प्रदेश के कितने जिलों को लाभान्वित किया गया ?

(A) 20

(B) 24

(C) 28

(D) 30

27. Where was Chandni thermal power station established ?

(A) Chhindwara

(B) Dewas

(C) Amalai

(D) Nepanagar

28. In which area is Amarkantak thermal power plant located ?

(A) Baidhan

(B) Budhar

(C) Chachai

(D) Pather Kheda

29. What is the percentage of urban population in Madhya Pradesh according to the 2011 Census ?

(A) 21 to 23 percentage

(B) 24 to 26 percentage

(C) 27 to 29 percentage

(D) 30 to 32 percentage

30. Which of the following districts of Madhya Pradesh shares its borders with Uttar Pradesh and Chhattisgarh both ?

(A) Anuppur

(B) Singrauli

(C) Rewa

(D) Shahdol

31. Under which Rule of the Madhya Pradesh Panchayat Provisions (Extension to Scheduled Areas) Rules 2022 (PESA Act), the Gram Sabha has the right to return the land of Scheduled Tribes transferred by fraud ?

(A) Rule – 19

(B) Rule – 20

(C) Rule – 21

(D) Rule – 22

32. In which year was the State Level Kol Tribe Development Agency whose name has been changed to Kol Tribe Development Authority formed ?

(A) Year 2009

(B) Year 2010

(C) Year 2011

(D) Year 2012

33. How many districts of Madhya Pradesh were benefited under the Pradhan Mantri Jan Jati Nyay Mahaabhiyan (P.M. Janman-2) in the year 2024-25 ?

(A) 20

(B) 24

(C) 28

(D) 30

34. अनुसूचित जाति और अनुसूचित जनजाति (अत्याचार निवारण) अधिनियम 1989 की किस धारा में लोक सेवक को जो अनुसूचित जाति या अनुसूचित जनजाति का सदस्य नहीं है, को कर्त्तव्य की उपेक्षा के लिए दण्डित करने का प्रावधान है ?

(A) धारा – 2

(B) धारा – 3

(C) धारा – 4

(D) धारा – 5

35. जनजाति मंत्रणा (सलाहकार) परिषद में अध्यक्ष, उपाध्यक्ष एवं सदस्यों की कुल संख्या कितनी निर्धारित है ?

(A) 10

(B) 15

(C) 20

(D) 25

36. मध्य प्रदेश वन विकास निगम की स्थापना कब हुई थी ?

(A) 24 जुलाई 1975

(B) 15 अगस्त 1984

(C) 27 अगस्त 2008

(D) 10 जुलाई 1975

37. मध्य प्रदेश में जैविक (ऑर्गेनिक) संसाधनों के बेहतर उपयोग के उद्देश्य से सन् 2001 में किस विभाग का गठन किया गया ?

(A) मध्य प्रदेश राज्य जैव–विविधता बोर्ड

(B) मध्य प्रदेश जैव–प्रौद्योगिकी परिषद

(C) मध्य प्रदेश जैव–विविधता विभाग

(D) मध्य प्रदेश जैव–विविधता मंत्रालय

38. मध्य प्रदेश में वनों का विभाजन किस आधार पर किया गया है ?

(A) उष्णकटिबंध के आधार पर

(B) वनस्पति और भौगोलिक क्षेत्र के आधार पर

(C) वनमंडल के आधार पर

(D) वन ग्रामों के आधार पर

39. विपणन वर्ष 2024-25 में किस फसल का उपार्जन न्यूनतम समर्थन मूल्य पर प्राइस सपोर्ट स्कीम के अन्तर्गत पहली बार किया जा रहा है ?

(A) चना

(B) सोयाबीन

(C) मसूर

(D) सरसों

40. मध्य प्रदेश का सकल राज्य घरेलू उत्पाद (GSDP) वित्तीय वर्ष 2024-25 में वर्तमान मूल्यों पर कितना रहा ?

(A) 13,53,809 करोड़ रुपए

(B) 14,00,000 करोड़ रुपए

(C) 15,03,395 करोड़ रुपए

(D) 16,00,000 करोड़ रुपए

34. Which Section of the Scheduled Castes and Scheduled Tribes (Prevention of Atrocities) Act 1989 provides for punishment for dereliction of duty by a public servant who is not a member of a Scheduled Caste or Scheduled Tribe ?

(A) Section – 2

(B) Section – 3

(C) Section – 4

(D) Section – 5

35. What is the total number of Chairperson, Vice Chairperson and Members prescribed in the Tribal Advisory Council ?

(A) 10

(B) 15

(C) 20

(D) 25

36. Madhya Pradesh Forest Development Corporation was established in

(A) 24 July 1975

(B) 15 August 1984

(C) 27 August 2008

(D) 10 July 1975

37. Which department was constituted in the year 2001 for the purpose of better utilisation of biological (organic) resources in Madhya Pradesh ?

(A) Madhya Pradesh State Biodiversity Board

(B) Madhya Pradesh Council of Biotechnology

(C) Madhya Pradesh Biodiversity Department

(D) Madhya Pradesh Biodiversity Ministry

38. On what basis was the division of forests done in Madhya Pradesh ?

(A) Based on the tropics

(B) Based on vegetation and geographical region

(C) Based on the forest division

(D) On the basis of forest villages

39. In the marketing year of 2024-25 which crop is included in price support scheme first time at minimum support price of earning value ?

(A) Chickpea (Gram)

(B) Soyabean

(C) Lentil

(D) Mustard

40. What was the Gross State Domestic Product (GSDP) of Madhya Pradesh at current prices for the financial year 2024-25 ?

(A) Rs. 13,53,809 crore

(B) Rs. 14,00,000 crore

(C) Rs. 15,03,395 crore

(D) Rs. 16,00,000 crore

41. फरवरी 1930 को जबलपुर से "दैनिक लोकमत" किसके संपादन में प्रारम्भ किया गया ?

(A) माधव अगरकर

(B) सेठ गोविन्द दास

(C) डी. पी. मिश्र

(D) गिरिजा शंकर

42. आर्य समाज की स्थापना भोपाल में किस नाम से 1890 में की गयी ?

(A) जन सभा

(B) लोकसभा

(C) जागृति सभा

(D) मित्र सभा

43. "पेपर्स रिलेटिंग टु दि एबोरीजनल ट्राइब्स ऑफ द सेन्ट्रल प्रोविन्सेज" किसकी रचना है ?

(A) रसेल

(B) स्टीफेन हिसलोप

(C) हीरालाल

(D) आर. बी. फूट

44. मध्य प्रदेश की कौन-सी जनजाति मुख्यत: मेघनाथ को आराध्य के रूप में पूजती हैं ?

(A) कोरकू

(B) गोंड

(C) बैगा

(D) उरांव

45. भोपाल राज्य प्रजा मंडल की स्थापना कब की गयी ?

(A) 1942

(B) 1944

(C) 1946

(D) 1938

46. मध्य प्रदेश में उप-लोकायुक्त का कार्यकाल है

(A) 3 वर्ष

(B) 4 वर्ष

(C) 5 वर्ष

(D) 6 वर्ष

47. निम्नलिखित में से मध्य प्रदेश के किस मुख्य सचिव का कार्यकाल सबसे लंबा था ?

(A) एच. एस. कामथ

(B) आर. पी. नरोन्हा

(C) बी. के. दुबे

(D) के. एस. शर्मा

48. 73 वें संविधान संशोधन अधिनियम के तहत पंचायती राज लागू करने वाला देश का पहला राज्य कौन-सा था ?

(A) गुजरात

(B) महाराष्ट्र

(C) उत्तर प्रदेश

(D) मध्य प्रदेश

49. निम्नलिखित में से कौन राज्य सूचना आयोग की चयन समिति का हिस्सा **नहीं** होता ?

(A) मुख्यमंत्री

(B) विधानसभा का नेता प्रतिपक्ष

(C) मुख्यमंत्री द्वारा मनोनीत कैबिनेट सदस्य

(D) उच्च न्यायालय के मुख्य न्यायाधीश

50. निम्नलिखित में से 'मध्य प्रदेश गोवंश वध प्रतिषेध अधिनियम 2004' के अनुसार कौन "गोवंश" की परिभाषा में शामिल है/हैं ?

(A) केवल गाय

(B) गाय और बछड़े

(C) गाय, साँड, बैल और बछड़े

(D) गाय, साँड और बछड़े

41. Under whose editorship was "Dainik Lokmat" started from Jabalpur in February 1930 ?
(A) Madhav Agarkar
(B) Seth Govind Das
(C) D. P. Mishra
(D) Girija Shankar

42. Under what name was Arya Samaj established in Bhopal in 1890 ?
(A) Jan Sabha
(B) Lok Sabha
(C) Jagriti Sabha
(D) Mitra Sabha

43. Who is the author of "Papers Relating to the Aboriginal Tribes of the Central Provinces" ?
(A) Russel
(B) Stephen Hislop
(C) Hiralal
(D) R. B. Foote

44. Which tribe of Madhya Pradesh mainly worship Meghnath as their deity ?
(A) Korku
(B) Gond
(C) Baiga
(D) Oraon

45. When was Bhopal State Praja Mandal established ?
(A) 1942
(B) 1944
(C) 1946
(D) 1938

46. The tenure of Up-Lokayukt in Madhya Pradesh is
(A) 3 years
(B) 4 years
(C) 5 years
(D) 6 years

47. Who among the following was the longest serving Chief Secretary of Madhya Pradesh ?
(A) H. S. Kamath
(B) R. P. Naronha
(C) B. K. Dubey
(D) K. S. Sharma

48. Which was the first State in India to implement Panchayati Raj as per 73rd Constitutional Amendment Act ?
(A) Gujarat
(B) Maharashtra
(C) Uttar Pradesh
(D) Madhya Pradesh

49. Which of the following is **not** a part of the committee to select State Information Commissions ?
(A) Chief Minister
(B) Leader of Opposition Legislative Assembly
(C) Cabinet Member nominated by CM
(D) Chief Justice of High Court

50. According to 'Madhya Pradesh Govansh Vadh Pratishedh Adhiniyam 2004', which of the following is/are included under definition of "Cow progeny" ?
(A) Cows only
(B) Cows and Calves
(C) Cows, Bulls, Bullocks and Calves
(D) Cows, Bulls and Calves

SECTION – B
MECHANICAL ENGINEERING

51. _____ of assignment provides us with an efficient method of finding optimal solution without having to make a direct comparison of every solution.

(A) Simplex method

(B) North-West Corner method

(C) MODI method

(D) Hungarian method

52. The success of any Entrepreneurship Development Programmes (EDP) is evaluated in terms of

(A) number of trainee joined the training program

(B) number of trainee launched their venture after the completion of training program

(C) number of trainee actually participated in all the exercises of EDP

(D) none of the above

53. Which of the following is **not** a fund raised from external sources ?

(A) Deposits or borrowings from relatives and friends

(B) Credit facilities from commercial banks

(C) Loan taken on personal assets

(D) Term loans from financial institutions

54. Identify the liability of a company from the following balance sheet entries.

(A) Capital work-in-progress

(B) Investment property

(C) Inventories

(D) Government grants

55. Current ratio is calculated as

(A) $\frac{\text{Current assets}}{\text{Current liabilities}}$

(B) $1 - \frac{\text{Current assets}}{\text{Current liabilities}}$

(C) $\frac{\text{Current liabilities}}{\text{Current assets}}$

(D) $1 - \frac{\text{Current liabilities}}{\text{Current assets}}$

56. Cold working produces the following effects

i. The workpiece metal gets strain hardened.

ii. Surface finish is reduced.

iii. Better dimensional accuracy.

iv. Strength of the metal decreased.

Which of the above statements are correct ?

(A) i and ii

(B) i and iii

(C) i and iv

(D) i, ii and iii

57. A 25 mm thick metal slab is rolled using a rolling mill with 500 mm diameter rolls. If the coefficient of friction between the roll and the slab is 0.12, what is the maximum possible reduction in thickness ?

(A) 1.8 mm

(B) 2.4 mm

(C) 3.6 mm

(D) 4.8 mm

58. Two spherical casting made of same material with diameters of 2 cm and 4 cm are cast in green sand molds. If the smaller casting solidifies in 2 min., what is the expected solidification time for the larger casting ?

(A) 16 min.

(B) 8 min.

(C) 4 min.

(D) 2 min.

59. Continuous chips are most likely to form during machining of

(A) Ductile material at high speed

(B) Ductile material at low speed

(C) Brittle material at high speed

(D) Brittle material at low speed

60. In a single point turning operation of steel with carbide tool, the Taylor's tool life equation parameters are found to be n = 0.5 and C = 540 m/min. If the cutting speed is reduced to half its original value, the tool life will increase by how many times ?

(A) 1/2

(B) 2

(C) 4

(D) 8

61. Which of the following is **not** a main geometric modelling technique/way ?

(A) Wire frame modelling

(B) Surface modelling

(C) Critical modelling

(D) Solid modelling

62. Under CAD, surface modelling technique NURBS stands for

(A) Non-Uniform Rotational B-Splines

(B) Non-Uniform Rational B-Splines

(C) Non-Uniform Rational Bullion Shapes

(D) Numerical Universal Rotational Bullion Shapes

63. Spindle axis of a CNC machine is generally configured in part programming as

(A) X-axis

(B) Y-axis

(C) Z-axis

(D) A-axis

64. In robotics_____ is a device or tool connected to a robot arm. It could be a tool such as gripper, a vacuum pump, tweezers, scalpel, blowtorch etc.

(A) an End Effector

(B) an Elbow

(C) a Shoulder

(D) a Wrist

65. A robot capable of continuous path control can most effectively be used in which of an application ?

(A) Arc Welding

(B) Spot Welding

(C) Pick-n-Place

(D) Loading and Unloading

66. Cryogenics for metals is the study of the behaviour of matter at temperatures

(A) Below –200°C

(B) In between –200°C to +200°C

(C) Above +200°C

(D) None of these

67. Normalising treatment for steel (as per American Society of Material Testing) involves

(A) Heating above the upper transformation range and heating in air

(B) Heating upto the upper transformation range and cooling through air flow

(C) Heating above the upper transformation range and cooling in still air at room temperature

(D) None of these

68. While a forming process, the glass can be face the heat treatment

(A) Hardening

(B) Nitriding

(C) Normalizing

(D) Tempering

69. Visco-elastic behaviour is common in

(A) Plastic

(B) Rubber

(C) Crystalline materials

(D) Non-crystalline materials

70. The austenitizing temperature for hypoeutectoid steel lies usually in between

(A) 723°C and 910°C

(B) 770°C and 1130°C

(C) 768°C and 1130°C

(D) 770°C and 1400°C

71. Pitot tube is used to measure the

(A) Discharge

(B) Temperature at a point

(C) Velocity of flow at a point

(D) Pressure at a point

72. In a pipe flow, the head due to friction is 6 m. If the power transmitted through the pipe has to be the maximum, then the total head at the inlet of the pipe will have to be maintained at

(A) 36 m

(B) 30 m

(C) 24 m

(D) 18 m

73. Euler number is **not** important for the following flow situations.

(A) Discharge through orifices, mouthpieces and sluices

(B) Pressure rise due to sudden closure of valves

(C) Flow through pipes

(D) Pressure gradient not exists

74. Specific speed of an impulse turbine (Pelton wheel) ranges from

(A) 12 to 70

(B) 80 to 400

(C) 300 to 1000

(D) 1000 to 1200

75. Unit speed is the speed of a turbine when it is working

(A) Under a unit head and develops unit power

(B) Under a unit head and discharge one m^3/sec

(C) Under a unit head

(D) None of the above

76. The correct sequence of steps involved in method study is

(A) Select – Record – Develop – Examine – Define – Install – Maintain

(B) Select – Record – Examine – Develop – Define – Install – Maintain

(C) Select – Record – Examine – Define – Develop – Maintain – Install

(D) Select – Record – Examine – Define – Develop – Install – Maintain

77. Which of the following layout is suitable when few pieces of identical heavy products are to be manufactured and when the assembly consist of large number of heavy parts ?

(A) Product layout
(B) Process layout
(C) Combination layout
(D) Fixed position layout

78. A company wants to purchase 5000 kg raw material for producing item per year. The cost of placing an order is Rs. 50/- and cost of carrying inventory is 20% of inventories investment. The purchase price is Rs. 10/- per kg. Calculate optimum lot size.

(A) 50 kg/order
(B) 500 kg/order
(C) 5000 kg/order
(D) 5050 kg/order

79. Select the correct statement about ABC analysis.

(A) For 'A' items, the ordering quantities, reorder point and minimum stock level should be revised more frequently
(B) 'C' items are ordered in small quantities
(C) 'B' items involve maximum investment and stock level should be revised daily
(D) Both option (B) and (C) are correct

80. The time by which an activity can be delayed without affecting the project completion time is called

(A) Free float
(B) Independent float
(C) Interfering float
(D) Total float

81. When steel is heated above its critical temperature under heat treatment process, _____ is formed.

(A) Ferrite
(B) Pearlite
(C) Austenite
(D) Cementite

82. Least count for the micrometer is

(A) 0.01mm
(B) 0.02mm
(C) 0.001mm
(D) 0.002mm

83. CLADDING is a process of type

(A) Organic coating
(B) Inorganic coating
(C) Metallic coating
(D) None of these

84. _____ is an example of organic coating.

(A) Electroplating

(B) Vitreous coating

(C) Cementation

(D) Enamel

85. _____ is a composite of cellulose and lignin.

(A) Concrete

(B) Adhesive

(C) Wood

(D) Glass

86. The transition from laminar to turbulent flow does **not** depend on

(A) Surface geometry

(B) Surface roughness

(C) Surface temperature

(D) Surface tension

87. Radiosity is defined as the total radiation energy leaving a surface

(A) Per unit time only

(B) Per unit area only

(C) Per unit time and per unit area

(D) Per unit volume

88. In heat exchangers, the fouling factor depends on

(A) Viscosity of the fluids

(B) Velocity of the fluids

(C) Density of the fluids

(D) Surface tension of the fluids

89. For specified inlet and outlet temperatures, the LMTD for a counter flow heat exchanger is

(A) Always smaller than that for a parallel flow heat exchanger

(B) Always greater than that for a parallel flow heat exchanger

(C) Same that for a parallel flow heat exchanger

(D) None of the above

90. For a specified NTU and capacity ratio $C = \frac{C_{min}}{C_{max}}$, following type of heat exchanger has the highest effectiveness

(A) Parallel-flow

(B) Counter-flow

(C) Cross-flow with both fluids unmixed

(D) Cross-flow with both fluids mixed

91. In evacuated tube collectors, to improve the performance of a flat plate collector

(A) Both conduction and convection losses are suppressed

(B) Only conduction losses suppressed

(C) Only convection losses are suppressed

(D) Only radiation losses are suppressed

92. A storage tank capacity 900 L is at temperature 30°C. Calculate the temperature of the tank after 2 hours, if the rate of charging from the source is 100 W. Given the rate of heat removal by the load is zero and ambient temperature is 12°C. The area of storage tank is 10 m^2 and overall heat transfer coefficient between liquid in tank and ambient is 6 W/m^2.

(A) 48.1°C

(B) 38.1°C

(C) 28.1°C

(D) 21.1°C

93. The operating temperature of which of the following fuel cell type is very high typically 800°C-1000°C.

(A) Proton exchange membrane fuel cells

(B) Solid oxide fuel cells

(C) Alkaline fuel cells

(D) Direct methanol fuel cells

94. The main drawback of electromagnetic energy storage is that it requires

(A) A very bulky inductor coil

(B) A very strong magnetic field

(C) A very strong electromagnetic field

(D) A super conducting material

95. Which type of electric vehicle uses a combination of an electric motor and a traditional internal combustion engine, where the electric motor is the primary source of propulsion ?

(A) Battery Electric Vehicle (BEV)

(B) Plug-in Hybrid Electric Vehicle (PHEV)

(C) Hybrid Electric Vehicle (HEV)

(D) Fuel Cell Electric Vehicle (FCEV)

96. The center of gravity of an object is

(A) Always located at the geometric centroid of the object

(B) Dependent on the shape of the object but not its mass-distribution

(C) Always at the highest point of the object

(D) The point where the total weight of the object can be considered to act

97. Mohr's circle is a graphical representation of

(A) Moment-curvature relationship

(B) Principal strains and shear strains

(C) Principal stresses and shear stresses

(D) Strain energy distribution in a body

98. Which of the following is a type of beam subjected to roller support at both ends and free to rotate ?

(A) Cantilever beam

(B) Simply supported beam

(C) Fixed beam

(D) Overhanging beam

99. According to the Euler's theory of column, the equivalent length of a column fixed at both ends is

(A) $l/2$

(B) $2l$

(C) $l/\sqrt{2}$

(D) $3l$

100. Which of the following is an example of a higher pair in a mechanism ?

(A) A revolute pair

(B) A sliding pair

(C) A prismatic pair

(D) A cam and follower pair

101. With increase in pressure, the bulk modulus of elasticity of a fluid

(A) Decreases

(B) Increases

(C) Remains constant

(D) None of the above

102. Surface tension is caused by the force of _____ between the liquid particles at the free surface.

(A) Cohesion

(B) Adhesion

(C) Both (A) and (B)

(D) None of the above

103. Fluid statics deals with

(A) Viscous and pressure forces

(B) Viscous and gravity forces

(C) Gravity and pressure forces

(D) Surface tension and gravity force

104. In fluid mechanics, the continuity equation is a mathematical statement based on the principle of

(A) Conservation of momentum

(B) Conservation of mass

(C) Conservation of energy

(D) None of the above

105. Which of the following assumption is **not** made in the derivation of Bernoulli's equation ?

(A) The fluid is ideal and incompressible

(B) The flow is steady

(C) The flow is irrotational

(D) The fluid is compressible

106. In sensors, the sensitivity can be expressed as

(A) The difference between maximum and minimum values of the applied parameter that can be measured

(B) Degree of reproducibility of the measurements

(C) The smallest change that can be detected by a sensor

(D) The change in output of the sensor per unit change in the parameter being measured

107. Which of the following electric drive is mainly used for simple pick and place mechanism having low cost and less or negligible controllability ?

(A) Stepper motor

(B) DC Servos

(C) AC Servos

(D) No electric drive can be used

108. "Computers ability to learn without being explicitly programmed", is termed as

(A) Machine Learning (ML)

(B) Motor Learning

(C) CAM Learning

(D) CIM Learning

109. A typical neural network have three general layers ; these are

(A) AI, Deep Learning and Output Layers

(B) Input, Hybrid and Output Layers

(C) Input, Hidden and Output Layers

(D) AI, ML and Hybrid Layers

110. A three axis milling machine for generating 3D-contour shape in a workpiece is an example of

(A) Point to point control system

(B) Straight line control system

(C) Continuous path control system

(D) Logical control system

111. The tooth profile of a gear must satisfy the law of gearing in order to ensure

(A) The teeth remain in contact throughout the mesh

(B) A high contact ratio

(C) Low friction between the gear teeth

(D) Uniform load distribution across the gear teeth

112. In the slider crank mechanism, when the crank rotates through a full revolution, the slider moves through

(A) A straight line

(B) A circular arc

(C) A complete sinusoidal path

(D) A reciprocating motion

113. When balancing reciprocating masses in a engine, the forces generated by the piston and connecting rod need to be balanced to reduce

(A) Torsional vibrations

(B) Harmonic distortion

(C) Axial vibrations

(D) None of these

114. Match the following :

a.	Gyroscopic couple	1. The axis of rotation of a spinning body shifting in response to an external torque
b.	Gyroscopic stability	2. A rotating body to resist changes to its orientation due to angular momentum
c.	Gyroscopic effect	3. The torque generated by a rotating body when an external force tries to tilt or change its direction
d.	Precession	4. The application of gyroscopic principles in maintaining stability in vehicles like airplanes or ships

(A) a – 1, b – 2, c – 3, d – 4

(B) a – 4, b – 3, c – 1, d – 2

(C) a – 3, b – 4, c – 2, d – 1

(D) a – 2, b – 1, c – 4, d – 3

115. Which of the following is **not** a practical application of gyroscopic precession ?

(A) Maintaining stability of ships during turns

(B) Keeping an aircraft's orientation during flight

(C) Stabilizing spinning wheels in vehicles

(D) Storing the energy of rotating body

116. What is the concentration ratio for a two dimensional geometry if the acceptance angle is 30° ?

(A) 2.0

(B) 3.86

(C) 0.96

(D) 0.86

117. Calculate fill factor for a solar cell which has following parameters

$V_{oc} = 0.21$ V, $I_{sc} = -5.5$ mA,
$V_{max} = 0.125$ V, $I_{max} = -3$ mA

Where;

$V_{oc} \rightarrow$ Open Circuit Voltage

$I_{sc} \rightarrow$ Short Circuit Current

$V_{max} \rightarrow$ Voltage at Max Power

$I_{max} \rightarrow$ Current at Max Power

(A) 3.08

(B) 1.09

(C) 0.91

(D) 0.32

118. A biomass gasifier is used to run a CI engine. The engine operates in a dual fuel made with 80% diesel replacement. The gasifier engine system produces 350 kW of power. Calculate the biomass feeding rate to the gasifier, if the efficiency of the engine is 35% and calorific value of biomass is 16800 kJ/kg. Given that the efficiency of the gasifier is 0.75.

(A) 88 kg/h

(B) 128 kg/h

(C) 228.6 kg/h

(D) 328.6 kg/h

119. Consider the following statements regarding instruments for measuring solar radiation.

1. Pyranometer is an instrument to measure either global or diffuse radiation.
2. Pyroheliometer measures either global or diffuse radiation.
3. Shading ring is used in pyroheliometer to measure diffuse radiation.

Which of these statement is/are correct ?

(A) 1 only

(B) 2 only

(C) 2 and 3

(D) 1 and 3

120. For a flat plate solar collector, top loss coefficient is 6.6 $W/m^2{}^\circ C$. Calculate the overall loss coefficient using following data. Back insulation thickness = 45 mm; insulation thermal conductivity = 0.04 $W/m^\circ C$; collector bank length = 8m ; collector bank width = 2.5 m, collector thickness = 80 mm, edge insulation thickness = 20 mm.

(A) 4.7 $W/m^2{}^\circ C$
(B) 5.7 $W/m^2{}^\circ C$
(C) 6.7 $W/m^2{}^\circ C$
(D) 7.7 $W/m^2{}^\circ C$

121. The advanced machining process that essentially requires a vacuum is

(A) Electron Beam Machining
(B) Electro Chemical Machining
(C) Electro Discharge Machining
(D) Laser Beam Machining

122. The working principle of electrochemical machining is based on

(A) Faraday's laws
(B) Kirchhoff's laws
(C) Joule's laws
(D) Ohm's laws

123. The average height from a mean line of all the absolute values of the surface profile ordinates is called the

(A) R_a value
(B) R_m value
(C) R_z value
(D) RMS value

124. In metrology, CMM is preferred over conventional gauges when

(A) Only linear dimensions are needed
(B) Measurements are only in the horizontal planes
(C) Measurements are only in the vertical planes
(D) Complex 3D profiles need to be measured

125. A hole of diameter $20^{+0.20}_{+0.00}$ mm and a shaft of diameter $20^{+0.10}_{-0.10}$ mm when assembled would yield

(A) Clearance fit
(B) Interference fit
(C) Transition fit
(D) None of these

126. Equation of soderberg line is where σ_m and σ_a are mean stress and stress amplitude respectively. Further, s_{yt}, s_{ut}, s_e are yield strength, ultimate tensile strength and endurance limit stress of the component respectively

(A) $\sigma_m/s_{yt} + \sigma_a/s_e = 1$
(B) $\sigma_m/s_{ut} + \sigma_a/s_e = 1$
(C) $\sigma_m/s_e + \sigma_a/s_{yt} = 1$
(D) $\sigma_m/s_e + \sigma_a/s_{ut} = 1$

127. A single cover butt joint is made by 8 rivets. Each rivet has 4 mm diameter. What will be the shear area ?

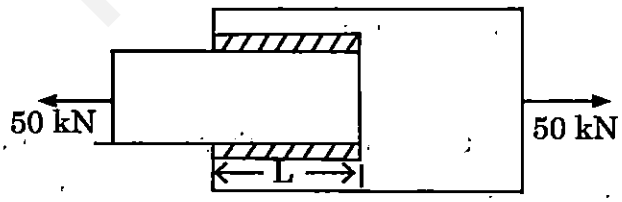
(A) 16π

(B) 20π

(C) 32π

(D) 40π

128. A steel plate, 100 mm wide and 10 mm thick is welded to another steel plate by means of double parallel fillet welds as shown in figure. The plates are subjected to a static tensile force of 50 kN. Determine the permissible shear stress in the weld if the length of the welds is 40 mm.



(A) 80.40 N/mm^2

(B) 88.40 N/mm^2

(C) 92.40 N/mm^2

(D) None of the above

129. A pinion with 25 teeth and rotating at 1200 rpm drives a gear which rotates at 200 rpm. The module is 4 mm. Calculate the centre distance between the gears.

(A) 300 mm

(B) 350 mm

(C) 400 mm

(D) 450 mm

130. A pair of parallel helical gears consists of a 20 teeth pinion meshing with a 40 teeth gear. The helix angle is 25° and normal pressure angle is 20°. The normal module is 3 mm. If the pinion tooth is experiencing the tangential load around 1150 N then the radial load will be

(A) 450 N

(B) 490 N

(C) 461.83 N

(D) 491.83 N

131. What is the effect of increasing the pressure ratio $\left(r_p = \frac{P_{max}}{P_{min}}\right)$ in the simple Brayton cycle ?

(A) Decreases thermal efficiency

(B) Increases thermal efficiency

(C) Has no effect

(D) Causes cycle in stability

132. Which types of equations should be used to analyze the Rankine cycle ?

(A) Closed system equations

(B) Chemical equilibrium equations

(C) Transient flow equations

(D) Steady-flow system equations

133. Even with a stoichiometric or lean mixture some Carbon monoxide is still produced due to

(A) High engine speed

(B) High air intake pressure

(C) Poor mixing

(D) Excessive fuel atomization

134. Which of the following factors contribute to longer ignition delay during early injection ?

(A) High pressure and temperature
(B) Low pressure and temperature
(C) Rich-air fuel mixture
(D) Faster combustion rate

135. For a cylindrical combustion chamber, the dominant acoustic frequency f(Hz) is given by the following equation

Where c = sound speed, n = wave mode eigen value, b = cylinder diameter

(A) $f = \frac{cn}{\pi b}$

(B) $f = \frac{\pi c}{nb}$

(C) $f = \frac{\pi b}{cn}$

(D) $f = \frac{cb}{\pi n}$

136. Which of the following refrigerants is non-flammable ?

(A) R 113

(B) R 152

(C) R 290

(D) R 717

137. The temperature to which moist air must be cooled at constant pressure before condensation of moisture takes place is called the
(A) Dew point temperature
(B) Wet bulb temperature
(C) Dry bulb temperature
(D) Degree of saturation

138. In a psychrometric chart (w-t chart) which psychrometric property is shown along the abscissa ?
(A) Specific humidity
(B) Dry-bulb temperature
(C) Wet-bulb temperature
(D) Relative humidity

139. The capacity of a refrigerator is 600 tons when working between −5°C and + 20°C. The mass of ice produced within 24 hours when water is supplied at 10°C is
(A) 8.58 kg/sec.
(B) 7.85 kg/sec.
(C) 5.85 kg/sec.
(D) 7.58 kg/sec.

140. The amount of heat transferred through a rectangular cross sectional area of fin made of metal (K = 150 W/m°C) with following dimensions; thickness = 5 mm, width = 1 m and height = 10 cm, is
(A) 186.97 Watts
(B) 159.76 Watts
(C) 179.67 Watts
(D) 186.67 Watts

141. Bending moment and torsional moment experienced by a shaft are 1360 kN-mm and 382 kN-mm respectively. The permissible shear stress of the shaft is 95 N/mm^2. The diameter of the shaft will be

(A) 30.30 mm

(B) 36.30 mm

(C) 42.30 mm

(D) 48.30 mm

142. For ball bearings, the fatigue life L measured in number of revolutions is 540 million revolutions for the radial load of 20 kN. The load (in kN) for a life of one million revolutions is

(A) 142.586 kN

(B) 146.685 kN

(C) 158.465 kN

(D) 162.865 kN

143. Wire diameter and mean coil diameter of a helical spring are 7 mm and 42 mm respectively. Then the Wahl factor for the spring will be

(A) 1.3725

(B) 1.5225

(C) 1.2525

(D) 1.4525

144. A plate clutch consists of one pair of contacting surfaces. The inner and outer diameters of the friction disk are 100 and 200 mm respectively. The coefficient of friction is 0.2 and the permissible intensity of pressure is 0.5 N/mm^2. Assuming uniform wear theory, operating force on the clutch will be

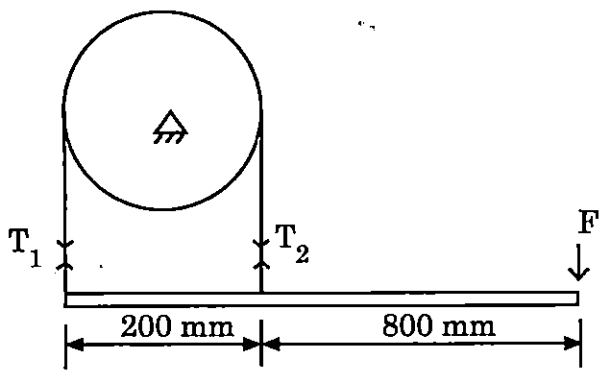
(A) 7053.98 N

(B) 7853.98 N

(C) 8653.98 N

(D) None of the above

145. A band brake shown in figure below has a coefficient of friction 0.35 and the band can take a maximum force of 2 kN. The maximum braking force that can be safely applied is



(A) 120.20 N

(B) 125.20 N

(C) 133.20 N

(D) 140.20 N

146. In a steady-flow process, which of the following quantities must be constant across the control surface ?

(A) Mass flow rate and energy flow rate

(B) Velocity and volume only

(C) Temperature and pressure only

(D) Density and viscosity

147. A key limitation of the first law of thermodynamics is that it

(A) Violates conservation of mass

(B) Does not apply to closed systems

(C) Cannot quantify energy exchanges

(D) Does not predict the feasibility of a spontaneous process proceeding in a certain direction

148. Which of the following is an incorrect pairing of a property type and its example ?

(A) Intensive property – Pressure

(B) Extensive property – Mass

(C) Intensive property – Density

(D) Extensive – Temperature property

149. The 'dead state' of a finite system in a useful work-producing process is reached when the systems

(A) Pressure is higher than the surroundings pressure

(B) Pressure and temperature become equal to the surroundings pressure and temperature

(C) Temperature is lower than the surrounding temperature

(D) Volume has become maximum

150. What is equivalence of the Kelvin-Planck and Clausius-statements ?

(A) They describe different physical laws

(B) They apply only to open systems

(C) They contradict each other

(D) Violation of one implies the violation of the other and vice versa

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