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JECRE/GS/2025

(PAPER—I)

Question Booklet Number

Series : a

Time : 2 Hours **Maximum Marks : 150**

ROLL NO.

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1. Had I known the meeting was today, I _____ my schedule accordingly.

[A] had rearranged

[B] would have rearranged

[C] would rearrange

[D] will have rearranged

2. Fill in the blank with the best phrasal verb : "The new policy aims to _____ inefficiencies without disrupting daily operations."

[A] fizzle out

[B] drone on

[C] shell out

[D] weed out

3. Choose the word that best fits "Her remarks were so _____ that even critics found themselves nodding along".

[A] trenchant

[B] obtuse

[C] diffident

[D] capricious

4. Which of the following pairings is ***correct***?

[A] To take something with a grain of salt — to accept without question

[B] Par for the course — something unexpectedly good

[C] To throw in the towel — to give up

[D] Run-of-the-mill — exceptionally rare

5. Choose the ***correct*** option.

"It is high time the board _____ decisive action on sustainability."

[A] takes

[B] would take

[C] had taken

[D] took

6. Select the sentence that best matches

"to hold someone to account".

[A] We praised her for her efforts, regardless of the outcomes

[B] They ensured he answered for the delays and corrected the process

[C] He promised to come through, but no one followed up

[D] She allowed the team to take ownership without oversight

7. She _____ working in this office since 2016.

[A] was

[B] is

[C] has been

[D] had been

8. Choose the best option.

"The report is replete _____ examples that illustrate the trend."

[A] for

[B] with

[C] by

[D] of

9. Choose the ***correct*** option.

I _____ him for a long time.

[A] did not met

[B] do not meet

[C] have not met

[D] had not met

10. Which of the following passive constructions is ***correct*** for the given sentence?

"The committee approved the proposal yesterday."

[A] The proposal was approved by the committee yesterday

[B] The proposal is approved by the committee yesterday

[C] The proposal has been approved by the committee yesterday

[D] The proposal got approved by the committee yesterday

11. *The Story of My Experiments with Truth* _____ by Mahatma Gandhi.

[A] had been written

[B] have been written

[C] has been written

[D] was written

12. A _____ of sheep was seen near the river.

[A] herd

[B] group

[C] flock

[D] bunch

13. Choose the best active version of the passive sentence :

"The results will be announced by the host at noon."

[A] The results will announce the host at noon

[B] The host announced the results at noon

[C] The host announces the results at noon

[D] The host will announce the results at noon

14. We should keep this matter _____ until the official announcement.

[A] in mind

[B] on fire

[C] by heart

[D] under the wraps

15. Identify the ***correct*** passive form of

"They are building a new bridge."

[A] A new bridge is being built by them

[B] A new bridge was being built by them

[C] A new bridge is built by them

[D] A new bridge has been built by them

16. There is no use crying over _____.

[A] lost time

[B] broken glass

[C] spilt milk

[D] fallen leaves

17. Select the active counterpart of

"Mistakes have been made." (No agent specified)

[A] Someone made mistakes

[B] People make mistakes

[C] Mistakes are made by people

[D] Someone has made mistakes

18. Match the following synonym pairs.

Word	**Synonym**
(a) Happy	*(i)* Strenuous
(b) Fast	*(ii)* Accelerated
(c) Difficult	*(iii)* Ecstatic
(d) Begin	*(iv)* Embark

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(i)*	*(ii)*	*(iii)*	*(iv)*
[B]	*(iii)*	*(ii)*	*(i)*	*(iv)*
[C]	*(i)*	*(iii)*	*(iv)*	*(ii)*
[D]	*(ii)*	*(iii)*	*(i)*	*(iv)*

19. Which of the following words given in the options can be used to fill the blank space in the sentence to convey the same meaning?

"The _____ sunset painted the sky in oranges."

[A] gorgeous / stunning / splendid

[B] lovely / meritorious / lucrative

[C] good / elegant / brisk

[D] complex / crucial / enraged

20. Which of the following situations best explains 'turn a blind eye'?

[A] Closing one's eye due to pain

[B] Ignoring something wrong intentionally

[C] Looking at something closely

[D] Playing blindfold

21. Which of the following word sets has been spelt ***correctly***?

[A] Denger, piecefully, warehouse, genious

[B] Danger, peacefully, warehouse, genius

[C] Danger, piecefully, warehouse, genious

[D] Danger, peacefully, warehouse, genious

22. Which of the following options has a combination of synonymous words?

[A] Originate, dejected, launch

[B] Trigger, initiate, kick off

[C] Embark, set out, sorrowful

[D] Launch, commence, brilliant

23. Choose the words having the same or nearly the same meaning as 'splendour'.

[A] Magnificence, grandeur, opulence

[B] Glory, modestly, opulence

[C] Elegance, majesty, timidly

[D] Luxury, pomp, reserve

24. Which of the following set of words is considered to be the synonym of 'prompt'?

[A] Punctual, sluggish, immediate

[B] Sluggish, immediate, timely

[C] Immediate, timely, punctual

[D] Timely, punctual, sluggish

25. In the sentence, "they went to the fair", the 'fair' refers to

[A] justice

[B] beauty

[C] exhibition

[D] weather

26. Arrange the parts to form a clear sentence :

(i) on the table

(ii) she placed

(iii) the red book

(iv) carefully

[A] *(iii)—(ii)—(iv)—(i)*

[B] *(iv)—(ii)—(iii)—(i)*

[C] *(ii)—(iv)—(i)—(iii)*

[D] *(ii)—(iii)—(i)—(iv)*

27. Identify the error in the following sentence :

"Each of the students were given their assignments before the bell rang."

Which of the following corrections best fixes the error?

[A] Change 'before' to 'until'

[B] Change 'were' to 'was'

[C] Change 'Each' to 'All'

[D] Change 'their' to 'his or her'

28. Spot the error :

"Neither the manager nor the assistants was aware that the reports were missing."

Which of the following is the best correction?

[A] Insert a comma after 'assistants'

[B] Change 'assistants' to 'assistant'

[C] Change 'was' to 'were'

[D] Change 'were' to 'was'

29. The proverb 'action speaks louder than words' teaches us the value of

[A] silence

[B] good speech

[C] public speaking

[D] practical deeds

30. Complete the proverb :
As you sow, so _____ you reap.

[A] may

[B] might

[C] will

[D] shall

31. 'Rome was not built in a day' means

[A] Rome is very old

[B] Construction requires planning

[C] Great achievements take time

[D] history is important

32. The shopkeeper sold three _____ bananas for ₹150.

[A] dozens

[B] dozen

[C] dozen of

[D] dozens of

33. Find the wrongly spelt words in the sentence to convey proper meaning.

"The roads and bridge projects play a vital role in developing urban infrastructure but face challenges such as innsufficient funding, poor planning, and week coordination among stateholders."

[A] Challenges, innsufficient, stateholders

[B] Week, innsufficient, stateholders

[C] Coordination, stateholders, infrastructure

[D] Innsufficient, stateholders, infrastructure

34. Arunachal Pradesh is one of the most biodiverse and _____ in India.

[A] forest State

[B] forested State

[C] forested States

[D] forest States

35. Which Global Summit in November 2025 focused on accelerating climate finance for adaptation and loss-and-damage support?

[A] G20 Leaders' Summit in Rio de Janeiro

[B] COP29 in Baku

[C] UN Climate Action Summit in New York

[D] COP 30 in Belém

36. In December 2025, which regional conflict saw a temporary humanitarian pause to allow aid convoys wider access to civilians?

[A] Ukraine's Eastern front

[B] Nagorno-Karabakh

[C] Ethiopia's Tigray region

[D] Israel-Gaza conflict

37. Which major economy announced a coordinated package in December 2025 to stabilize global supply chains for critical minerals used in batteries?

[A] European Union

[B] United States

[C] Japan

[D] India

38. Which space agency announced a December 2025 milestone for a lunar lander mission, targeting a mid-2026 launch window?

[A] JAXA, NASA

[B] ESA, ISRO

[C] ISRO, JAXA

[D] NASA, ESA

39. A 2025 logistics reform created a single-window portal for freight permits across States. What immediate benefit should shippers expect?

[A] Lower diesel prices nationwide

[B] Automatic toll waivers on national highways

[C] Higher axle-load limits for all trucks

[D] Reduced border check delays and fewer idle hours

40. Late-2025 urban heat mitigation pilots in Indian cities tested reflective roofs and cool pavements. What metric best captures the direct thermal benefit to residents?

[A] Reduction in indoor air temperature during peak hours

[B] Change in citywide GDP growth

[C] Number of cars added to the city

[D] Increase in monsoon rainfall

41. As India's 5G rollout expanded in 2025, which enterprise most clearly benefits from Ultra-Reliable Low-Latency Communications (URLLC)?

[A] Remote robotic control on factory floors

[B] Bulk nightly data backups to the cloud

[C] Streaming pre-recorded training videos

[D] Email and office productivity tools

42. In late 2025 discussions on urban mobility, which intervention most effectively reduces peak congestion without large new construction?

[A] Time-variable congestion pricing with improved public transit frequency

[B] Mandating larger parking lots in offices

[C] Adding more flyovers at every intersection

[D] Subsidizing private car purchases

43. A major economic reform bill aims to streamline land acquisition for infrastructure. Which safeguard most directly reduces the litigation risk while keeping timelines predictable?

[A] Capping court filing windows at 30 days

[B] Allowing executive override of environmental clearances

[C] Mandating digitized consent and social impact assessments with public audit trails

[D] Raising compensation uniformly by 50%

44. Match the list of new appointments in November 2025.

Name	**Appointment**
(a) Keerthy Suresh	*(i)* First Woman to lead UN Tourism
(b) Shaikha Nasser Al Nowais	*(ii)* President, ASSOCHAM
(c) Sanjay Garg	*(iii)* Director General (BIS)
(d) Nirmal Kumar Minda	*(iv)* UNICEF India's Celebrity Advocate for Child Rights

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(i)*	*(ii)*	*(iii)*	*(iv)*
[B]	*(iv)*	*(i)*	*(iii)*	*(ii)*
[C]	*(iii)*	*(ii)*	*(i)*	*(iv)*
[D]	*(ii)*	*(iii)*	*(iv)*	*(i)*

45. Match the rows in the given list.

Institute name	**Location**
(a) Central Institute of Temperate Horticulture, Regional Station	*(i)* Dirang
(b) Central Institute of Himalayan Culture Studies	*(ii)* Dahung
(c) National Institute of Electronics and Information Technology (NIELIT)	*(iii)* Pasighat
(d) Govind Ballabh Pant 'National Institute of Himalayan Environment' (NIHE)	*(iv)* Itanagar

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(i)*	*(ii)*	*(iii)*	*(iv)*
[B]	*(ii)*	*(iii)*	*(i)*	*(iv)*
[C]	*(i)*	*(ii)*	*(iv)*	*(iii)*
[D]	*(ii)*	*(i)*	*(iii)*	*(iv)*

46. What is the name of India's first indigenous CRISPR-based gene therapy for Sickle Cell Disease?

[A] SCD-CURE

[B] GEN-EDIT 1

[C] BIRSA 101

[D] HematoGene

47. Which one of the following is ***true*** for the Exercise Mitra Shakti 2025?

[A] It is the 11th edition of the annual India-Nepal joint military drill

[B] Its location: Foreign Training Node in Belagavi, Karnataka

[C] It was carried out for bilateral economic development

[D] Intends for technology transfer of Brahmos

48. Which of the following is ***not true*** about "JK Tyre Orange 4X4 Fury International"?

[A] It was a three-day off-road rally

[B] Competition was across challenging riverbeds and forest trails

[C] It covered 6 districts of Arunachal Pradesh

[D] The rally was ceremonially flagged off on December 18, 2025

49. Nation's first indigenous semiconductor assembly & test facility in Assam is located at

[A] Nagaon

[B] Tezpur

[C] Mangaldoi

[D] Jagiroad

50. Which 2025 policy move accelerates electric mobility adoption in Northeast hill States without overloading the grid?

[A] Ban on all combustion vehicles within one year

[B] Flat subsidies for any charger at any time

[C] Mandating only ultra-fast chargers in rural towns

[D] Time-of-use tariffs and *V2G* pilots for bus depots

51. Arrange the town of Arunachal Pradesh in descending order according to annual rainfall.

(i) Aalo

(ii) Pasighat

(iii) Tawang

(iv) Tezu

[A] *(i)-(ii)-(iii)-(iv)*

[B] *(ii)-(iv)-(i)-(iii)*

[C] *(iii)-(i)-(iv)-(ii)*

[D] *(iv)-(iii)-(ii)-(i)*

52. Arrange the State Headquarters of NE India States according to aerial distance from Guwahati, in order of nearest to farthest.

(i) Aizawl

(ii) Imphal

(iii) Itanagar

(iv) Kohima

[A] *(i)-(ii)-(iii)-(iv)*

[B] *(iii)-(iv)-(ii)-(i)*

[C] *(iii)-(i)-(iv)-(ii)*

[D] *(iv)-(iii)-(ii)-(i)*

53. Arrange the places of Arunachal Pradesh according to time of sunrise - earliest to last.

(i) Aalo

(ii) Basar

(iii) Mechuka

(iv) Tuting

[A] *(i)-(ii)-(iii)-(iv)*

[B] *(iv)-(ii)-(i)-(iii)*

[C] *(ii)-(iii)-(iv)-(i)*

[D] *(iv)-(i)-(ii)-(iii)*

54. Which Indian player won the U-17 title at the British Junior Squash Open 2025 in Birmingham?

[A] Anahat Singh

[B] Joshna Chinappa

[C] Nikita Joshi

[D] Ramit Tandon

55. Which of the following statements about the 7th International Para Athletics Championship is ***not true***?

[A] Tingong Wangpan won two gold medals

[B] Kipa Mero participated in javelin throw

[C] Para Athletics Championship 2025 was held in Chennai

[D] Gold medals were for the 400m and 200m sprints

56. Which factor best explains why tea plantations thrive on the foothills of Assam and Meghalaya?

[A] Alkaline soils with arid climate and intense sunlight

[B] Permafrost conditions that prevent pests

[C] Flat alluvial plains with low rainfall

[D] Acidic, well-drained hill soils with high rainfall and humidity

57. Why is bamboo-based industry considered a strategic opportunity for Northeast India's rural economy?

[A] Bamboo grows slowly and needs heavy chemical inputs

[B] It aligns with fast regrowth cycles, diversified products and community forestry

[C] It requires large desert land tracts not found in the region

[D] Its uses are limited to traditional handicrafts only

58. Which feature best explains why Meghalaya's Cherrapunji–Mawsynram belt attracts eco-tourists despite heavy rainfall?

[A] High-altitude glaciers are suitable for summer skiing

[B] Living root bridges are formed by trained aerial roots

[C] Coral reefs are ideal for shallow-water diving

[D] Coal mines and barren areas

59. A traveller plans a heritage circuit linking Ahom-era sites around Sivasagar. Which inclusion best aligns with this theme?

[A] Rang Ghar and Talatal Ghar complexes

[B] Ziro Valley's paddy-fish agriculture

[C] Nathu La Pass high-altitude border crossing

[D] Kaziranga's central range elephant safaris

60. Match the following :

Key Sanctuaries & Parks	**Location**
(a) Namdapha National park & Tiger Reserve	*(i)* East Siang district
(b) Eaglenest Wildlife Sanctuary	*(ii)* Changlang
(c) Mouling National Park	*(iii)* West Kameng
(d) D'Ering Memorial Wildlife Sanctuary	*(iv)* Upper Siang

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(ii)*	*(iv)*	*(i)*	*(iii)*
[B]	*(ii)*	*(iii)*	*(iv)*	*(i)*
[C]	*(iii)*	*(ii)*	*(i)*	*(iv)*
[D]	*(iv)*	*(iii)*	*(i)*	*(ii)*

61. Match the following :

Padma Shri Awardee (2025)	**State**
(a) Anil Kumar Boro	*(i)* Nagaland
(b) Jumde Yomgam Gamlin	*(ii)* Arunachal Pradesh
(c) L. Hangthing	*(iii)* Assam
(d) Thiyam Suryamukhi Devi	*(iv)* Manipur

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(ii)*	*(iii)*	*(i)*	*(iv)*
[B]	*(i)*	*(ii)*	*(iv)*	*(iii)*
[C]	*(iii)*	*(ii)*	*(i)*	*(iv)*
[D]	*(iv)*	*(ii)*	*(iii)*	*(i)*

62. Match the following :

Some important Cyclones	**Affected States**
(a) Amphan (2020)	*(i)* Andhra Pradesh and Tamil Nadu
(b) Nisarga (2020)	*(ii)* Maharashtra
(c) Tauktae (2021)	*(iii)* Gujarat and Kerala
(d) Mandous (2022)	*(iv)* West Bengal and Odisha

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(ii)*	*(iii)*	*(i)*	*(iv)*
[B]	*(iv)*	*(ii)*	*(i)*	*(iii)*
[C]	*(ii)*	*(iii)*	*(iv)*	*(i)*
[D]	*(iv)*	*(ii)*	*(iii)*	*(i)*

63. Between 2020-2025, what kind of technology transfer has DRDO emphasized to scale indigenous defense production through private industry?

[A] Exclusive Government-only manufacturing of all strategic systems

[B] Open-source release of complete hypersonic vehicle designs

[C] Foreign direct ownership of DRDO labs by private firms

[D] Transfer of production technology for subsystems like seekers, AESA radar modules and composites

64. During the G20 Summit in Johannesburg, PM Narendra Modi announced a new trilateral technology and innovation partnership. Which of the following countries is ***not*** involved in this trilateral partnership?

[A] India

[B] Australia

[C] Canada

[D] United States

65. Which of the following countries has officially become a full member of BRICS as announced by Brazil in January 2025?

[A] United Arab Emirates

[B] Egypt

[C] Iran

[D] Indonesia

66. Which of the following is the nodal ministry for the PM Vishwakarma Scheme?

[A] Ministry of Rural Development

[B] Ministry of Micro, Small and Medium Enterprises

[C] Ministry of Labour and Employment

[D] Ministry of Skill Development and Entrepreneurship

67. What is the main focus of partnership formed in August 2025 by BSNL with Ericsson, Qualcomm, Cisco and Nokia?

[A] Developing satellite-based communication networks

[B] Creating 5G training centers and digital skill development

[C] Enhancing fiber-optic networks for rural areas

[D] Establishing quantum computing centers for telecom

68. Ram starts from a point *A* and walks 6 km North, then turns left and walks 8 km, then turns left and walks 12 km up to the point *B*. What is the direction of Ram?

[A] North

[B] South

[C] East

[D] West

69. What should come in place of the question mark in the following series?

2, 6, 14, 30, ?, 126

[A] 62

[B] 72

[C] 63

[D] 73

70. A mother is 20 years older than her daughter. 4 years before she was 5 times of her daughter's age at that time. How old is the daughter now?

[A] 9 years

[B] 12 years

[C] 18 years

[D] 16 years

71. Mohan started from point *P* and walked 2 m towards west. He then took a right turn and walked 3 m before taking a left turn and walked 5 m. He finally took a left turn, walked 3 m and stopped at a point *Q*. How far is point *Q* from point *P*?

[A] 5 m

[B] 6 m

[C] 7 m

[D] 8 m

72. Find the LCM of a^3b^4, ab^5 and a^2b^7.

[A] a^7b^3

[B] a^3b^7

[C] a^2b^5

[D] ab^5

73. The difference in compound interest and simple interest on a certain amount at 10% per annum at the end of the third year is ₹ 930. The principal amount is

[A] ₹ 20,000

[B] ₹ 25,000

[C] ₹ 30,000

[D] ₹ 30,500

74. In a row of students, the place of Rahul from right is 12th and from left is 4th. How many students should be added to make the total number of students 28?

[A] 13

[B] 14

[C] 18

[D] 20

75. The sum of the two numbers is 40 and their difference is 4. The ratio of the numbers is

[A] 11:9

[B] 10:7

[C] 20:12

[D] 11:12

76. In a group of cows and hens, the number of legs are 14 more than twice the number of heads. The number of cows is

[A] 5

[B] 7

[C] 10

[D] 12

77. In a bag, there are coins of 25 p, 10 p and 5 p in the ratio of 1 : 2 : 3. If there are ₹ 30 in all, then the number of 5 p coins are

[A] 200

[B] 30

[C] 150

[D] 250

78. Find the ***wrong*** number in the series :

2, 9, 28, 65, 126, 216, 344

[A] 2

[B] 28

[C] 65

[D] 216

79. The Least Common Multiple of 24, 36 and 40 is

[A] 340

[B] 360

[C] 230

[D] 400

80. The price of a house is decreased from ₹ 15,00,000 to ₹ 12,00,000. The percentage of decrease is

[A] 10

[B] 20

[C] 30

[D] 40

81. A man bought an old bicycle for ₹ 1,500. He spends ₹ 500 on its repair and sells it for ₹ 1,800. Find the percentage of his loss or profit.

[A] Profit 10%

[B] Loss 10%

[C] Loss 20%

[D] Profit 20%

82. Complete the series :

AZ, GT, MN, _____, YB

[A] SK

[B] JH

[C] SH

[D] TS

83. The ratio of two numbers is 4 : 7. On subtracting 10 from each number, the ratio becomes 1 : 2, then the greater number is

[A] 40

[B] 70

[C] 80

[D] 100

84. A tank can be filled by an inlet tap in 10 hours and it can be emptied by an outlet pipe in 12 hours. If both the inlet tap and outlet pipe are opened, then find the time taken to fill the tank.

[A] 120 hrs

[B] 60 hrs

[C] 30 hrs

[D] 15 hrs

85. In a village of 121000 people, the ratio of men to women is 6 : 5. The number of men is

[A] 33000

[B] 66000

[C] 55000

[D] 44000

86. The population of a village is 50000, 40% of them are men, 20% of them are children and the rest are women. The number of women is

[A] 10000

[B] 20000

[C] 30000

[D] 40000

87. If $P = 9$, then the value of $P(P^2 + 3P + 3)$ is equal to

[A] 9

[B] 99

[C] 999

[D] 9999

88. Ethics is the science of

[A] beauty

[B] truth

[C] conduct

[D] mind

89. An engineer discovers that a popular product has a small probability of causing serious harm under rare conditions. Management wants to delay fixing the issue because it is costly and failures are unlikely. What is the engineer's most ethical first step?

[A] Post anonymously about the issue on social media to pressure the company

[B] Quietly collect more data without informing anyone yet

[C] Report the issue to the appropriate internal safety or ethics committee and document the concern

[D] Ignore the issue because the probability of harm is low

90. A project team is under intense time pressure and considers skipping a planned verification test for a critical system component. Which rationale best reflects ethical engineering values for deciding whether to skip the test?

[A] To perform the test because critical components must be verified even if its deadlines are at risk

[B] To skip the test because the client has not specifically asked for it in the contract

[C] To skip the test but add a disclaimer in the documentation

[D] To skip the test because the design passed similar tests in previous projects

91. An engineer working on a data-driven product is asked to collect more user data than is necessary for the stated function, mainly to support future marketing analysis. Which response best reflects ethical considerations about privacy and respect for users?

[A] To collect the extra data but anonymize nothing to preserve full marketing value

[B] To collect only the data necessary for the product's function and advocate for privacy-by-design principles

[C] To delay raising concerns until users complain about privacy

[D] To collect all requested data because it may be useful later

92. Statements :

All flats are homes.

All wells are tiles.

No flat is well.

Only a few homes are well.

Conclusions :

I. Some tiles are not flats.

II. A few homes are tiles.

[A] Only conclusion I follows

[B] Only conclusion II follows

[C] Neither conclusion I nor II follows

[D] Both conclusions I and II follow

Direction (Question Nos. 93-95) : Study the following information carefully to answer the given questions.

Eight Persons *P*, *Q*, *R*, *S*, *T*, *U*, *W* and *X* are in a family. There are three married couples. *T* is sister of *P*, *R* is the grandfather of *X*. *W* is father of *U*. *Q* is the daughter-in-law of *S*, who is not married to *W*. *X* is unmarried male and *T* is married to *U*, who has no child.

93. Who among the following is the nephew of *T*?

[A] *R*

[B] *X*

[C] *S*

[D] *Q*

94. Who among the following is the son-in-law of *S*?

[A] *P*

[B] *X*

[C] *R*

[D] *U*

95. What is the relation of *Q* with *X*?

[A] Mother

[B] Aunt

[C] Grandmother

[D] Sister

96. The difference between the sample value expected and the estimated value of the parameter is called as

[A] bias

[B] error

[C] contradiction

[D] difference

97. $\int_0^1 3x^2 dx = ?$

[A] 0

[B] 1

[C] 2

[D] 3

98. $\tan 45° = ?$

[A] 0

[B] 1

[C] $\sqrt{3}$

[D] -1

99. If $(x-2)(x+3) = 0$, then the sum of roots is

[A] -1

[B] 1

[C] 5

[D] -5

100. If $x = 2+\sqrt{3}$, then $x\frac{1}{x} =$

[A] 4

[B] 2

[C] 1

[D] 5

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

SPACE FOR ROUGH WORK

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SPACE FOR ROUGH WORK

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JECRE/CE/2025

(PAPER—II)

Question Booklet Number

Series : a

Time : 3 Hours **Maximum Marks : 300**

ROLL NO.

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1. In terms of Poisson's ratio (μ), the ratio of Young's Modulus (E) to Shear Modulus (G) of elastic materials is

[A] $2G(1 + \mu)$

[B] $2G(1 - \mu)$

[C] $0.5G(1 + \mu)$

[D] $0.5G(1 - \mu)$

2. Orifice meter is used to measure the

[A] rate of flow of fluid in open channel

[B] rate of flow of fluid in pipe

[C] head of water

[D] pressure coefficient

3. Two beams, one having square cross-section and another circular cross-section, are subjected to the same amount of bending moment. If the cross-sectional area as well as the material of both the beams are the same, then

[A] maximum bending stress developed in both the beams is the same

[B] the circular beam experiences more bending stress than the square one

[C] the square beam experiences more bending stress than the circular one

[D] as the material is same both the beams will experience same deformation

4. A test specimen is stressed slightly beyond the yield point and then unloaded. Its yield strength will

[A] decrease

[B] increase

[C] remain same

[D] become equal to ultimate tensile strength

5. Using prismoidal method, what is the volume (m^3) of earthwork required for 6 m deep ditch, if the top and bottom dimensions are 4 m × 8 m and 8 m × 16 m respectively?

[A] 448

[B] 646

[C] 800

[D] 1493

6. What is the quantity (m^3) of cement mortar required for plastering (both sides/faces) of wall with 10 m length and 10 m height with plastering thickness of 15 mm?

[A] 0.75

[B] 1.5

[C] 3.0

[D] 6.0

7. **Assertion (A) :** Inertia force always acts through the centroid of the body and is directed opposite to the acceleration of the centroid.

Reason (R) : It has always a tendency to retard the motion.

[A] Both **A** and **R** are individually true and **R** is the correct explanation of **A**

[B] Both **A** and **R** are individually true but **R** is not the correct explanation of **A**

[C] **A** is true but **R** is false

[D] **A** is false but **R** is true

8. What is the estimate (₹) for a room with a plinth area of 300 sq.m with rate of ₹3,500 per sq.m? (Consider the adds of 10% of electric installation and 6% of miscellaneous)

[A] 1,50,000

[B] 14,50,080

[C] 6,09,000

[D] 12,18,000

9. **Assertion (A) :** If the bending moment along the length of a beam is constant, then the beam cross-section will not experience any shear stress.

Reason (R) : The shear force acting on the beam will be zero everywhere along the length.

[A] Both **A** and **R** are individually true and **R** is the correct explanation of **A**

[B] Both **A** and **R** are individually true but **R** is not the correct explanation of **A**

[C] **A** is true but **R** is false

[D] **A** is false but **R** is true

10. **Assertion (A) :** The change in bending moment between two cross-sections of a beam is equal to the area of the shearing force diagram between the two sections.

Reason (R) : The change in the shearing force between two cross-sections of beam due to distributed loading is equal to the area of the load intensity diagram between the two sections.

[A] Both **A** and **R** are individually true and **R** is the correct explanation of **A**

[B] Both **A** and **R** are individually true but **R** is not the correct explanation of **A**

[C] **A** is true but **R** is false

[D] **A** is false but **R** is true

11. If the shear force acting at every section of a beam is of the same magnitude and of the same direction, then it represents a

[A] simply supported beam with a concentrated load at the centre

[B] overhung beam having equal overhang at both supports and carrying equal concentrated loads acting in the same direction at the free ends

[C] cantilever subjected to concentrated load at the free end

[D] simply supported beam having concentrated loads of equal magnitude and in the same direction acting at equal distances from the supports

12. The compaction factor of 0.95 between partially compacted (W_p) and fully compacted (W_f) concrete indicates what level of workability in the concrete?

[A] Low level

[B] Very low level

[C] High level

[D] None of the above

13. **Assertion (A) :** If the bending moment diagram is a rectangle, it indicates that the beam is loaded by a uniformly distributed moment all along the length.

Reason (R) : The BMD is a representation of internal forces in the beam and not the moment applied on the beam.

[A] Both **A** and **R** are individually true and **R** is the correct explanation of **A**

[B] Both **A** and **R** are individually true but **R** is not the correct explanation of **A**

[C] **A** is true but **R** is false

[D] **A** is false but **R** is true

14. If a beam is subjected to a constant bending moment along its length, then the shear force will

[A] also have a constant value everywhere along its length

[B] be zero at all sections along the beam

[C] be maximum at the centre and zero at the ends

[D] zero at the centre and maximum at the ends

15. In a slump test, each layer of concrete is compacted by a steel rod 60 cm long and of 16 mm diameter for 20 times. This statement is

[A] true

[B] false

[C] Compaction is not required

[D] Cannot say

16. Which of the seasoning method is adopted for the rapid seasoning of timer on large scale to obtain any desired moisture content?

[A] Air seasoning

[B] Boiling process

[C] Water seasoning

[D] None of the above

17. Match the following :

(a)	Service pipe	*(i)*	Pipe connecting storage tanks to various fixtures
(b)	Distribution pipe	*(ii)*	Pipe used for feeding the water from the main to the building
(c)	Supply pipe	*(iii)*	Pipeline between stopcock and storage tank
(d)	Water main	*(iv)*	Pipeline intended for general use

	(a)	*(b)*	*(c)*	*(d)*
[A]	*(ii)*	*(i)*	*(iii)*	*(iv)*
[B]	*(i)*	*(iii)*	*(iv)*	*(ii)*
[C]	*(ii)*	*(iv)*	*(iii)*	*(i)*
[D]	*(iii)*	*(i)*	*(ii)*	*(iv)*

18. When level difference between branch sewer and main sewer is more than 0.6 m, these are joined by

[A] manhole

[B] lamphole

[C] drop manhole

[D] street inlet

19. According to IS 456-2000, which one of the following statements about the depth of neutral axis $X_{u,\,bal}$ for a balanced reinforced concrete section is ***correct***?

[A] $X_{u,\,bal}$ depends on the grade of the concrete only

[B] $X_{u,\,bal}$ depends on the grade of the steel only

[C] $X_{u,\,bal}$ depends on both grades of steel as well as concrete

[D] None of the above

20. Which of the following areas is included in the plinth area of the building?

[A] Area of the lofts

[B] Tower projecting above the terrace

[C] Cornices

[D] None of the above

21. Intensity is the term expressing the _____ effect of earthquake.

[A] energy release

[B] amplitude

[C] severity

[D] None of the above

22. Drainage is taken along the sewage in

[A] a separate system

[B] a partially separate system

[C] both separate and partially separate systems

[D] combined system

23. **Statement 1 :** Doubly reinforced beams are used when depth is restricted.

Statement 2 : Compression reinforcement compensates for reduced lever arm.

[A] Both statements are true and related

[B] Statement 1 is true, statement 2 is false

[C] Both statements are false

[D] Statement 1 is false, statement 2 is true

24. The anchorage length of a 20 mm diameter bar in tension in M25 concrete, as per IS 456 : 2000, is

[A] $24d$

[B] $40d$

[C] $46d$

[D] $50d$

25. What is the maximum permissible velocity in horizontal type sedimentation tank?

[A] 0.2 m/s

[B] 0.3 m/s

[C] 0.5 m/s

[D] 1 m/s

26. The effective size of sand used in rapid sand filters is _____ the slow sand filter.

[A] higher than

[B] lower than

[C] equal to

[D] None of the above

27. Calculate the flow rate (m^3/hr) of a sand filter with the following data :

velocity : 12 m/hr and diameter : 15.3 m

[A] 2200

[B] 1985

[C] 2560

[D] 2650

28. Only one main pipe is used which collects both the foul soil waste as well as waste from the building without the provision of ventilation is called

[A] one-pipe system

[B] single-stack system

[C] two-pipe system

[D] None of the above

29. Soak pits are arriving effluents from

[A] sewer

[B] drainage

[C] oxidation pond

[D] septic tank

30. For a simply supported beam with a point load at the center, the variation in bending moment is

[A] parabolic

[B] triangular

[C] hyperbolic

[D] semi-circular

31. Slenderness ratio of a column is the ratio of

[A] the minimum radius of gyration to the unsupported length

[B] unsupported length of column to the minimum radius of gyration

[C] the minimum radius of gyration to the area of cross-section

[D] area of cross-section to the minimum radius of gyration

32. Which of the following processes ***does not*** help in the removal of permanent hardness of water?

[A] Lime-soda process

[B] Lime-water process

[C] Base exchange process

[D] Demineralization process

33. Which of the following is suitable for high discharge?

[A] Centrifugal pump

[B] Reciprocating pump

[C] Rotary pump

[D] Cavity pump

34. Which of the following aquifers is called phreatic aquifer?

[A] Confined aquifer

[B] Unconfined aquifer

[C] Ground aquifer

[D] Connate aquifer

35. Water table is the boundary between the _____ zone and the _____ zone.

[A] aquifer, aquiclude

[B] confined, unconfined

[C] saturated, unsaturated

[D] None of the above

36. Arunachal Pradesh lies in seismic _____ as per IS 1893-2025.

[A] Zone III

[B] Zone IV

[C] Zone V

[D] Zone VI

37. Find the discharge (m^3/sec) for a 2 m wide rectangular channel carrying water at a depth of 0.5 m. Channel slope is 0.0004 and Chezy's coefficient is 73.60.

[A] 0.850

[B] 0.580

[C] 0.630

[D] 0.360

38. The space between adjacent bents in a roof truss is called

[A] purlins

[B] braces

[C] knee

[D] None of the above

39. The hydraulic radius and cross-sectional area of a channel are given by 5.0 m and 25.5 sq.m respectively. What is the wetted perimeter (m) of channel?

[A] 12.75

[B] 5.10

[C] 1.50

[D] 75.12

40. Levees are constructed _____ to river flow.

[A] parallel

[B] transverse

[C] perpendicular

[D] centre

41. The surface area of 3240 m^2 of setting tank is used for design discharge of 1.5 m^3/sec. What is the design overflow rate for tank?

[A] 10 m^3/m^2/day

[B] 20 m^3/m^2/day

[C] 30 m^3/m^2/day

[D] 40 m^3/m^2/day

42. The trapezoidal open channel has a bottom width of 3 m and side slope of 1.5H : 1 V. The longitudinal slope of the channel is 0.0004. The uniform flow depth and the velocity of flow are 1.25 m and 1.45 m/s respectively. The Manning's roughness coefficient for the channel is

[A] 0.012

[B] 0.050

[C] 0.033

[D] 0.002

43. In the design of lacing system for a built-up steel column, the maximum allowable slenderness ratio of lacing bar is

[A] 120

[B] 145

[C] 180

[D] 250

44. **Assertion (A) :** In masonry structures limiting value of slenderness ratio for a column is less than that of a wall.

Reason (R) : A column made out of brick masonry can buckle around either of the two horizontal axes while a wall can buckle around only one axis.

[A] Both **A** and **R** are individually true and **R** is the correct explanation of **A**

[B] Both **A** and **R** are individually true but **R** is not the correct explanation of **A**

[C] **A** is true but **R** is false

[D] **A** is false but **R** is true

45. Design tensile strength of tension member is given by

[A] rapture at a critical section

[B] yielding of gross section

[C] block shear of end region

[D] Lesser of above three

46. In limit state method, characteristic strength of concrete is

[A] mean strength

[B] mean strength – 1.65 × standard deviation

[C] mean strength – 2.5 × standard deviation

[D] mean strength + 1.65 × standard deviation

47. Which of the following formations ***does not*** contain any groundwater?

[A] Aquifer

[B] Aquifuge

[C] Aquitard

[D] Aquiclude

48. As per IS 800-2007, the partial safety factors for dead load and live load for a roof truss as per limit state of serviceability are respectively

[A] 1.0 and 1.50

[B] 1.2 and 1.2

[C] 1.0 and 1.0

[D] 1.5 and 1.5

49. The percentage of elongation of mild steel (E250 A Grade) of rolled shape is about _____ as per IS 2062.

[A] 23

[B] 20

[C] 8

[D] 4

50. **Statement 1 :** A simply supported beam cannot resist lateral torsional buckling.

Statement 2 : It lacks lateral restraint at compression flange.

[A] Both statements are true and related

[B] Statement 1 is true, Statement 2 is false

[C] Both statements are false

[D] Statement 1 is false, Statement 2 is true

51. The design compressive stress of axially loaded compression member in IS 800 : 2007 is given by

[A] Merchant-Rankine Formula

[B] Secant formula

[C] Euler's formula

[D] Perry-Robertson formula

52. A beam is called laterally restrained beam, from structural point of view when

[A] a web of beam is stiffened with transverse stiffeners

[B] a tension flange of beam is restrained laterally

[C] a compression flange of beam is restrained laterally

[D] a web of beam is strengthened

53. Density of cement is

[A] 1400 kg/cu.m

[B] 1440 kg/cu.m

[C] 1500 kg/cu.m

[D] 1540 kg/cu.m

54. Pick up the ***correct*** statement regarding the centreline method of estimating a building.

[A] Product of the centreline of the walls and area of cross-section of any item, gives total quantity of the item

[B] The centreline is worked out separately for different sections of walls of a building

[C] The centreline length is reduced by half the layer of main wall joining the partition wall

[D] All of the above

55. The span to depth ratio limit is specified in IS 456-2000 for the reinforced concrete beams, in order to ensure that the

[A] tensile crack width is below a limit

[B] shear failure is avoided

[C] stress in the tension reinforcement is less than the allowable value

[D] deflection of the beam is below a limiting value

56. Which of the following is ***not*** a compression member?

[A] Strut

[B] Tie

[C] Principle rafter

[D] Boom

57. As per IS 800-2007, the slenderness ratio of compression member carrying compressive load resulting from wind or earthquake actions is

[A] 250

[B] 350

[C] 180

[D] 400

58. Web crippling in steel beam occurs due to

[A] column action of compression flange

[B] failure of web under heavy concentrated load

[C] excessive bending moment

[D] secondary bending moment

59. Which one of the following cross-sections in which elements buckle locally even before attaining of yield stress are classified as per IS 800-2007?

[A] Slender section

[B] Semi-compact section

[C] Compact section

[D] Plastic section

60. While estimating for plastering, usually no deduction is made for

[A] ends of beams

[B] small openings up to 0.5 sq. m

[C] end of rafters

[D] All of the above

61. Pick up the ***incorrect*** statement from the following.

[A] No deduction is made for the volume occupied by reinforcement

[B] No deduction is made for the openings up to 0.1 sq.m

[C] No deduction is made for volumes occupied by pipes, not exceeding 100 sq.cm in cross-section

[D] None of the above

62. For 100 square metres of plastered surface, the quantity of lime required for one coat of white washing will be

[A] 10 kg

[B] 5 kg

[C] 6.5 kg

[D] 100 kg

63. A document containing detailed description of all the items of work (but their quantities are not mentioned) together with their current rates is called

[A] tender

[B] analysis of rate

[C] schedule of rates

[D] abstract estimate

64. Pick up the ***incorrect*** statement from the following.

[A] The built-up covered area at the floor level of any storey of a building is called plinth area

[B] The usable covered area of the rooms of any storey of a building is called carpet area

[C] The carpet area of a building along with area of its kitchen, pantry, store, lavatory, bathroom and glazed verandah, is called floor area.

[D] None of the above

65. If the camber is x%, then the cross slope is

[A] $100x$

[B] $200/x$

[C] $x/100$

[D] $100 + x$

66. Ruling gradient is the _____ for vertical profile of a road.

[A] maximum design gradient

[B] limiting design gradient

[C] minimum design gradient

[D] None of the above

67. The extra-widening required for a two-lane national highway at a horizontal curve of 300 m radius, considering a wheel base of 8 m and a design speed of 100 kmph is

[A] 0.42 m

[B] 0.82 m

[C] 0.62 m

[D] 0.92 m

68. The plan of a map was photocopied to a reduced size such that a line originally 100 mm, measures 90 mm. The original scale of the plan was 1 : 1000. The revised scale is

[A] 1 : 900

[B] 1 : 1121

[C] 1 : 1111

[D] 1 :1221

69. The type of surveying in which the curvature of the earth is considered is called

[A] geodetic surveying

[B] plane surveying

[C] preliminary surveying

[D] topographical surveying

70. The plan of a survey plotted to a scale of 10 m to 1 cm is reduced in such a way that a line originally 10 cm long now measures 9 cm. The area of the reduced plan is measured as 81 cm^2. The actual area (m^2) of the survey is

[A] 10000

[B] 1000

[C] 6561

[D] 656

71. A lighthouse of 120 m height is just visible above the horizon from a ship. The correct distance (m) between the ship and the lighthouse considering combined correction for curvature and refraction is

[A] 39.098

[B] 39098

[C] 42.270

[D] 42270

72. Which of the following errors can be eliminated by reciprocal measurements in differential levelling?

(i) Error due to earth's curvature.

(ii) Error due to atmospheric refraction.

[A] Both *(i)* and *(ii)*

[B] *(i)* only

[C] *(ii)* only

[D] Neither *(i)* nor *(ii)*

73. Which one of the following is ***incorrect*** about a flexible pavement?

[A] Grain to grain transfer of compressive stresses

[B] Reflects deformation of lower layers on road surface

[C] Comprises of subgrade, subbase, base and surface course

[D] High flexural strength

74. Which of the following statements is ***false***?

[A] Plumb line is along the direction of gravity

[B] Mean Sea Level (MSL) is used as a reference surface for establishing the horizontal control

[C] Mean Sea Level (MSL) is a simplification of Geoid

[D] Geoid is an equi-potential surface of gravity

75. In a closed loop traverse of 1 km total length, the closing errors in departure and latitude are 0.3 m and 0.4 m, respectively. The relative precision of this traverse will be

[A] 1 : 5000

[B] 1 : 4000

[C] 1 : 3000

[D] 1 : 2000

76. Two pegs *A* and *B* were fixed on opposite banks of a 50 m wide river. The level was set up at *A* and the staff readings on Pegs *A* and *B* were observed as 1.350 m and 1.550 m, respectively. Thereafter the instrument was shifted and set up at *B*. The staff readings on Pegs *B* and *A* were observed as 0.750 m and 0.550 m, respectively. If the R.L. of Peg *A* is 100.200 m, then the R.L. (m) of Peg *B* is

[A] 20

[B] 50

[C] 120

[D] 100

77. If any station that is affected by local attraction, then the

[A] difference between the fore bearing and back bearing is always equal to 90 degrees

[B] difference between the fore bearing and back bearing is always equal to 180 degrees

[C] difference between the fore bearing and back bearing is not equal to 180 degrees

[D] difference between the fore bearing and back bearing is always not equal to 180 degrees

78. Apex distance in a simple curve is indicated by _____, where *R* is radius of curvature and θ is degree of curvature.

[A] $R[\sin(\theta/2)-1]$

[B] $R[\tan(\theta/2)-1]$

[C] $R[\cot(\theta/2)-1]$

[D] $R[\sec(\theta/2)-1]$

79. Contour line is an imaginary line connecting points of

[A] same R.L.

[B] same declination

[C] same dip

[D] same inverted level

80. Centering, levelling and orientation are the order of setting up a

[A] compass

[B] plane table

[C] dumpy level

[D] theodolite

81. A super-elevation e is provided on a circular horizontal curve such that a vehicle can be stopped on the curve without sliding. Assuming a design speed v and maximum coefficient of side friction f_{max}, which one of the following criteria should be satisfied?

[A] $e \leq f_{max}$

[B] $e > f_{max}$

[C] No limit on e can be set

[D] None of the above

82. A bitumen sample has been graded as VG30 as per IS : 73-2013. The '30' in the grade means that

[A] penetration of bitumen at 25 °C is between 20 and 40

[B] viscosity of bitumen at 60 °C is between 2400 and 3600 poise

[C] ductility of bitumen at 27 °C is more than 30 cm

[D] elastic recovery of bitumen at 15 °C is more than 30%

83. A survey line was measured to be 285.5 m with a tape having a nominal length of 30 m. On checking, the true length of the tape was found to be 0.05 m too short. If the line lay on a slope of 1 in 10, the reduced length (horizontal length) of the line for plotting of survey work would be

[A] 283.6 m

[B] 284.5 m

[C] 285.0 m

[D] 285.6 m

84. Bituminous materials are commonly use in highway construction because of their good

[A] tensile and compression properties

[B] shear strength and tensile properties

[C] binding and water proofing properties

[D] bond and tensile properties

85. The following statements are related to temperature stresses developed in concrete pavement slabs with free edges (without any restraint) :

(P) The temperature stresses will be zero during both day and night times if the pavement slab is considered weightless.

(Q) The temperature stresses will be compressive at the bottom of the slab during night time if the self-weight of the pavement slab is considered.

(R) The temperature stresses will be compressive at the bottom of the slab during day time if the self-weight of the pavement slab is considered.

The ***true*** statement(s) is(are)

[A] P only

[B] Q only

[C] P and Q only

[D] P and R only

86. A soil sample has a void ratio of 0.5 and its porosity will be close to

[A] 50%

[B] 66%

[C] 100%

[D] 33%

87. The two criteria for the determination of allowable bearing capacity of a foundation are

[A] tensile failure and compression failure

[B] tensile failure and settlement

[C] bond failure and shear failure

[D] shear failure and settlement

88. The following two statements are made with reference to the calculation of net bearing capacity of a footing in pure clay soil ($\phi = 0$) using Terzaghi's bearing capacity theory.

(i) Increase in footing width will result in increase in bearing capacity.

(ii) Increase in depth of foundation will result in higher bearing capacity.

Identify if they are ***true*** or ***false***.

[A] Both statements are ***true***

[B] Both statements are ***false***

[C] Statement *(i)* is ***true*** but statement *(ii)* is ***false***

[D] Statement *(i)* is ***false*** but statement *(ii)* is ***true***

89. A clayey soil has a maximum dry density of 16 kN/m^3 and optimum moisture content of 12%. A contractor during the construction of core of an earth dam obtained the dry density 15.2 kN/m^3 and water content 11%. This construction is acceptable because

[A] the density is less than the maximum dry density and water content is on dry side of optimum

[B] the compaction density is very low and water content is less than 12%

[C] the compaction is done on the dry side of the optimum

[D] both the dry density and water content of the compacted soil are within the desirable limits

90. When a retaining wall moves away from the back-fill, the pressure exerted on the wall is termed as

[A] passive earth pressure

[B] swelling pressure

[C] pore pressure

[D] active earth pressure

91. Darcy's law for groundwater movement states that the velocity is proportional to

[A] the hydraulic gradient

[B] the square of the hydraulic gradient

[C] the logarithm of the hydraulic gradient

[D] the reciprocal of the hydraulic gradient

92. A long pipe is bored or drilled deep into the ground, intercepting one or more water-bearing strata, is called

[A] tube wells

[B] shallow wells

[C] deep wells

[D] None of the above

93. Which formula is commonly used to calculate the major head loss due to friction in a pipe?

[A] Chezy's formula

[B] Darcy-Weisbach formula

[C] Bernoulli's equation

[D] Hagen-Poiseuille equation

94. A rectangular channel with a width of 6 m and a depth of 3 m has a bed slope of 1 in 2000. If Chezy's constant (C) is 55, calculate the discharge (Q) through the channel.

[A] 18.5 m^3/s

[B] 27.1 m^3/s

[C] 35.4 m^3/s

[D] 42.0 m^3/s

95. A notch is typically defined as an opening in the side of a tank or reservoir such that the liquid surface is _____ the top edge of the opening.

[A] above

[B] below

[C] level with

[D] None of the above

96. The design capacity of most major components of a water treatment plant is based on which specific demand measure?

[A] Average daily demand

[B] Minimum daily demand

[C] Maximum daily demand

[D] Peak hourly demand

97. Which pipe material is widely known for its exceptional corrosion resistance and durability, making it suitable for aggressive soils and long service life, though it has a higher initial cost?

[A] Cast Iron

[B] Galvanized Iron (GI)

[C] Copper

[D] Asbestos Cement

98. Centrifugal pump that increases the kinetic energy of a fluid using a rotating impeller and then converts this energy to

[A] pressure energy

[B] hydrostatic energy

[C] potential energy

[D] buoyancy energy

99. Reciprocating pumps (piston pumps) are known for their ability to generate very high pressure at relatively _____ flow rates.

[A] high

[B] low

[C] medium

[D] None of the above

100. The defining feature of a 'water-sealed latrine' is the presence of a 'trap' that holds a small amount of water. The purpose of this water seal is to

[A] help flush the excreta away more quickly

[B] prevent foul odors and insects from coming up through the pan/ commode

[C] disinfect the waste before it enters the pit or septic tank

[D] indicate when the pit is full and needs emptying

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(PAPER—II)

Question Booklet Number

Series : a

Time : 3 Hours **Maximum Marks : 300**

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1. The ratio between rolling resistance and dynamic weight of a tractor is called

[A] tractive efficiency

[B] wheel slip

[C] coefficient of rolling resistance

[D] rim pull

2. The mechanical device used to control engine speed is known as

[A] governor

[B] carburettor

[C] spark plug

[D] camshaft

3. Muffler is provided in a tractor to control

[A] fuel consumption

[B] engine speed

[C] vibration

[D] engine noise

4. In a typical 4-stroke spark-ignition engine, what is the speed relationship between the camshaft and the crankshaft?

[A] Camshaft rotates at the same speed as the crankshaft

[B] Camshaft rotates at half the speed of the crankshaft

[C] Camshaft speed is unrelated to crankshaft speed

[D] Camshaft rotates at twice the speed of the crankshaft

5. The thermostat valve is a component of which system?

[A] Fuel supply system

[B] Lubrication system

[C] Cooling system

[D] Ignition system

6. In Arunachal Pradesh, which is the key focus of farm mechanization due to jhum (shifting) cultivation practices?

[A] Large-scale combine harvesters

[B] Power tillers and small hill-friendly tools

[C] Heavy disc ploughs

[D] Automatic seed planters

7. The Diesel Particulate Filter (DPF) in modern tractors is used for

[A] fuel cooling

[B] particulate removal from exhaust

[C] fuel injection

[D] air filtration

8. A tractor delivers 35 kW at drawbar with 50% drawbar efficiency. Engine power is approximately

[A] 35 kW

[B] 18 kW

[C] 70 kW

[D] 60 kW

9. If the weight of a body is 98.1 N on Earth, then its mass is approximately

[A] 9 kg

[B] 11 kg

[C] 10 kg

[D] 9.81 kg

10. Pressure at 1 m depth in water (density of water (ρ) =1000 kg/m^3) is

[A] 39.24 kPa

[B] 9.81 kPa

[C] 19.62 kPa

[D] 98.10 kPa

11. A tractor pulls with 18 kN at 2.0 m/s. Power is

[A] 36 kW

[B] 18 kW

[C] 9.0 kW

[D] 72 kW

12. A force of 600 N acts at 30° with horizontal. Its component normal to the surface is

[A] 150.0 N

[B] 260.5 N

[C] 300.0 N

[D] 519.6 N

13. The length of a line measured with a 20 m chain is 100 m. If the chain is 10 cm too long, what is the true length of the line?

[A] 100 m

[B] 100.5 m

[C] 99.50 m

[D] 105.0 m

14. For an embankment where cross-sectional areas A_1, A_2, A_3, ..., A_n are spaced at a constant interval d, the volume (V) by Simpson's one-third rule (prismoidal formula) is

[A] $V = d\left[\frac{A_1 + A_n}{2} + A_2 + A_3 \cdots\cdots + A_{n-1}\right]$

[B] $V = d\left[A_1 + A_n + 2\sum A_{\text{odd}} + 4\sum A_{\text{even}}\right]$

[C] $V = \frac{d}{3}\left[A_1 + A_n + 4\sum A_{\text{even}} + 2\sum A_{\text{odd}}\right]$

[D] $V = \frac{d}{6}\left[A_1 + A_n + 2\sum A_{\text{even}} + 4\sum A_{\text{odd}}\right]$

15. Modern Electronic Distance Measurement (EDM) instruments in total stations primarily work on the principle of measuring

[A] the time taken by electromagnetic waves to travel to a target and back

[B] the change in atmospheric temperature along the line of sight

[C] the change in magnetic field around the instrument

[D] mechanical vibrations in the line of sight

16. Which file format commonly stores vector features like fields, wells and canals in desktop GIS?

[A] CSV of elevation values

[B] Shapefile

[C] JPEG

[D] GeoTIFF

17. Using the trapezoidal (average end area) formula, the volume of earthwork between end areas A_1 = 10 m^2, and A_2 = 30 m^2 over a spacing of 40 m is

[A] 400 m^3

[B] 3200 m^3

[C] 800 m^3

[D] 1600 m^3

18. What does a Digital Elevation Model (DEM) primarily represent?

[A] Underground water tables

[B] Ground elevation values

[C] Surface temperature variations

[D] Land cover categories

19. The implement mounted on a three-point linkage is known as a/an _____ implement.

[A] trailed

[B] mounted

[C] semi-mounted

[D] offset

20. Planter differs from seed drill by

[A] power source

[B] fuel type

[C] precision placement of seeds

[D] depth of operation

21. UAV-based spraying is mainly used for

[A] wheat sowing

[B] targeted pesticide application

[C] land levelling

[D] tillage

22. Combine harvester performs

[A] harvesting only

[B] harvesting + baling

[C] harvesting + threshing + cleaning

[D] drying

23. Power Take-Off (PTO) speed on standard tractors is

[A] 360 rpm

[B] 450 rpm

[C] 540 rpm

[D] 550 rpm

24. A rigid body with zero net force ($\Sigma F = 0$), but non-zero net moment ($\Sigma M \neq 0$)

[A] is in equilibrium

[B] moves linearly

[C] remains at rest

[D] rotates

25. What is the main purpose of a Free Body Diagram (FBD) while analyzing a static object?

[A] To calculate the object's mass and density

[B] To visually isolate the object and represent all external forces acting on it

[C] To show the object's motion over time

[D] To display the internal stresses within the object's material

26. Instantaneous centre of rotation is used in

[A] statics

[B] rigid-body kinematics

[C] friction

[D] centroid problems

27. A 4-kg body accelerates from 2 m/s to 6 m/s in 2 s. Force applied is

[A] 8 N

[B] 4 N

[C] 12 N

[D] 16 N

28. Moment of inertia of a thin rod (length L, axis through centre) is

[A] mL^2

[B] $mL^2/6$

[C] $mL^2/12$

[D] $mL^2/32$

29. A 300 N block rests on a horizontal surface with coefficient of friction $\mu = 0.35$. The limiting friction is

[A] 85 N

[B] 210 N

[C] 140 N

[D] 105 N

30. The centroid of a semicircle (radius r) from its base is

[A] r

[B] $2r/3$

[C] $4r/(3\pi)$

[D] $\pi r/4$

31. A uniform plate has an area 0.6 m^2 and density 1000 kg/m^3. Mass (thickness 6 mm) is approximately

[A] 2.8 kg

[B] 2.0 kg

[C] 3.6 kg

[D] 4.2 kg

32. Firing order of a typical 6-cylinder engine is

[A] 1-2-3-4-5-6

[B] 1-3-4-6-2-5

[C] 1-3-2-6-4-5

[D] 1-5-3-6-2-4

33. Diesel fuel cetane number indicates

[A] fuel viscosity

[B] ignition quality

[C] volatility

[D] sulphur content

34. Field capacity =

[A] Depth × Width

[B] Weight × Draft

[C] Speed × Efficiency

[D] Width × Speed

35. Moisture removal in drying mainly occurs by

[A] freezing

[B] bending

[C] evaporation

[D] sedimentation

36. In milling of pulses, husk is removed by

[A] freezing

[B] flailing

[C] abrasion

[D] drying

37. The basic mode of heat transfer in dryers is

[A] conduction only

[B] convection + conduction + radiation

[C] radiation only

[D] adsorption

38. High-Temperature Short-Time (HTST) milk pasteurization is done at

[A] 92 °C for 15 seconds

[B] 85 °C for 15 seconds

[C] 72 °C for 15 seconds

[D] 100 °C for 15 seconds

39. Which equipment is most suitable for achieving the separation of mustard seeds from wheat?

[A] Disc separator

[B] Magnetic separator

[C] Spiral separator

[D] Roll separator

40. A bucket elevator is mainly used for

[A] horizontal transportation of materials

[B] vertical transportation of bulk materials

[C] mixing of materials

[D] crushing of materials

41. Buoyant force equals the

[A] weight of object

[B] weight of displaced fluid

[C] volume of object

[D] flow rate

42. Reynolds number represents

[A] gravity effects

[B] the ratio of inertial to viscous forces

[C] heat transfer

[D] capillarity

43. Froude number is important in

[A] pipe flow

[B] open-channel flow

[C] high-speed gas flow

[D] heat exchangers

44. Void ratio is

[A] volume of solids / volume of voids

[B] total volume / void volume

[C] water volume / solid volume

[D] volume of voids / volume of solids

45. If the void ratio of a soil is $e = 0.50$ and the porosity is n, then the porosity is

[A] 30.50%

[B] 185.70%

[C] 33.33%

[D] 53.80%

46. If the saturated unit weight of soil is $\gamma_{sat} = 19.5\ kN/m^3$ and the unit weight of water is $\gamma_w = 9.81\ kN/m^3$, then the submerged unit weight γ' of the soil is approximately

[A] $8.2\ kN/m^3$

[B] $9.7\ kN/m^3$

[C] $19.5\ kN/m^3$

[D] $12.8\ kN/m^3$

47. Darcy's law for one-dimensional saturated flow with standard notations is often written as $q = -K\frac{dh}{dx}$. What does the negative sign physically indicate?

[A] The cross-sectional area is decreasing

[B] Flow occurs from high head to low head

[C] Hydraulic conductivity is always negative

[D] Flow accelerates as head increases

48. A soil sample has coefficient of permeability $k = 1.5 \times 10^{-4}$ m/s and cross-sectional area $A = 0.02$ m^2. If the hydraulic gradient $i = 0.35$, then the discharge Q through the sample is

[A] 1.05×10^{-5} m^3/s

[B] 1.05×10^{-6} m^3/s

[C] 1.05×10^{-7} m^3/s

[D] 1.05×10^{-8} m^3/s

49. Active earth pressure occurs when the

[A] wall moves towards soil

[B] wall rotates into soil

[C] wall is fixed

[D] wall moves away from soil

50. If the bulk unit weight of soil is $\gamma = 15$ kN/m^3, the depth $z = 3$ m and the coefficient of active earth pressure $K_a = 0.50$, then the active earth pressure at the bottom is approximately

[A] 22.5 kN/m^2

[B] 24 kN/m^2

[C] 3.0 kN/m^2

[D] 15 kN/m^2

51. Capillary rise is highest in

[A] gravel

[B] sand

[C] clay

[D] crushed stone

52. For a given soil sample, the volume of solids V_s is 0.04 m^3 and the volume of voids V_v is 0.02 m^3. What is the void ratio e?

[A] 1.5

[B] 2.0

[C] 0.5

[D] 0.67

53. A soil layer has unit weight $\gamma = 17$ kN/m^3. At a depth of 4 m, the pore water pressure is $u = 15$ kPa. The total vertical stress at this depth is

[A] 50 kPa

[B] 54 kPa

[C] 68 kPa

[D] 72 kPa

54. Duty of water refers to

[A] water depth stored

[B] yield per hectare

[C] area irrigated per cumec

[D] field capacity

55. Irrigation efficiency increases when

[A] losses increase

[B] percolation increases

[C] conveyance losses decrease

[D] tail-water increases

56. Irrigation scheduling is based on

[A] crop cost

[B] tractor size

[C] soil moisture and crop stage

[D] market demand

57. Drip irrigation mainly reduces

[A] yield

[B] evaporation losses

[C] irrigation uniformity

[D] fertilizer efficiency

58. If flow velocity = 0.45 m/s in a channel of area 0.2 m^2, then discharge is

[A] 0.04 m^3/s

[B] 0.09 m^3/s

[C] 0.18 m^3/s

[D] 0.24 m^3/s

59. The base period of a crop is

[A] weeks from sowing

[B] the time between two successive irrigations

[C] the soil moisture period

[D] the storage interval

60. Furrow irrigation is most suitable for

[A] paddy

[B] wheat

[C] potato

[D] tea

61. Conveyance losses are largest in

[A] lined canals

[B] unlined canals

[C] pipes

[D] sprinklers

62. A field requires 3600 m^3 of water. If the canal delivers 0.6 m^3/s, then the time required to supply this volume is

[A] 1 hour

[B] 1 hour 40 minutes

[C] 2 hours 10 minutes

[D] 3 hours 15 minutes

63. Drainage coefficient refers to

[A] rainfall rate

[B] depth of water removed per day

[C] infiltration rate per day

[D] saturation level/irrigation depth

64. Hydraulic conductivity represents

[A] soil density

[B] ease of water movement through soil

[C] water absorption

[D] evaporation

65. Mole drains are installed in

[A] heavy clay soils

[B] peaty soils

[C] sand

[D] gravel

66. Gypsum is applied mainly for the reclamation of

[A] saline soils

[B] alkali (sodic) soils

[C] acidic soils

[D] gravel soils

67. For pipe drains, typical spacing decreases when

[A] soil is sandy

[B] slope increases

[C] rainfall is low

[D] soil has low permeability

68. Precision farming is based on the concept of

[A] uniform field management

[B] traditional farming

[C] site-specific crop management

[D] manual farming

69. Tile drains in agricultural fields are typically placed at a depth of about

[A] 1.0–1.5 m

[B] 3.0–5.0 m

[C] 0.1–0.3 m

[D] 6.0–10 m

70. Capillary rise is inversely proportional to

[A] temperature

[B] permeability

[C] drain depth

[D] pore size

71. Surface drainage is ***not*** suitable in

[A] paddy fields

[B] sandy soils with high infiltration

[C] flat wetlands

[D] shallow-rooted crops

72. A pumping test determines

[A] water colour

[B] soil electrical conductivity

[C] aquifer parameters

[D] crop demand

73. If the initial (static) water level in a well is 18 m below the ground surface and during pumping the water level falls to 23 m, then the drawdown is

[A] 18 m

[B] 5 m

[C] 23 m

[D] 41 m

74. For unconfined aquifers, Dupuit's equation calculates

[A] total porosity

[B] soil moisture

[C] capillary rise

[D] discharge to a well

75. In real scenario, the suction head of a centrifugal pump cannot exceed approx.

[A] 2 m

[B] 4 m

[C] 7 m

[D] 12 m

76. A pump delivers 30 L/s against a head of 25 m. If the efficiency is 70%, then the power required is

[A] 5 kW

[B] 10.5 kW

[C] 7 kW

[D] 14 kW

77. A centrifugal pump's characteristic curve gives relation between

[A] soil and water

[B] speed and torque

[C] head, discharge and efficiency

[D] power, efficiency and torque

78. Step-drawdown test helps in finding

[A] aquifer boundary

[B] soil density

[C] well losses

[D] water temperature

79. Discharge of a centrifugal pump increases with

[A] increased head

[B] decreased head

[C] increase in viscosity

[D] decrease in temperature

80. The specific speed of a centrifugal pump depends on

[A] speed and discharge only

[B] speed, discharge and head

[C] head and discharge only

[D] speed and head only

81. Cavitation is caused when

[A] pressure falls below vapour pressure

[B] pressure increases

[C] velocity decreases

[D] water purity increases

82. In a confined aquifer, water level in a well

[A] equals water table

[B] rises above aquifer top

[C] falls below aquifer bottom

[D] always remains constant

83. A hyetograph represents

[A] runoff vs. time

[B] water table vs. time

[C] rainfall intensity vs. time

[D] soil moisture vs. depth

84. According to Horton's equation, the infiltration capacity of a soil during a storm typically

[A] increases linearly with time

[B] remains constant with time

[C] decreases exponentially with time

[D] oscillates with rainfall intensity only

85. A 25-mm rainfall over 3 hectares gives a total rainfall volume of

[A] 250 m^3

[B] 350 m^3

[C] 750 m^3

[D] 1200 m^3

86. SCS Curve Number (CN) depends on

[A] air humidity

[B] latitude

[C] temperature

[D] land use, soil type and antecedent moisture

87. A field receives 40 mm of rainfall. If the runoff coefficient is 0.10, then the depth of runoff is

[A] 10 mm

[B] 4.0 mm

[C] 20 mm

[D] 40.0 mm

88. In the Universal Soil Loss Equation (USLE), the soil erodibility factor *K* mainly depends on

[A] rainfall

[B] crop residue

[C] vegetation

[D] soil erodibility

89. Mulching helps in

[A] reducing evaporation and conserving moisture

[B] raising soil temperature always

[C] increasing soil crust

[D] increasing runoff

90. Zero tillage helps by

[A] increasing soil crust

[B] minimizing soil disturbance and conserving moisture

[C] eliminating residues

[D] slowing germination

91. Protected cultivation structures include

[A] trenches

[B] polyhouses and shade nets

[C] clouds

[D] wells

92. Moment of inertia increases when

[A] mass moves closer to the axis

[B] mass moves away from the axis

[C] density decreases

[D] velocity increases

93. Which type of furrow opener in a seed drill is used for reduced tillage/zero tillage?

[A] Reversible shovel type

[B] Hoe type

[C] Inverted T-type

[D] Disc type

94. A diesel engine has an Indicated Power (IP) of 32 kW and a mechanical efficiency of 72%. The Brake Power (BP) is approximately

[A] 20.4 kW

[B] 23.0 kW

[C] 26.8 kW

[D] 29.9 kW

95. The main function of a mouldboard plough is

[A] soil cutting, lifting and inversion

[B] soil cutting and lifting

[C] soil lifting and inversion

[D] soil cutting and pulverization

96. A rotavator performs

[A] cutting and mixing

[B] inversion and lifting

[C] cutting, pulverization and mixing

[D] mixing and pulverization

97. Straw walkers in a combine help in

[A] cutting straw

[B] separating grains from straw

[C] drying straw

[D] feeding crop

98. Hammer mill type chaff cutters cut forage by

[A] shear action

[B] thrust action

[C] impact action

[D] compression

99. The depth of ploughing is primarily controlled by

[A] drawbar

[B] coulter

[C] gauge wheel or tail wheel

[D] sieve

100. The ideal pH range for most hydroponic crops is

[A] 3.0–4.0

[B] 4.5–5.0

[C] 5.5–6.5

[D] 7.5–8.5

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6. **Candidates are strictly prohibited to possess any book, notebook or loose paper, calculator, mobile phone, any electronic gadget, digital wristwatch etc. inside the Examination Hall, except his/her Unique ID, Admit Card and writing materials only.**
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8. Violation of any of the above Rules will render the candidate liable to be expelled and disqualified from the Examination and according to the nature and gravity of his/her offence, he/she may be debarred from future Examinations and interviews to be conducted by the Commission and other such organizations.

NB : CANDIDATES ARE ALLOWED TO TAKE THIS QUESTION BOOKLET WITH THEM ONLY AFTER COMPLETION OF 3 (THREE) HOURS OF EXAMINATION TIME.

DO NOT OPEN THE SEAL UNTIL INSTRUCTED TO DO SO

1. A sinusoidal voltage, $v = 50\sin\omega t$ is applied to a series *RL* circuit. The current in the circuit is given by $i = 40\sin(\omega t - 60°)$. The average power is

[A] 2000 W

[B] 150 W

[C] 250W

[D] 500 W

2. Which one of the following materials is commonly used as the core of a transformer?

[A] Silicon Steel

[B] Aluminium

[C] Carbon steel

[D] Stainless steel

3. In an indicating instrument, the purpose of damping torque is to

[A] start pointer movement

[B] bring pointer to final position quickly

[C] oppose deflecting torque

[D] increase instrument range

4. Match the DC machine parts with its functions. Select the ***correct*** answer using the code given below the lists :

List-1 (Part)	**List-2 (Functions)**
(p) Interpoles	*(i)* Mechanical support and magnetic path
(q) Commutator	*(ii)* Reverses current in armature coil
(r) Armature winding	*(iii)* Reduces armature reaction during commutation
(s) Yoke	*(iv)* Induces EMF

Code **:**

	(p)	*(q)*	*(r)*	*(s)*
[A]	*(iv)*	*(iii)*	*(ii)*	*(i)*
[B]	*(iii)*	*(ii)*	*(iv)*	*(i)*
[C]	*(iv)*	*(iii)*	*(i)*	*(ii)*
[D]	*(iii)*	*(ii)*	*(i)*	*(iv)*

5. Which one of the following is ***not*** a type of estimate used in electrical works?

[A] Supplementary estimate

[B] Detailed estimate

[C] Abstract estimate

[D] Statistical estimate

6. Ferranti effect is observed in a transmission line when

[A] load is unity power factor

[B] load is heavy

[C] line is short in length

[D] line is long and lightly loaded

7. Consider the following statements :

(i) Synchronous motor runs at constant speed independent of load.

(ii) Induction motor's speed varies with load.

(iii) Single-phase motor has rotating magnetic field at start.

(iv) Synchronous motor can operate at leading power factor.

(v) Induction motor requires DC excitation.

Correct statements are

[A] *(i)*, *(ii)* and *(iv)* only

[B] *(ii)*, *(iii)* and *(v)* only

[C] *(i)*, *(iii)* and *(iv)* only

[D] *(ii)*, *(iv)* and *(v)* only

8. A single-phase full-wave mid-point thyristor converter uses a 230/200 V transformer with centre tap on the secondary side (100–0–100 V). The Peak Inverse Voltage (PIV) per thyristor is

[A] 100 V

[B] 282.8 V

[C] 200 V

[D] 141.4 V

9. Potential transformers are used to measure

[A] high voltages

[B] low voltages

[C] high currents

[D] low currents

10. In a hydroelectric power station, the function of the surge tank is to

[A] improve generator power factor

[B] reduce water hammer effect

[C] increase turbine speed

[D] maintain synchronous speed

11. A voltage waveform is given by $v(t) = \left[2\sqrt{2} + 2\sin(\omega t) - 2\sin(3\omega t)\right]$ volts. This voltage is measured using a moving-coil voltmeter (reading V_1) and a moving-iron voltmeter (reading V_2). Then V_1 and V_2 values respectively are

[A] $8\text{V}, 16\text{V}$

[B] $2\sqrt{2}\,\text{V}, 3\sqrt{2}\,\text{V}$

[C] $2\sqrt{2}\,\text{V}, 2\sqrt{3}\,\text{V}$

[D] $4\,\text{V}, 2\sqrt{2}\,\text{V}$

12. In a DC shunt motor, the torque is proportional to

[A] $I_a R_a$

[B] I_a^2

[C] $\phi^2 I_a$

[D] ϕI_a

13. Overhead charges in an electrical estimate include

(i) office rent and administrative expenses

(ii) labour wages for wiring

(iii) depreciation of tools and equipment

(iv) cost of transportation of materials

(v) contractor's profit

From the above, the ***correct*** answer is

[A] *(i)*, *(iii)* and *(iv)* only

[B] *(i)*, *(ii)* and *(iv)* only

[C] *(i)*, *(iii)* and *(v)* only

[D] *(ii)*, *(iii)* and *(iv)* only

14. Energy consumed by a domestic consumer is measured in

[A] kVA

[B] kVArh

[C] kWh

[D] watt

15. Hysteresis loss in magnetic materials is proportional to

[A] permeability

[B] resistivity

[C] slope of B–H curve

[D] area of B–H curve

16. A winding is distributed in the slots along the air-gap periphery

(i) to add mechanical strength to the winding

(ii) to reduce the amount of conductor material required

(iii) to reduce the harmonics in the generated e.m.f.

(iv) to reduce the size of the machine

(v) for full utilization of iron and conductor materials

From the above, the ***correct*** answer is

[A] *(i)*, *(iii)*, *(iv)* and *(v)* only

[B] *(i)*, *(ii)*, *(iv)* and *(v)* only

[C] *(i)*, *(ii)*, *(iii)* and *(v)* only

[D] *(i)*, *(iii)* and *(v)* only

17. Above the Curie temperature, a ferromagnetic material

[A] becomes ferrimagnetic

[B] becomes paramagnetic

[C] becomes diamagnetic

[D] remains ferromagnetic

18. Which one of the following electrodes is used for pipe earthing?

[A] Hollow GI rod

[B] Solid steel rod

[C] Solid GI rod

[D] Solid copper rod

19. In rural LT distribution systems, earthing is required for

(i) transformer neutral point

(ii) distribution poles

(iii) consumer appliance metal bodies

(iv) phase conductor

(v) street-light poles

The ***correct*** statements are

[A] *(i)*, *(ii)*, *(iii)* and *(v)* only

[B] *(ii)*, *(iii)* and *(iv)* only

[C] *(i)*, *(iii)* and *(iv)* only

[D] *(i)*, *(iv)* and *(v)* only

20. Which among the following devices is the most suited for high-frequency applications?

[A] BJT

[B] IGBT

[C] MOSFET

[D] SCR

21. In a synchronous motor, the damper winding

(i) provides starting torque

(ii) reduces oscillations in rotor speed

(iii) supplies field current during steady state

(iv) acts as squirrel-cage during starting

(v) causes the motor to run above synchronous speed

From the above, the ***correct*** statements are

[A] *(i)*, *(iii)* and *(v)* only

[B] *(ii)*, *(iii)* and *(iv)* only

[C] *(i)*, *(ii)* and *(v)* only

[D] *(i)*, *(ii)* and *(iv)* only

22. The sag of an overhead line is inversely proportional to

[A] span length

[B] weight of the conductor

[C] square of span length

[D] tension in the conductor

23. The working principle of a Megger is based on

[A] Ohm's law

[B] DC permanent magnet moving coil

[C] generator action (hand-driven)

[D] thermal effect

24. If the bridge shown in the **Fig. 1** is balanced, then the current supplied by battery is

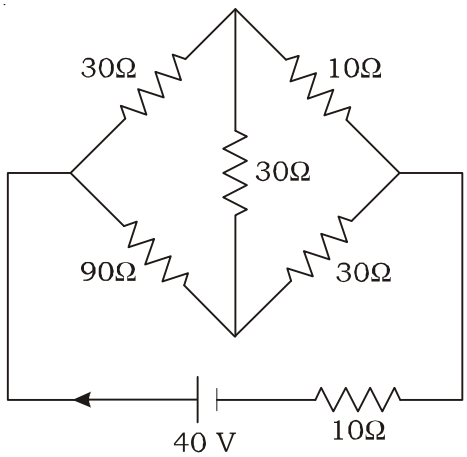

Fig. 1

[A] 2.0 A

[B] 1.0 A

[C] 0.5 A

[D] 0.4 A

25. Turn-on time for an SCR is 10 μsec . If an inductance is inserted in the anode circuit, then the turn-on time will be

[A] 10 μsec

[B] 5 μsec

[C] more than 10 μsec

[D] less than 10 μsec

26. Phase splitting is achieved in single-phase induction motors with the help of

[A] inductors

[B] capacitors

[C] resistors

[D] diodes

27. Three coils having self-inductances and mutual inductances are connected as shown in **Fig. 2.** The total inductance of the coil is

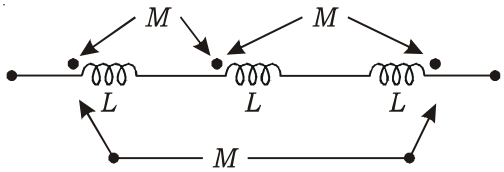

Fig. 2

[A] $3L + 4M$

[B] $3L - 4M$

[C] $3L + 2M$

[D] $3L - 2M$

28. Double-field revolving theory states that a pulsating field is equivalent to

[A] two unequal rotating fields

[B] two stationary fields

[C] two equal fields rotating in opposite directions

[D] one rotating and one stationary field

29. A 200 V shunt DC motor runs at a speed where the back e.m.f. is 180 V. Armature resistance (including brushes contact) is 0.4 Ω . The armature current at this operating point is

[A] 100 A

[B] 50 A

[C] 150 A

[D] 500 A

30. A series *RLC* circuit has quality factor $Q = 25$ at a resonant frequency of 5 kHz. The bandwidth of the circuit is

[A] 200 Hz

[B] 100 Hz

[C] 50 Hz

[D] 5000 Hz

31. In a domestic wiring plan, the main factor for selecting cable size is

[A] colour of insulation

[B] number of bends

[C] current-carrying capacity and voltage drop

[D] appearance of cable

32. A material with negative temperature coefficient of resistance is

[A] copper

[B] tungsten

[C] silicon

[D] aluminium

33. An EHV transmission line operates at 400 kV. If the surge impedance of the transmission line is $200\,\Omega$, then Surge Impedance Loading (SIL) is

[A] 400 MW

[B] 800 MW

[C] 1200 MW

[D] 1600 MW

34. A practical capacitor is represented by an ideal capacitor of capacitance value $2\,\mu F$ and a series resistance of $1\,k\Omega$. The dissipation factor of the capacitor at 50 Hz is

[A] 0.63

[B] 1.60

[C] 0.11

[D] 9.10

35. Unit of solar irradiance is

[A] watt

[B] watt-hour

[C] watt/m^2

[D] joules

36. The material commonly used as sheath for high voltage cables is

[A] lead

[B] copper

[C] aluminium

[D] iron

37. In a single-phase fully controlled rectifier with continuous current, for what value of firing angle α, the average output voltage becomes zero?

[A] 0°

[B] 45°

[C] 60°

[D] 90°

38. A single-phase induction motor is ***not*** self-starting because

[A] the stator produces a pulsating magnetic field at standstill

[B] rotor current is absent at standstill due to zero induced e.m.f.

[C] slip at starting is equal to unity, resulting in zero electromagnetic torque

[D] slip is zero

39. A DC circuit is delivering maximum power to a load. The efficiency of the circuit is

[A] 100%

[B] 50%

[C] 75%

[D] 25%

40. In a thyristor (SCR), the magnitude of anode current will

[A] increase if gate current is increased

[B] decrease if gate current is decreased

[C] increase if gate current is decreased

[D] not change with any variation in gate current

41. The Wheatstone bridge is most suitable for measurement of

[A] very low resistances

[B] medium range resistances

[C] very high resistances

[D] insulation resistance of cables

42. A 1-phase load takes 2 kW power at a lagging power factor of 0.5. The kVA rating of the load is

[A] 4 kVA

[B] 8 kVA

[C] 12 kVA

[D] 1 kVA

43. In domestic wiring installation, conduit wiring is preferred because

(i) it gives better mechanical protection

(ii) it allows future extension and replacements

(iii) it reduces material estimation and cost

(iv) it is suitable for damp and outdoor locations

(v) it strictly follows IE Rules for fire safety

From the above statements, the ***correct*** option is

[A] *(i)*, *(ii)*, *(iii)* and *(v)* only

[B] *(i)*, *(ii)* and *(iii)* only

[C] *(ii)*, *(iii)*, *(iv)* and *(v)* only

[D] *(i)*, *(ii)*, *(iv)* and *(v)* only

44. The current I in the circuit shown in **Fig. 3** is

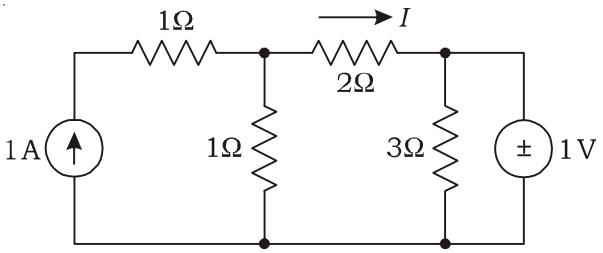

Fig. 3

[A] 1.00 A

[B] –1.00 A

[C] 0.33 A

[D] 0.00 A

45. LED lamps operate on

[A] both AC supply and DC supply

[B] AC supply only

[C] DC supply only

[D] high frequency AC supply

46. In a thermal plant, "forced draft fan" is used to

[A] supply air to furnace

[B] supply steam to turbine

[C] remove ash from boiler

[D] increase vacuum in condenser

47. Match the damping method with the instrument. Select the ***correct*** answer using the code given below the lists :

List-1	**List-2**
(p) Air-friction damping	*(i)* Induction type meter
(q) Eddy-current damping	*(ii)* PMMC
(r) Fluid damping	*(iii)* Hydraulic instruments
(s) Electromagnetic damping	*(iv)* Portable MI instrument

Code :

	(p)	*(q)*	*(r)*	*(s)*
[A]	*(iv)*	*(i)*	*(ii)*	*(iii)*
[B]	*(i)*	*(ii)*	*(iii)*	*(iv)*
[C]	*(iv)*	*(i)*	*(iii)*	*(ii)*
[D]	*(ii)*	*(iii)*	*(iv)*	*(i)*

48. Norton equivalent of a DC circuit consists of a

[A] current source and a series resistance

[B] voltage source and a series resistance

[C] current source and a parallel resistance

[D] voltage source and a parallel resistance

49. A single-phase full converter is fed with RLE type of motor load. The minimum requirement to turn-on the device (SCR) is

[A] $\alpha > 30^\circ$

[B] $V_m \sin(\alpha) > E$

[C] $V_m \sin(\alpha) < E$

[D] $\alpha < 30^\circ$

50. A fuse is a

[A] power limiting device

[B] power factor limiting device

[C] voltage limiting device

[D] current limiting device

51. A transmission line with line parameters, $A = 0.8, B = 20, C = 0.5 \times 10^{-6}, D = 1.25$ is operating at 400 kV at no load. The sending line current is

[A] 0.14 A

[B] 1.44 A

[C] 0.25 A

[D] 2.50 A

52. Thevenin's resistance across terminals A and B for the network shown in **Fig. 4** is

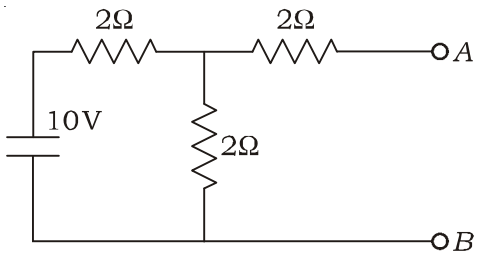

Fig. 4

[A] 2

[B] 3

[C] 4

[D] 6

53. Which of the following devices is used to minimize the effects of armature reaction?

[A] Rheostat

[B] Capacitor bank

[C] Interpoles

[D] Coupling transformer

54. Casing and capping wiring is mainly preferred because

[A] it is waterproof

[B] it allows easy extension and modification

[C] it is the cheapest of all methods

[D] it requires no insulation

55. Average value of the voltage waveform shown in **Fig. 5** is

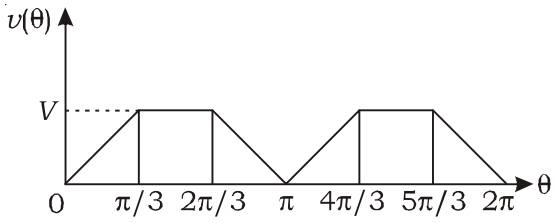

Fig. 5

[A] $V / 3$

[B] $V / \sqrt{3}$

[C] $2V / 3$

[D] $3V / 4$

56. BJT is a/an

[A] current-controlled device

[B] voltage-controlled device

[C] uncontrolled device

[D] frequency controlled device

57. A good conductor is characterized by

[A] wide band gap

[B] narrow band gap

[C] no band gap

[D] large forbidden energy

58. In hydropower plant and corresponding turbine selection, choose the ***correct*** option for the following :

Assertion (A) : Kaplan turbines are suitable for low-head and high-discharge hydroelectric stations.

Reason (R) : Kaplan turbines have adjustable runner blades which allow efficient operation over a wide range of water flow.

[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] **A** is false, but **R** is true

59. The value of the capacitance shown in the circuit **Fig. 6** which will make the unity power factor is

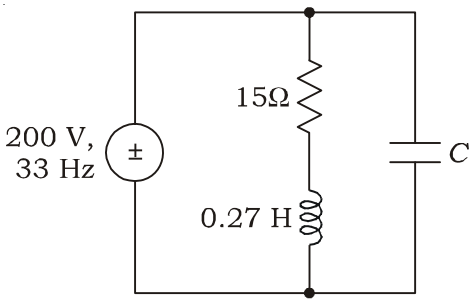

Fig. 6

[A] 890 μF

[B] 42.5 μF

[C] 0.1 μF

[D] 80 μF

60. TRIAC is a

[A] three-terminal unidirectional device

[B] two-terminal unidirectional device

[C] three-terminal bidirectional device

[D] two-terminal bidirectional device

61. Tenders are invited in electrical works for the following reasons :

(i) To select the lowest or most suitable bidder

(ii) To follow Government procurement norms

(iii) To check the earthing resistance of the installation

(iv) To ensure fairness and transparency in awarding work

(v) To determine the number of sub-circuits for a building

From the above, the ***correct*** answer is

[A] *(i)*, *(ii)* and *(iv)* only

[B] *(i)*, *(iii)* and *(iv)* only

[C] *(ii)*, *(iv)* and *(v)* only

[D] *(i)*, *(ii)* and *(v)* only

62. Reactive power sharing between parallel operation of three-phase alternators depends on

[A] speed

[B] governor setting

[C] excitation

[D] torque

63. For a resistive load, the input voltage to a single-phase half-wave controlled rectifier is $200\sin 100\pi t$ volt. For a firing angle of 60°, the average output voltage (in V) is

[A] $150/\pi$

[B] $250/\pi$

[C] $100/\pi$

[D] $50/\pi$

64. Which colour is used to indicate earth connection?

[A] Black

[B] Blue

[C] Red

[D] Green

65. A 3-phase balanced star-connected load consumes P watts of power from a balanced 3-phase supply. If the same load is now connected in delta, the power consumption from the same supply will be

[A] $\frac{1}{\sqrt{3}}P$

[B] $3P$

[C] $\sqrt{3}P$

[D] $\frac{1}{3}P$

66. The most commonly used material for overhead line insulators is

[A] Porcelain

[B] Mica

[C] PVC

[D] Asbestos

67. A moving iron ammeter has a full-scale angle of 90° at a current of 1 A. If the ammeter has a square law response, then the current corresponding to a deflection of 45° is

[A] 0.8 A

[B] 0.2 A

[C] 0.5 A

[D] 0.7 A

68. The permissible range of frequency as per IE rules is

[A] 48 Hz to 52 Hz

[B] 48.5 Hz to 51.5 Hz

[C] 49 Hz to 51 Hz

[D] 47.5 Hz to 52.5 Hz

69. Which one of the following materials has a strong permanent magnetic moment?

[A] Ferromagnetic material

[B] Ferrimagnetic material

[C] Diamagnetic material

[D] Paramagnetic material

70. In alternators, regardless of number of poles, pole pitch is always

[A] 180° mechanical

[B] 90° mechanical

[C] 180° electrical

[D] 90° electrical

71. The full-scale deflection current of an ammeter is 1 mA and its internal resistance is $100\,\Omega$. If the meter is to have full deflection at 5 A, the value of shunt resistance to be used is

[A] $2.00\,\Omega$

[B] $0.20\,\Omega$

[C] $50.0\,\Omega$

[D] $0.02\,\Omega$

72. In a series *RLC* circuit at resonance, which of the following is ***true***?

(p) Current is maximum.

(q) Impedance is purely resistive.

(r) Voltage across inductor equals voltage across capacitor.

(s) Power factor is zero.

[A] *(p)*, *(q)* and *(s)* only

[B] *(p)*, *(r)* and *(s)* only

[C] *(q)*, *(r)* and *(s)* only

[D] *(p)*, *(q)* and *(r)* only

73. Time constant of an *R-L* series circuit is given by

[A] RL

[B] R/L

[C] L/R

[D] R^2/L

74. Select the ***correct*** options from the concept of Magnetic Materials :

Assertion (A) : Ferromagnetic materials exhibit hysteresis when subjected to alternating magnetic fields.

Reason (R) : In ferromagnetic materials, magnetic domains get permanently aligned even after removal of the external magnetic field.

[A] Both **A** and **R** are true, but **R** is ***not*** the correct explanation of **A**

[B] Both **A** and **R** are true and **R** is the correct explanation of **A**

[C] **A** is true, but **R** is false

[D] **A** is false, but **R** is true

75. In open-circuit test of a transformer, the measured power gives

[A] eddy current loss

[B] copper loss at full load

[C] hysteresis and eddy current losses

[D] total losses

76. The input power to a 3-phase 4-pole 50 Hz induction motor is 125 kW. The motor runs at 5% slip. If the stator copper loss, stator iron loss and mechanical losses are 3 kW, 1.5 kW and 2 kW respectively, efficiency of the motor is

[A] 90%

[B] 98%

[C] 95%

[D] 85%

77. Hunting in an alternator is reduced by

[A] increasing number of poles

[B] providing damper winding on the rotor

[C] providing damper winding on the stator

[D] providing inter-poles

78. While measuring power of a balanced 3-phase system using two-wattmeter method, it is observed that the readings of the two wattmeters are equal. The power factor of the system is

[A] 1.00

[B] 0.00

[C] 0.50

[D] 0.86

79. In a DC machine, AC to DC conversion is obtained with the help of

[A] commutator

[B] wave winding

[C] lap winding

[D] brushes

80. For a synchronous motor operating at rated voltage and constant load, the armature current is minimum when the motor is operating at

[A] zero field current

[B] under-excited condition

[C] over-excited condition

[D] unity power factor

81. The locked rotor current in a 3-phase, wye-connected 15 kW, 4-pole 230 V, 50 Hz induction motor at rated conditions is 50 A. Neglecting losses and magnetizing current, the approximate locked rotor line current drawn when the motor is connected to a 236 V, 57 Hz supply is

[A] 40.00 A

[B] 45.00 A

[C] 55.00 A

[D] 60.00 A

82. The conductors usually used in transmission lines are

[A] steel wires

[B] aluminium wires

[C] copper wires

[D] ACSR wires

83. A single-phase transformer has a turn ratio 1 : 2 and is connected to a purely resistive load. The magnetizing current drawn is 1 A and the secondary current is 1 A. If core losses and leakage reactance are negligible, the primary current is

[A] 3.00 A

[B] 2.00 A

[C] 2.24 A

[D] 1.41 A

84. Running the motor at no load is ***not*** advisable for

[A] DC series motors

[B] DC shunt motors

[C] permanent magnet DC motors

[D] squirrel cage induction motors

85. While estimating a building wiring installation, the number of sub-circuits depends on

[A] ceiling height

[B] connected load

[C] painting colour

[D] type of flooring

86. Parallel operation of single-phase transformers requires

[A] equal iron losses

[B] equal kVA ratings

[C] equal polarity, same voltage ratio, same per-unit impedance

[D] same core material

87. In the **Fig. 7**, the value of current i is

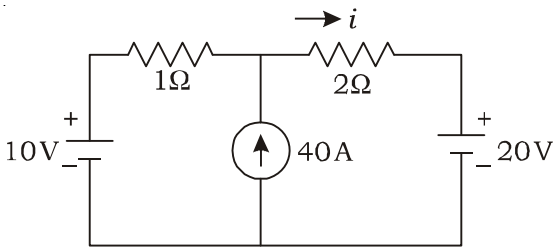

Fig. 7

[A] $\left(\frac{10}{3}+\frac{40}{3}-\frac{20}{3}\right)$ A

[B] $\left(\frac{10}{1}+\frac{40}{1}-\frac{20}{2}\right)$ A

[C] $\left(\frac{10}{3}+\frac{40}{3}+\frac{20}{3}\right)$ A

[D] $\left(\frac{10}{3}-\frac{40}{3}-\frac{20}{3}\right)$ A

88. The illumination on a surface at a distance of 2 m from a point source is 100 lux. What will be the illumination at a distance of 4 m from the same source?

[A] 75 lux

[B] 50 lux

[C] 25 lux

[D] 400 lux

89. A 3-phase 4-pole induction motor is supplied from a 3-phase 60 Hz AC supply. The motor speed at 6% slip is

[A] 1415 r.p.m.

[B] 1692 r.p.m.

[C] 1410 r.p.m.

[D] 1698 r.p.m.

90. The equivalent resistance between the terminals *a* and *b* in the circuit shown in **Fig. 8** is

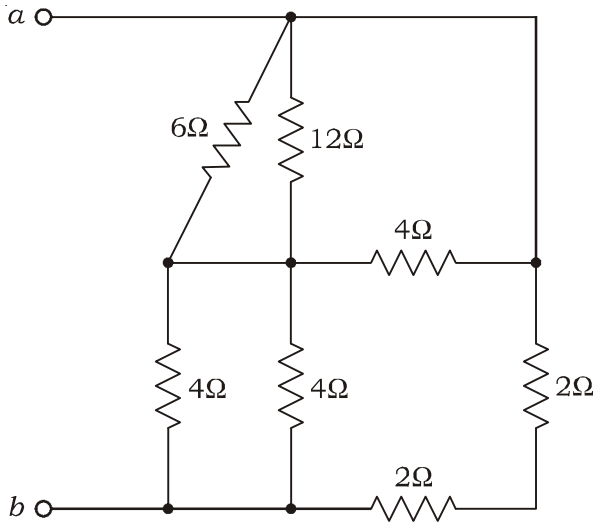

Fig. 8

[A] 2 Ω

[B] 4 Ω

[C] 6 Ω

[D] 8 Ω

91. In a distribution system, the commonly used feeder arrangement for high reliability is

[A] radial

[B] ring main

[C] interconnected

[D] mesh

92. If a 200 kVA, 400/200 V transformer has iron loss of 500 W and full-load copper loss of 2 kW, then the load (in kVA) at maximum efficiency is

[A] 100

[B] 1000

[C] 200

[D] 50

93. The dv/dt protection of an SCR is usually provided by

[A] freewheeling diode

[B] RC snubber

[C] series inductor

[D] Zener diode

94. Selenium is a/an

[A] insulator

[B] conductor

[C] superconductor

[D] semiconductor

95. In campus lighting design, the spacing between lamps depends mainly on

[A] pole material

[B] supply voltage

[C] lamp lumen output and mounting height

[D] number of phases

96. A thyristor once turned ON can be turned OFF by

[A] removing gate pulse

[B] reducing anode current below holding current

[C] applying negative gate current

[D] increasing forward voltage

97. Select the ***correct*** option regarding insulation resistance measurement:

Assertion (A) : Insulation resistance measurements are carried out using AC voltage.

Reason (R) : AC voltage would not introduce capacitive reactance and phase difference between voltage and current.

[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] **A** is false and **R** is also false

98. Voltage regulation of an alternator becomes negative when supplying

[A] lagging power factor load

[B] unity power factor load

[C] leading power factor load

[D] zero power factor load

99. Diesel power plants are best suited for

[A] base load

[B] peak load

[C] grid stability control

[D] pumped storage

100. A limited tender is normally invited, when

[A] work value is very high

[B] work is specialized and only few contractors are available

[C] work must be completed urgently

[D] the project is international

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(PAPER—II)

Question Booklet Number

Series : a

Time : 3 Hours **Maximum Marks : 300**

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1. The net change in internal energy in a steam power plant is

[A] zero

[B] positive

[C] negative

[D] infinity

2. In general, the Biot number (Bi) for a lumped capacity approximation during transient conduction should be

[A] $Bi \geq 1.0$

[B] $Bi \geq 0.1$

[C] $Bi \leq 0.1$

[D] $Bi \leq 1.0$

3. The critical pressure of water steam is

[A] 221.2 MPa

[B] 221.2 bar

[C] 221.2 Pa

[D] 221.2 GPa

4. For high-head hydroelectric plants, the turbine used is

[A] Kaplan

[B] Francis

[C] Pelton wheel

[D] Savonius

5. For a fully developed flow through a circular pipe of uniform cross-section, the relation between Darcy friction factor (f) and Fanning friction coefficient (C_f) is given by

[A] $f = 4C_f$

[B] $f = 8C_f$

[C] $f = 16C_f$

[D] $f = 64C_f$

6. The slip of a reciprocating pump is defined as

[A] difference between the theoretical discharge and actual discharge

[B] ratio of the actual discharge to the theoretical discharge

[C] sum of actual discharge and theoretical discharge

[D] multiplication of actual discharge and theoretical discharge

7. A gas turbine works on

[A] Stirling cycle

[B] Brayton cycle

[C] Rankine cycle

[D] Otto cycle

8. No heat engine can operate by exchanging heat from a single thermal energy reservoir. This is

[A] the Kelvin-Planck statement of second law of thermodynamics

[B] the Clausius statement of second law of thermodynamics

[C] the Joule's law

[D] the Carnot theorem

9. Steam at exit from the nozzle has

[A] high pressure and low velocity

[B] high pressure and high velocity

[C] low pressure and low velocity

[D] low pressure and high velocity

10. The maximum content of moisture allowed at the turbine exhaust in the steam power plant is

[A] 50%

[B] 40%

[C] 35%

[D] 15%

11. In a steam power plant, feedwater heater is a heat exchanger to preheat feedwater by

[A] extracting steam from the turbine

[B] extracting steam from the boiler

[C] hot air from the air preheater

[D] taking heat from atmosphere

12. Which of the following is based on the Zeroth law of thermodynamics?

[A] Entropy increase in isolated systems

[B] Heat transfer through conduction

[C] Mass transfer through diffusion

[D] Temperature measurement

13. Volumetric efficiency of a reciprocating compressor is defined as the ratio of actual volume of air to

[A] volume of air sucked in

[B] free air delivery

[C] swept volume

[D] clearance volume

14. In a flow through a circular pipe, the initiation of turbulence is usually observed at a Reynolds number

[A] 2×10^6

[B] 5×10^5

[C] between 5×10^5 and 2×10^6

[D] between 2000 and 2800

15. The useful power available at the engine output shaft (crankshaft) is known as

[A] indicated power

[B] friction power

[C] brake power

[D] horsepower

16. In a vapour compression refrigeration system, to ascertain that there is no droplet of liquid refrigerant being carried over into the compressor, it is recommended to

[A] superheating of vapour after the evaporator

[B] subcooling of liquid after the expansion

[C] supply additional wet refrigerant from outside

[D] cooling the vapour after the evaporator

17. For a heat engine operating on Carnot cycle, the work output is 1/4th of the heat rejected to the sink. The thermal efficiency of the engine would be

[A] 10%

[B] 20%

[C] 30%

[D] 40%

18. When an ideal gas is made to undergo a Joule-Kelvin expansion (i.e. throttling), there is no change in

[A] pressure

[B] entropy

[C] temperature

[D] density

19. A household refrigerator with COP of 1.2 removes heat from the refrigerated space at a rate of 60 kJ/min. The electric power consumed by the refrigerator is

[A] 0.02 kJ/min

[B] 72 kJ/min

[C] 50 kJ/min

[D] 0 kJ/min

20. In a cyclic process, heat transfers are 14.7 kJ, –25.2 kJ, –3.56 kJ and 31.5 kJ. The net work for this cycle process is

[A] 75.26 kJ

[B] –75.26 kJ

[C] 17.44 kJ

[D] –17.44 kJ

21. For any irreversible process, the net entropy change is

[A] zero

[B] positive

[C] negative

[D] undefined

22. In a Brayton cycle with multiple stages of compression, which of the following is adapted between the stages?

[A] Preheating

[B] Intercooling

[C] Regeneration

[D] Heating

23. In the van der Waals equation $\left(p+\frac{a}{v^2}\right)(v-b)=RT$, the constant b accounts for

[A] the finite volume occupied by the gas molecules

[B] the molecular forces of attraction

[C] the elastic collisions between the gas molecules

[D] the momentum of gas molecules in random manner

24. Reference fuels for knock rating of SI engines fuels would include

[A] iso-octane and α-methyl naphthalene

[B] normal octane and aniline

[C] iso-octane and normal hexane

[D] normal heptane and iso-octane

25. In four-stroke engines, the camshaft is connected to the crankshaft by gears or chain and rotates at

[A] double the crankshaft speed

[B] equal to the crankshaft speed

[C] three-fourth the crankshaft speed

[D] half the crankshaft speed

26. A device which is used to remove the impurities of water from the boiler is called

[A] economizer

[B] feed pump

[C] fusible plug

[D] blow off cock

27. The Otto cycle normally operates with a compression ratio in the range

[A] 6-10

[B] 25-30

[C] 2-4

[D] 35-45

28. The dimension of thermal diffusivity is given by

[A] $L^2\,T^{-1}$

[B] $M\,L\,T^{-2}$

[C] $M\,L^{-2}\,T$

[D] $L\,T^{-1}$

29. Euler's equation is based on the assumption that

[A] the fluid is non-viscous

[B] the fluid is homogeneous and incompressible

[C] the flow is continuous, steady and along the streamline

[D] All of the above

30. Barometer is used to measure

[A] pressure in water channels, pipes, etc.

[B] difference in pressure at two points

[C] atmospheric pressure

[D] very high pressure

31. Falling drops of water become spheres due to

[A] viscosity

[B] surface tension

[C] cohesion

[D] adhesion

32. In power plant, the process of adjustment of fluid flow with load is known as

[A] governing

[B] cavitation

[C] compounding

[D] loading

33. According to Stefan-Boltzmann law, the thermal radiation from a black body per unit area is directly proportional to the

[A] absolute temperature

[B] fourth power of the absolute temperature

[C] cube of the absolute temperature

[D] square of the absolute temperature

34. Bomb calorimeter is used to determine

[A] calorific value of solid and liquid fuels

[B] calorific value of gaseous fuels

[C] ash content of solid fuels

[D] incombustible matter in solid fuel

35. Reciprocating compressor is

[A] a dynamic action machine

[B] an axial displacement machine

[C] a positive displacement machine

[D] a negative displacement machine

36. The gases are considered incompressible when Mach number

[A] is equal to 1.0

[B] is equal to 0.5

[C] is more than 0.3

[D] is less than 0.3

37. Work done in a free expansion process is

[A] negative

[B] maximum

[C] minimum

[D] zero

38. In a Carnot cycle, the addition and rejection of heat take place at

[A] constant temperature

[B] constant pressure

[C] constant volume

[D] constant entropy

39. Which of the following is an intensive property of a thermodynamic system?

[A] Energy

[B] Volume

[C] Mass

[D] Temperature

40. An isentropic process is

[A] adiabatic and reversible

[B] adiabatic and irreversible

[C] isothermal and reversible

[D] isothermal and irreversible

41. In the ideal Rankine cycle, the steam that enters the condenser leaves as a

[A] wet steam

[B] saturated steam

[C] saturated liquid

[D] superheated steam

42. The velocity of a particle moving along the x-axis varies with distance x as $v = 2x - 5$. At the instant of zero acceleration, its velocity in m/s will be

[A] 0

[B] 2.5

[C] 0.4

[D] 10

43. A 1 kg block is resting on a surface with coefficient of friction $\mu = 0.1$. A force of 0.8 N is applied horizontally to the block. The frictional force is

[A] 0

[B] 0.8 N

[C] 0.89 N

[D] 0.98 N

44. For brittle materials, the most appropriate failure theory is

[A] maximum principal stress theory

[B] maximum shear stress theory

[C] maximum principal strain theory

[D] shear strain energy theory

45. A zero angle of friction implies that

[A] frictional force is infinite

[B] frictional force is zero

[C] frictional force acts normal to the plane

[D] frictional force acts along the direction of motion

46. Bending moment M and torque T are applied to a solid circular shaft. If the maximum bending stress due to bending moment (M) equals to double the maximum shear stress developed due to torque (T), then M is equal to

[A] $T/2$

[B] T

[C] $2T$

[D] $4T$

47. Two shafts, A and B, are made up of the same material. The diameter of shaft B is thrice that of shaft A. The ratio of power that can be transmitted by shaft A to that of shaft B is

[A] 1/8

[B] 1/16

[C] 1/27

[D] 1/64

48. In a cantilever beam with a point load at the free end, the maximum bending moment occurs at

[A] free end

[B] mid-span

[C] fixed end

[D] load point

49. Coplanar concurrent forces are those forces that

[A] meet at one point and their lines of action also lie on the same plane

[B] do not meet at one point, but their lines of action lie on the same plane

[C] meet at one point, but their lines of action do not lie on the same plane

[D] do not meet at one point, and their lines of action lie on the same plane

50. The impact strength of a material is an index of its

[A] hardness

[B] toughness

[C] resistance to corrosion

[D] fatigue strength

51. If the ratio of the diameter of the rivet hole to the pitch of rivets is 0.3, then the tearing efficiency of the joint is

[A] 50%

[B] 30%

[C] 70%

[D] 80%

52. Number of inversions for a slider-crank mechanism is

[A] 3

[B] 4

[C] 5

[D] 6

53. The ratio of the maximum shear stress to the average shear stress in a beam with a square cross-section is

[A] 1

[B] 2

[C] 3/2

[D] 2/3

54. For an isotropic, homogeneous and elastic material obeying Hooke's law, the number of independent elastic constants is

[A] 2

[B] 3

[C] 9

[D] 1

55. During inelastic collision of two particles, which one of the following is conserved?

[A] Total linear momentum only

[B] Total kinetic energy only

[C] Both linear momentum and kinetic energy

[D] Neither linear momentum nor kinetic energy

56. A ball is dropped from a height of 2.25 m on a smooth floor and it rises to a height of 1 m after the first bounce. The coefficient of restitution between the ball and the floor is

[A] 0.67

[B] 0.57

[C] 0.44

[D] 0.33

57. A mass at the end of a spring is displaced from its position and then released. The period of the resulting vibrations is certain to increase if

[A] spring constant is increased

[B] mass is decreased

[C] mass is increased

[D] initial displacement is increased

58. A vibrating system having damping factor unity is called

[A] critically-damped

[B] damping factor

[C] magnification factor

[D] logarithmic decrement

59. A certain minimum number of teeth is to be kept for a gear wheel

[A] so that the gear is of a good size

[B] for better durability

[C] to avoid interference and undercutting

[D] for better strength

60. In third-angle projection, the side view is placed

[A] to the left of the front view

[B] to the right of the front view

[C] below the top view

[D] above the top view

61. Which line is used for drawing visible outlines and visible edges?

[A] Long-break line

[B] Dashed thick line

[C] Continuous thick line

[D] Chain thick line

62. In a simple gear train, gear *A* has 20 teeth and drives gear *B* with 40 teeth. If gear *A* rotates at 800 r.p.m., find the speed of gear *B*.

[A] 200 r.p.m.

[B] 300 r.p.m.

[C] 400 r.p.m.

[D] 500 r.p.m.

63. A screw jack is said to be self-locking if its efficiency is

[A] less than 50%

[B] equal to 50%

[C] more than 50%

[D] 100%

64. The percentage of carbon in cast iron varies between

[A] 0.1 to 0.2%

[B] 0.5 to 1.0%

[C] 1.0 to 1.5%

[D] 2.5 to 3.5%

65. In low-carbon steels, the presence of small quantities of sulphur improves

[A] weldability

[B] formability

[C] machinability

[D] hardenability

66. The BCC and HCP crystals undergo plastic deformation by

[A] slip

[B] twinning

[C] edge dislocation

[D] twinning in combination with slip

67. Dislocation in materials is a _____ defect.

[A] point

[B] line

[C] plane

[D] volumetric

68. The coordination number of FCC crystal structure is

[A] 4

[B] 8

[C] 12

[D] 16

69. Which of the following structures has maximum hardness?

[A] Martensite

[B] Pearlite

[C] Sorbite

[D] Troosite

70. Increase of ferrite phase in steel increases

[A] strength

[B] hardness

[C] ductility

[D] brittleness

71. Which of the following cast irons consists of carbon in rosette form?

[A] White cast iron

[B] Grey cast iron

[C] Malleable cast iron

[D] Nodular cast iron

72. A single-point turning operation is considered orthogonal cutting, if

[A] rake face perpendicular to cutting velocity, edge parallel to motion

[B] rake face inclined at 30°

[C] cutting edge at an angle of 45°

[D] None of the above

73. The correct sequence of tool materials in increasing order of increasing hot hardness is

[A] HSS → Carbide → Ceramic → CBN

[B] Carbide → HSS → CBN → Ceramic

[C] HSS → Carbide → CBN → Ceramic

[D] Carbide → Ceramic → HSS → CBN

74. A lathe operation has main cutting force F_c = 400 N, Workpiece speed = 50 m/min. Power required (W) is approximately

[A] 333 W

[B] 500 W

[C] 400 W

[D] 250 W

75. A lathe reduces diameter 60 → 54 mm, length = 300 mm, feed = 0.2 mm/rev, spindle = 150 rpm. Cutting time (min) is

[A] 10

[B] 12

[C] 15

[D] 20

76. In machining mild steel with carbide tool (n = 0.2), if cutting speed is doubled, tool life will approximately become

[A] double

[B] half

[C] 1/16 times

[D] 1/32 times

77. For ceramic tool (n = 0.15), at V_1 = 300 m/min, T_1 = 45 min. What speed of V_2 gives T_2 = 15 min?

[A] 354 m/min

[B] 420 m/min

[C] 480 m/min

[D] 510 m/min

78. For finishing operations, tool life is frequently limited by

[A] flank wear 0.3 mm

[B] surface roughness requirement (e.g., Ra > 1.6 μm)

[C] flank wear 1.5 mm

[D] crater wear

79. In a taper turning process performed in a lathe, if D = large diameter and d = small diameter and l = length of the job, then tangent of half of the taper angle is

[A] $(D - d) / l$

[B] $(D - d) / 2l$

[C] $2(D - d) / l$

[D] $(D - d) / 4l$

80. The process of removing metal by rotating cutter, which is rotated in a direction opposite to the table feed direction, is known as

[A] conventional milling

[B] climb milling

[C] (A) or (B)

[D] None of the above

81. _____ is the operation used for making a conical chamfer on the edge of the hole.

[A] Spot facing

[B] Counter boring

[C] Counter sinking

[D] Trepanning

82. Which of the following is a kinematic pair mismatch in machine tool motions?

[A] Lathe — work rotates, tool feeds linearly

[B] Milling — tool rotates, work feeds linearly

[C] Shaper — tool reciprocates, work rotates

[D] Drilling — drill rotates and advances axially

83. In a milling process, an HSS cutter of 120 mm diameter with 8 number of teeth is used to mill a component. If the cutting speed is 24 m/min and table feed rate is 0.12 mm/tooth, the time required to complete the machining length of 115 mm is

[A] 2.19 min

[B] 2.29 min

[C] 1.88 min

[D] 1.11 min

84. Choose the ***wrong*** statement.

[A] Boring is the process of enlarging the hole that has been already drilled

[B] Drilling is the process of making hole on solid workpiece

[C] Reaming is the process of enlarging the drilled hole to proper size with a smooth finish

[D] Tapping is the process of making external threads on the workpiece

85. A mild steel rod 300 mm long, 25 mm diameter is to be turned to reduce its diameter to 24 mm in one cut. If the rod is rotating at 510 rpm, the cutting speed would be equal to

[A] 20 m/min

[B] 40 m/min

[C] 60 m/min

[D] 80 m/min

86. Knurling operation on lathe is used for

[A] reducing diameter of the workpiece

[B] producing internal threads

[C] producing rough surface on workpiece for gripping

[D] producing eccentric surface

87. Which tool-holding feature is found only in turret lathe and not in centre lathe?

[A] Three-jaw chuck

[B] Four-jaw independent chuck

[C] Morse taper center support

[D] Multi-station indexable tool holding

88. While cutting threads on a lathe using a single-point tool, the feed direction is

[A] perpendicular to spindle axis

[B] parallel to spindle axis

[C] tangential to workpiece surface

[D] Neither parallel nor perpendicular

89. A drill depth shows a tapered hole instead of straight. The most likely reason is

[A] excessive cutting speed

[B] too much coolant

[C] high feed rate

[D] drill wander due to unequal lip angles

90. A single-point tool is used for cutting a metric thread of 1.5 mm pitch. If the spindle rotates at 300 rpm, then the linear feed of the tool in mm/min is

[A] 300

[B] 450

[C] 600

[D] 1.5

91. An M12 × 1.75 mm internal thread is to be tapped. The size of the hole to be drilled is

[A] 10.5 mm

[B] 10.25 mm

[C] 11.25 mm

[D] 10.75 mm

92. In a hydraulic shaper, the cutting speed is controlled by

[A] change of ram position

[B] variation of oil flow rate

[C] change of pulley diameter

[D] altering quick return ratio

93. The number of turns of the index crank required to cut 24 teeth gear using a 40 : 1 dividing head is

[A] $1\frac{1}{3}$

[B] $1\frac{2}{3}$

[C] $2\frac{2}{3}$

[D] $3\frac{1}{3}$

94. The role of abrasive slurry in USM is

[A] to cool the tool only

[B] to carry abrasive particles for cutting

[C] to conduct electricity

[D] to apply mechanical force

95. In USM, if tool wears 0.1 mm while workpiece is machined to 1 mm depth, the tool wear ratio is

[A] 0.05

[B] 20

[C] 0.01

[D] 0.1

96. In EDM process, in order to remove maximum metal and have minimum wear on the tool,

[A] the tool is made cathode and workpiece as anode

[B] the tool is neutral and workpiece as anode

[C] the tool is anode and workpiece as cathode

[D] the polarity has no effect

97. Heat-Affected Zone (HAZ) in LBM can be minimized by

[A] using pulsed laser with short duration

[B] increasing pulse duration

[C] increasing laser power

[D] decreasing gas flow

98. A laser beam has energy 6 joules in a 3 ms pulse. The peak power is

[A] 1 kW

[B] 2 kW

[C] 20 kW

[D] 2000 kW

99. The function of interpolator in CNC machines is to

[A] control spindle speed

[B] control the machining process

[C] feed part program

[D] generate intermediate points for straight or circular path

100. In NC systems, 'closed-loop control' means

[A] positional feedback is used

[B] high accuracy and repeatability

[C] Both (A) and (B)

[D] None of the above

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1. Which of the following models proposed that electrons revolve in fixed orbits around the nucleus?

[A] Thomson's model

[B] Rutherford's model

[C] Bohr's model

[D] Quantum Mechanical model

2. Which of the following subatomic particles was discovered by Sir James Chadwick?

[A] Proton

[B] Electron

[C] Neutron

[D] Nucleus

3. The smallest particle of an element that can participate in a chemical reaction is called

[A] molecule

[B] atom

[C] ion

[D] electron

4. Which of the following rules states that no two electrons in an atom can have the same set of four quantum numbers?

[A] Pauli's exclusion principle

[B] Aufbau principle

[C] Bohr's rule

[D] Hund's rule

5. What is the maximum number of electrons in the *L*-shell ($n = 2$)?

[A] 2

[B] 18

[C] 8

[D] 32

6. In a conductor, the valence band and conduction band energies are

[A] overlapped

[B] partially filled with a wide gap

[C] widely separated

[D] All of the above

7. In a transistor with common base current gain $\alpha = 0.95$, what is the common emitter current gain β?

[A] 19

[B] 0.95

[C] 0.05

[D] 20

8. A copper wire of length 2 m and cross-sectional area 1 mm^2 has resistivity $\rho = 1.7 \times 10^{-8}$ $\Omega \cdot m$. Find its resistance.

[A] 0.034 Ω

[B] 0.017 Ω

[C] 0.068 Ω

[D] 0.085 Ω

9. Excess carriers are generated in a sample of an *n*-type of semiconductor by shining light at one end. The current flow in the sample will be made up of

[A] drift of carriers

[B] diffusion flow of carriers

[C] both diffusion and drift flows of carriers

[D] neither diffusion nor drift of carriers

10. If 1 ampere current is flowing in a wire for 1 second, then how many numbers of electron will flow in the wire?

[A] 6.25×10^{18} electrons

[B] 1.6×10^{-19} electrons

[C] 6.25 electrons

[D] Zero electrons

11. Which of the following materials is strongly attracted by a magnetic field?

[A] Diamagnetic

[B] Paramagnetic

[C] Ferromagnetic

[D] Piezoelectric

12. The domain theory of magnetism was proposed by

[A] Curie

[B] Weiss

[C] Bohr

[D] Maxwell

13. The temperature above which a ferromagnetic material becomes paramagnetic is called

[A] Curie temperature

[B] Melting point

[C] Néel temperature

[D] Transition point

14. The magnetic property responsible for the orientation of magnetic dipoles opposite to the applied field is called

[A] ferrimagnetism

[B] ferromagnetism

[C] paramagnetism

[D] diamagnetism

15. Which of the following has the largest hysteresis loss?

[A] Silicon steel

[B] Ferrite

[C] Iron

[D] Hard steel

16. In a magnetic material, at saturation level the *B-H* curve becomes

[A] horizontal

[B] vertical

[C] non-linear

[D] linear

17. Which of the following gases indicates arcing inside a transformer during dissolved gas analysis?

[A] Methane

[B] Carbon dioxide

[C] Acetylene

[D] Hydrogen

18. The frequency of output voltage of a transformer in India is normally

[A] 25 Hz

[B] 100 Hz

[C] 60 Hz

[D] 50 Hz

19. Which of the following IS codes is used for bitumen testing?

[A] IS 456

[B] IS 1201-1220

[C] IS 383

[D] IS 1489

20. The crystal structure of quartz is

[A] tetragonal

[B] cubic

[C] orthorhombic

[D] hexagonal

21. Which of the following materials has Piezoelectric property?

[A] Graphite

[B] Mica

[C] Quartz

[D] Gypsum

22. The standard frequency range where ferrite cores are mostly used is

[A] 100 Hz–1 kHz

[B] high frequency (kHz–MHz)

[C] below 10 Hz

[D] 50 Hz

23. A capacitor of 10 μF is connected to a 200 V supply. Find the charge stored.

[A] 0.002 C

[B] 0.02 C

[C] 0.0002 C

[D] 0.2 C

24. Which of the following types of resistors is commonly used for high-power applications?

[A] Wire-wound resistor

[B] Metal oxide resistor

[C] Light-dependent resistor

[D] Carbon film resistor

25. In a potentiometer, which type of resistor is used?

[A] Variable resistor

[B] Fuse resistor

[C] High-frequency resistor

[D] Fixed resistor

26. The main function of a choke capacitor in a rectifier circuit is to

[A] increase current

[B] reduce impedance

[C] smooth pulsating DC

[D] reduce voltage

27. Choke capacitors are commonly used in

[A] instrumentation amplifiers

[B] power supply filters

[C] RF oscillators

[D] logic circuits

28. In reactors, which type of reactance is provided in AC circuits?

[A] Resistive reactance

[B] Negative reactance

[C] Capacitive reactance

[D] Inductive reactance

29. The shunt reactors are generally used to compensate the

[A] resistive losses

[B] frequency

[C] active power

[D] reactive power

30. A resistor has colour bands with yellow, violet and brown. The value of resistance is

[A] 470 Ω

[B] 47 Ω

[C] 4700 Ω

[D] 4.7 kΩ

31. The colour code for 1Ω ± 10% is

[A] green, brown, black, gold

[B] blue, black, black, silver

[C] brown, black, black, silver

[D] brown, black, brown, gold

32. Which of the following resistor ratings is commonly used in small electronic circuits?

[A] 0.25 W

[B] 5 W

[C] 10 W

[D] 1 kW

33. In a resistor, which of the following factors is used to increase the power rating?

[A] Narrow temperature range

[B] Larger physical size

[C] High tolerance

[D] Low tolerance

34. The quality factor (Q) of an inductor is defined as

[A] $Q = X_L / R$

[B] $Q = R / X_L$

[C] $Q = R / C$

[D] $Q = L / C$

35. Skin effect is more prominent in inductors when

[A] frequency is high

[B] DC is used

[C] frequency is low

[D] temperature decreases

36. In a DC steady-state circuit, an inductor acts as

[A] capacitor

[B] open circuit

[C] short circuit

[D] None of the above

37. For the n-type semiconductor with $n = N_D$ and $p = n_i^2 / N_D$, the hole concentration will fall below the intrinsic value because some of the holes are

[A] drop to donor impurity states

[B] virtually leave the crystal

[C] drop back to acceptor impurity states

[D] recombine with the electrons

38. In switching diode fabrication, dopant is introduced into silicon which introduces additional trap levels in the material thereby reducing the mean lifetime of carriers. This dopant is

[A] aluminum

[B] platinum

[C] gold

[D] copper

39. How much is the approximate mobility of holes in germanium at room temperature?

[A] 1800 cm^2/Vs

[B] 2400 cm^2/Vs

[C] 4500 cm^2/Vs

[D] 900 cm^2/Vs

40. For a semiconductor, conductivity is a function of the products of the number of charge carriers and their mobilities. As a result, if the temperature of a slab of intrinsic silicon increases, how does its conductivity vary?

[A] Increases

[B] Decreases

[C] Increases or decreases depending upon the rise in temperature

[D] Remains unaffected

41. The change in barrier potential of a silicon *p-n* junction diode with temperature is

[A] 0.2500 V/°C

[B] 0.0030 V/°C

[C] 0.0025 V/°C

[D] 0.0014 V/°C

42. An iron core has a hysteresis loop area of 400 J/m^3 per cycle. If it operates at 50 Hz, the hysteresis loss per cubic meter is

[A] 400 W/m^3

[B] 800 W/m^3

[C] 20,000 W/m^3

[D] 50 W/m^3

43. In a *p-n* junction diode, the reverse saturation current is given I_{s1} at temperature T_1. If temperature increases with T_2, then reverse saturation current I_{s2} will be

[A] $I_{s2} = I_{s1} \times 2^{\frac{(T_2 - T_1)}{10}}$

[B] $I_{s2} = I_{s1}$

[C] $I_{s2} = I_{s1} \times 10^{\frac{(T_2 - T_1)}{2}}$

[D] $I_{s2} = I_{s1} \times \frac{(T_2 - T_1)}{10}$

44. Which one of the following is ***not*** an LED material?

[A] GaAs

[B] GaP

[C] SiC

[D] SiO_2

45. A device that converts light energy into electrical energy is called

[A] solar cell

[B] varactor diode

[C] Schottky diode

[D] LED

46. Which of the following diodes is used in microwave and high-speed switching applications?

[A] Rectifier diode

[B] Zener diode

[C] Tunnel diode

[D] LED

47. In a BJT, when emitter to base junction is in forward bias and collector to base junction is in reverse bias, then transistor is called

[A] active mode

[B] saturation mode

[C] cutoff mode

[D] inverted mode

48. The reverse bias breakdown of high-speed silicon transistors is due to

[A] avalanche breakdown mechanism at both the junctions

[B] Zener breakdown mechanism at both the junctions

[C] Zener breakdown mechanism at base-collector junction

[D] Zener breakdown mechanism at base-emitter junction

49. Which one of the following is the exact expression for I_{CEO} (collector to emitter current with base open) in BJT?

[A] $\alpha \times I_{CBO}$

[B] $(\alpha / 1 - \alpha) \times I_{CBO}$

[C] $I_{CBO} / 1 - \alpha$

[D] $(1 - \alpha) \times I_{CBO}$

50. To avoid thermal runways in the design of an analog circuit, the operating point of the BJT should be satisfying which of the following?

[A] $V_{CE} = V_{CC}/2$

[B] $V_{CE} \leq V_{CC}/2$

[C] $V_{CE} > V_{CC}/2$

[D] $V_{CE} \leq 0.78 V_{CC}$

51. In a BJT, the collector cut-off current 'I_{CBO}' reduces considerably by doping the

[A] emitter with high level of impurity

[B] emitter with low level of impurity

[C] collector with high level of impurity

[D] collector with low level of impurity

52. What is the most noticeable effect of a small increase in temperature in the common emitter connected BJT?

[A] Increase in I_{CBO}

[B] Increase in output resistance

[C] Decrease in forward current gain

[D] Increase in forward current gain

53. A bipolar junction transistor has a common base forward short circuit current gain (α) of 0.99. Its common-emitter forward short circuit current gain (β) will be

[A] 50

[B] 99

[C] 100

[D] 200

54. A bipolar junction transistor is in saturation region. Given V_{CC} = 10 V, R_C = 1 kΩ, h_{FE} = 100 and V_{CEsat} = 0.3 V. What is the collector current in saturation?

[A] 10 mA

[B] 0.1 mA

[C] 9.7 mA

[D] 1 mA

55. Which of the following h-parameters represents the current gain in BJT for CE configuration?

[A] hie

[B] hfe

[C] hoe

[D] hre

56. A 10 μF electrolytic capacitor rated at 25 V is connected across a 24 V AC supply. Which of the following statements is most ***correct***?

[A] Safe operation as voltage rating is higher

[B] Failure due to reverse polarity only

[C] Likely breakdown due to peak AC voltage exceeding rating

[D] No issue because capacitance is low

57. The ripple factor of a half-wave rectifier is equal to

[A] 0.5

[B] 81.2

[C] 0.482

[D] 1.21

58. The Peak Inverse Voltage (PIV) of each diode in a centre-tapped full-wave rectifier is equal to

[A] 2 Vm

[B] Vm

[C] Vm/2

[D] zero

59. The rectifier output wave contains unwanted AC components called

[A] harmonics

[B] ripple

[C] noise

[D] dropout

60. In a voltage regulator, load regulation refers to the change in output voltage with change in

[A] input voltage

[B] Zener breakdown voltage

[C] temperature

[D] load current

61. The main drawback of switching regulators is

[A] low efficiency

[B] high heat dissipation

[C] low power capability

[D] electromagnetic interference (EMI)

62. Class-B amplifier conduction angle is equal to

[A] 90°

[B] 270°

[C] 360°

[D] 180°

63. A push-pull amplifier is used to

[A] increase distortion

[B] increase transistor count only

[C] reduce output power

[D] cancel even harmonics

64. Which of the following amplifiers has highest efficiency?

[A] Class-C

[B] Class-A

[C] Class-B

[D] Class-AB

65. The condition required for oscillation is known as

[A] Coulomb's law

[B] Hooke's law

[C] Barkhausen criterion

[D] Norton's theorem

66. In a crystal oscillator, the crystal operates on the principle of

[A] Piezoelectric effect

[B] Ohm's law

[C] electrolysis

[D] Ampere's law

67. In Colpitts oscillator, feedback is obtained from

[A] capacitive voltage divider

[B] mutual inductance

[C] current mirror

[D] transformer

68. In binary system, find the value of $(1110)_2 - (1011)_2$.

[A] $(0101)_2$

[B] $(1001)_2$

[C] $(0110)_2$

[D] $(0011)_2$

69. Which of the following gates is known as a 'Universal Gate'?

[A] AND

[B] NAND

[C] OR

[D] EX-OR

70. The Boolean expression for Ex-OR gate is

[A] $\bar{A} + B$

[B] A+B

[C] $A \oplus B$

[D] $A \cdot B$

71. Which of the following quantities ***cannot*** be measured directly by a multimeter?

[A] Power

[B] Voltage

[C] Current

[D] Resistor

72. Compared to a BJT, a field-effect transistor (FET) is mainly

[A] current-controlled, with base current controlling collector current

[B] voltage-controlled, with gate voltage controlling drain current

[C] controlled by temperature only

[D] not suitable as an amplifier

73. A Cathode Ray Oscilloscope (CRO) is best suited for which of the following measurements?

[A] Only DC voltage magnitude

[B] Frequency, amplitude and waveform shape of time varying signals

[C] Resistance of small components

[D] Power factor of AC loads directly

74. The minimum Hamming distance required to detect 2-bit errors is

[A] 3

[B] 2

[C] 5

[D] 4

75. Which of the following types of errors occurs when multiple bits change together?

[A] Burst error

[B] Single-bit error

[C] Parity error

[D] Cross error

76. Checksum is mainly used in

[A] optical fiber communication

[B] internet protocols

[C] satellite communication only

[D] audio signals

77. Liquid Crystal Display (LCD) works on the principle of

[A] thermionic emission

[B] electroluminescence

[C] electromagnetic emission

[D] light modulation

78. A typical forward voltage of a red LED is in the range of

[A] 0.3 V– 0.7 V

[B] 0.7 V–1.42 V

[C] 1.8 V– 2.2 V

[D] 3.5 V– 4.5 V

79. Which of the following TTL sub-families is known for lowest power consumption?

[A] Low Power TTL (LTTL)

[B] Low Power Schottky TTL (LSTTL)

[C] Standard TTL

[D] High Power TTL (HTTL)

80. A Johnson counter with 5 flip-flops has

[A] 10 states

[B] 5 states

[C] 20 states

[D] 2^5 states

81. A register that loads all bits at once is known as

[A] parallel-in register

[B] serial-in register

[C] ring register

[D] shift register

82. The number of states in a ring counter with N flip-flops is

[A] $2N$

[B] N

[C] N^2

[D] 2^N

83. In a shift register, SISO is called

[A] Serial-In Serial-Out

[B] Simple Input Simple Output

[C] Serial-In Shift-Out

[D] Standard Input Serial Output

84. A logic gate has two inputs, *A* and *B*. The output is 1 when at least one input is 1 and is 0 only when both inputs are 0. Which gate is this?

[A] AND gate

[B] OR gate

[C] NAND gate

[D] NOR gate

85. The DAC that uses resistor network in binary weighted form is known as

[A] R-2R ladder DAC

[B] weighted resistor DAC

[C] flash DAC

[D] sigma delta DAC

86. The digital code applied to a DAC is 1100 (binary). If the full-scale voltage = 16 V for 4-bit DAC, then the output will be

[A] 6 V

[B] 9 V

[C] 12 V

[D] 3 V

87. In microprocessor systems, peripherals are connected using

[A] serial bus only

[B] tri-state interfacing between address and data bus

[C] direct CPU memory access

[D] single port addressing

88. In a microprocessor, RST 7.5, RST 6.5, RST 5.5 are called

[A] maskable interrupts

[B] software interrupts only

[C] non-maskable interrupts

[D] hardware interrupts

89. In a purely resistive circuit, the phase difference between voltage and current is equal to

[A] 90°

[B] 0°

[C] 45°

[D] 180°

90. A Butterworth filter is also known as

[A] resonant filter

[B] notch filter

[C] equal ripple filter

[D] maximally flat filter

91. If a transmission line is terminated in its characteristic impedance, then

[A] reflections are maximum

[B] line acts as open circuit

[C] reflections are zero

[D] standing waves are maximum

92. For a distortion less line, which of the following conditions is ***true***?

[A] $R/L = L/C$

[B] $R = 0$

[C] $R/L = G/C$

[D] $R/C = G/L$

93. The maximum power transferred to a load can be calculated using

[A] $P_{max} = V^2/R_L$

[B] $P_{max} = V^2_{th}/4R_{th}$

[C] $P_{max} = I^2 R_L$

[D] zero

94. The number of PN junctions in a thyristor is equal to

[A] one

[B] two

[C] three

[D] four

95. In a 555 timer, the threshold voltage is equal to

[A] $V_{cc}/2$

[B] V_{cc}

[C] $2V_{cc}/3$

[D] $V_{cc}/3$

96. A first-order RC low-pass filter is designed with a resistor $R = 10\ k\Omega$. The required cut-off frequency is $f_c = 1.6\ kHz$. What value of capacitor C should be used (nearest standard value)?

[A] 0.01 μF

[B] 0.01 nF

[C] 0.01 mF

[D] 0.01 F

97. Which of the following techniques is generally used for locating faults in communication systems?

[A] Loop testing

[B] Forward bias test

[C] Grounding test

[D] Flash testing

98. The number of scanning lines in Indian black and white TV system (PAL) is equal to

[A] 405

[B] 525

[C] 625

[D] 819

99. In a colour TV, the colour difference signals are measured by

[A] $(R - Y)$ and $(B - Y)$

[B] $(R - G)$ and $(B - Y)$

[C] G and B

[D] R and B

100. The horizontal scanning frequency for a 625-line PAL TV is approximately

[A] 12500 Hz

[B] 31250 Hz

[C] 15625 Hz

[D] 10000 Hz

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Question Booklet Number

Series : a

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1. What is the binary equivalent of $(13.375)_{10}$?

[A] $(1001.101)_2$

[B] $(1101.011)_2$

[C] $(1101.101)_2$

[D] $(1001.100)_2$

2. In the toggle mode, a *JK* flip-flop has

[A] $J = 0, K = 0$

[B] $J = 0, K = 1$

[C] $J = 1, K = 0$

[D] $J = 1, K = 1$

3. A MOD-16 ripple counter is holding count $(1001)_2$. What will be the count after 31 clock pulses?

[A] $(1000)_2$

[B] $(1001)_2$

[C] $(1100)_2$

[D] $(1101)_2$

4. A specific counter is using five S-R flip-flops. So, what is the maximum number of states possible?

[A] 8

[B] 16

[C] 32

[D] 64

5. The time delay obtained for an 8-bit serial register with a 200 MHz clock is

[A] 35 ns

[B] 20 ns

[C] 40 ns

[D] 16 ns

6. The hexadecimal of $(4321)_8$ is

[A] $(8C1)_{16}$

[B] $(7D1)_{16}$

[C] $(7B1)_{16}$

[D] $(8D1)_{16}$

7. How many flip-flops are needed for the MOD-16 ring counter and the MOD-16 Johnson counter?

[A] 4, 3

[B] 4, 4

[C] 16, 8

[D] 16, 16

8. A 2-bit synchronous counter uses flip-flops with a propagation delay of 25 ns each. What will be the maximum possible time required for the change of state?

[A] 25 ns

[B] 30 ns

[C] 40 ns

[D] 50 ns

9. N flip-flops can be used to divide the input clock frequency by

[A] N

[B] $2N$

[C] N^2

[D] 2^N

10. A synchronous sequential circuit is designed to detect the bit sequence 0101 (including overlapping sequences). Every time this sequence is detected, the circuit produces an output of 1. What is the minimum number of states the circuit must have?

[A] 4

[B] 5

[C] 6

[D] 7

11. **Statement 1 :** A register is a collection of flip-flops.

Statement 2 : To store n-bit data, a register comprising n+1 number of flip-flops.

Choose the ***correct*** option :

[A] Only Statement 1 is true

[B] Only Statement 2 is true

[C] Both Statement 1 and Statement 2 are true

[D] Both Statement 1 and Statement 2 are false

12. What will be the output of the following C code?

```
#include <stdio.h>
int main()
{
    signed char chr;
    chr = 128;
    printf("%d\n", chr);
    return 0;
}
```

Choose the ***correct*** option.

[A] 128

[B] –128

[C] 0

[D] Compile-time error

13. What is the output of the following C program?

```
#include<stdio.h>
void main()
{
    int a=10,b,c;
    b=++a;
    c=b++;
    printf ("%d\t%d\t%d", a,b,c);
}
```

Choose the ***correct*** option.

[A] 11 11 11

[B] 11 12 12

[C] 11 12 11

[D] 11 11 12

14. Which is the ***correct*** function name for overloading the addition (+) operator in C++?

[A] Operator:+

[B] Operator+

[C] Operator(+)

[D] Operator_+

15. What will be the output for the following C program?

```
#include<stdio.h>
void func()
{
    int x=0;
    x++;
    printf("%d", x);
}
int main()
{
    func();
    func();
    func();
    func();
}
```

Choose the ***correct*** option.

[A] 1234

[B] 1111

[C] 2345

[D] 0123

16. What will be the output of the following C code?

```
#include <stdio.h>

int main() {

  int arr[ ] = {1, 2, 3, 4, 5, 6};

  int i;

  int key = 5;

  int size = 6;

  for (i = 0; i < size; i++) {

    if (arr[i] == key) {

      printf("Element found at position:
      %d", i);

      break;

    }

  }

  return 0;

}
```

Choose the ***correct*** option.

[A] Element found at position : 6

[B] Element found at position : 5

[C] Element found at position : 4

[D] Element found at position : 3

17. What will be the output of the following C code?

```
#include <stdio.h>
int main() {
    int n = 9;
    label:
    printf("%/d", n);
    n++;
    if (n <= 10)
      n--;
    goto label;
    return 0;
}
```

Choose the ***correct*** option.

[A] 9

[B] 9 10

[C] 10

[D] Prints 9 endlessly

18. In which block should C++ code that may cause abnormal termination or exceptions be written?

[A] Catch

[B] Throw

[C] Try

[D] Finally

19. Which of the following statements is ***incorrect*** about function overriding?

[A] Static function cannot be overridden

[B] A function can be overridden only once

[C] Overridden function must have same return type and same parameter list

[D] Function overriding cannot be done within a class

20. _____ functions show polymorphism.

[A] Class member

[B] Friend

[C] Inline

[D] Virtual

21. What will be the output of the following C++ code?

```
#include <iostream>
using namespace std;
class Base {
public:
  Base() { foo(); }
  virtual void foo() { cout << "Base"; }
};
class Derived : public Base {
public:
  void foo() override { cout << "Derived";}
};
int main() {
  Derived d;
  return 0;
}
```

Choose the ***correct*** option.

[A] Derived

[B] Base

[C] DerivedBase

[D] Compile-time error

22. What will be the output of the following C++ code?

```
#include <iostream>
using namespace std;
    int main() {
    int i = 1;
    cout << sizeof(++i) << " " << i;
    return 0;
}
```

Choose the ***correct*** option.

[A] 4, 1

[B] 4, 2

[C] 4, 3

[D] Compile-time error

23. What will be the output of the following C++ code?

```
#include <iostream>
#include <string>
using namespace std;
int main() {
    string s = "abc";
    s[1] = s[2];
    cout << s;
}
```

Choose the ***correct*** option.

[A] aab

[B] abb

[C] abc

[D] acc

24. How can you make a bulleted list?

[A] <list>

[B] <dl>

[C]

[D]

25. What is the ***correct*** HTML for inserting an image?

[A] <img src="image.gif" alt="MyImage">

[B] <img alt="MyImage">image.gif</ img>

[C] <image src="image.gif" alt="MyImage">

[D] <img href="image.gif" alt="MyImage">

26. Which of the following HTML elements ***does not*** participate in defining the document's structural hierarchy?

[A] <head>

[B] <body>

[C] <meta>

[D] <section>

27. Consider the following HTML snippet :

```
<ol type="A" start="3">
```

The list will begin with

[A] A

[B] C

[C] 3

[D] D

28. Which CSS property is responsible for defining how overlapping elements are stacked?

[A] Float

[B] Display

[C] z-index

[D] Position

29. Which CSS selector has the highest specificity?

[A] Class selector

[B] ID selector

[C] Element selector

[D] Universal selector

30. **Statement 1 :** Metadata in the <head> section can influence rendering before the browser constructs the full DOM.

Statement 2 : Browsers ignore the <head> section while parsing HTML.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

31. Microsoft FrontPage primarily relied upon which underlying technology for live server-side site editing?

[A] WebDAV

[B] FTP Passive Mode

[C] FrontPage Server Extensions (FPSE)

[D] RPC over HTTP

32. GIF animation is limited to what colour depth?

[A] 8-bit

[B] 16-bit

[C] 32-bit

[D] 64-bit

33. Which of the following tools would you use to make a freehand selection in Adobe Photoshop?

[A] Pen Tool

[B] Lasso Tool

[C] Quick Selection Tool

[D] Rectangular Marquee Tool

34. Which of the following is ***not*** a valid audio file extension?

[A] .mid

[B] .mp3

[C] .rar

[D] .wav

35. Which JavaScript feature allows frames to interact only if they originate from the same protocol, domain and port?

[A] FrameGuard

[B] CORS

[C] Same-Origin Policy

[D] CSP

36. Firewalls primarily operate at which OSI layer(s)?

[A] Layer-1 only

[B] Layer-2 only

[C] Both Layer-1 and Layer-2

[D] Layer-3 and Layer-4

37. Which security threat specifically targets the manipulation of input fields on web pages?

[A] ARP poisoning

[B] DNS spoofing

[C] Port scanning

[D] SQL injection

38. Which of the following firewall techniques involves examining the contents of data packets to detect and block malicious content?

[A] Deep Packet Inspection (DPI)

[B] Intrusion Detection System (IDS)

[C] Virtual Private Network (VPN) support

[D] Stateful inspection

39. _____ is a public key encryption algorithm.

[A] DES

[B] AES

[C] Blowfish

[D] RSA

40. _____ is a type of malware that intentionally disguises itself as legitimate software.

[A] Worm

[B] Ransomware

[C] Trojan

[D] Virus

41. What is the purpose of using a sandbox in cybersecurity?

[A] To store sensitive data

[B] To optimize network traffic

[C] Managing user accounts

[D] To isolate and analyze suspicious files

42. What is the core principle of Zero Trust Architecture?

[A] Verify every user and device continuously

[B] Allow unrestricted network access

[C] Trust all users by default

[D] Encrypt all data automatically

43. _____ is a key benefit of Secure Access Service Edge (SASE), a recent cybersecurity framework.

[A] Disables cloud access

[B] Stores all data locally

[C] Integrates network security with cloud-based services

[D] Reduces network security controls

44. In an 8-bit microprocessor, the primary reason for introducing a segmented memory architecture is to

[A] increase ALU width

[B] extend addressable memory beyond 64 KB

[C] improve arithmetic processing speed

[D] reduce interrupt latency

45. Which instruction ***does not*** affect any flag in the 8085?

[A] INR

[B] DCR

[C] CMA

[D] ADD

46. In a typical 8-bit microprocessor with isolated I/O, what is the maximum number of I/O ports that can be addressed?

[A] 256

[B] 128

[C] 64

[D] 32

47. In 8085, the SIM instruction is used for

[A] interrupting vector modification

[B] controlling serial output data line

[C] masking RST interrupts

[D] both controlling serial output data line and masking RST

48. Which logic family is preferred in microprocessor system design for highest noise immunity?

[A] TTL

[B] ECL

[C] CMOS

[D] NMOS

49. Why are wait states introduced in memory interfacing?

[A] To slow down CPU

[B] To allow slow memory to match CPU speed

[C] To increase instruction throughput

[D] To reduce bus contention

50. Which instruction accesses memory indirectly through HL in 8085?

[A] MOV M, A

[B] STA 2050H

[C] LXI B, 2050H

[D] ANI 0F0H

51. TRAP interrupt in 8085 is

[A] Maskable + Edge triggered

[B] Maskable + Level triggered

[C] Non-maskable + Edge/level triggered

[D] Software interrupt

52. Which memory is used to store the bootstrap loader in microcomputers?

[A] SRAM

[B] DRAM

[C] Cache

[D] EEPROM/ROM

53. A microprocessor with a 16-bit address bus can address

[A] 32 KB

[B] 64 KB

[C] 128 KB

[D] 256 KB

54. What is the function of the HOLD signal in 8085?

[A] Reset CPU

[B] Start interrupt

[C] Request control of address/data bus

[D] Disable DMA

55. Which of the following best characterizes the role of firmware in relation to BIOS?

[A] Firmware is a subset of BIOS stored on the hard disk

[B] BIOS is a specialized type of firmware stored in non-volatile memory

[C] Firmware is executed only after the BIOS completes POST

[D] BIOS and firmware are entirely unrelated

56. During the BIOS boot process, which step occurs immediately after CPU reset?

[A] Executing instructions at the reset vector

[B] Initializing SATA controller

[C] Performing memory test

[D] Loading OS bootloader

57. Which CPU configuration parameter is most directly tied to thermal throttling thresholds?

[A] Cache line size

[B] QPI frequency

[C] Instruction pipeline depth

[D] TDP setting

58. In SATA, which mode supports Native Command Queuing (NCQ)?

[A] AHCI mode

[B] IDE mode

[C] Compatibility mode

[D] Legacy emulation mode

59. In modern UEFI (Unified Extensible Firmware Interface), which element replaces the traditional Master Boot Record boot mechanism?

[A] CSM

[B] MBR2GPT translator

[C] GPT + EFI system partition

[D] LBA0 boot opcode

60. SATA III supports which maximum theoretical bandwidth?

[A] 1.5 Gbps

[B] 3 Gbps

[C] 6 Gbps

[D] 12 Gbps

61. BIOS shadowing improves performance by

[A] copying BIOS code into RAM for faster execution

[B] compressing BIOS code

[C] storing BIOS in CPU cache

[D] eliminating POST delays

62. Which SATA feature allows devices to be connected while the system is powered on?

[A] RAID

[B] Hot plug

[C] NCQ

[D] LPM

63. Among the following, which POST test is performed earliest?

[A] Keyboard controller check

[B] Disk controller initialization

[C] GPU framebuffer test

[D] CPU initialization

64. What does the POST card code 0x00 typically indicate?

[A] CPU is not executing instructions

[B] RAM failure

[C] Bootloader missing

[D] GPU not detected

65. Which input device provides absolute positioning rather than relative positioning?

[A] Mouse

[B] Light pen

[C] Joystick

[D] Trackball

66. In Hard Disk Drives (HDDs), which part is responsible for maintaining the head-to-platter air cushion?

[A] Actuator shaft

[B] Spindle

[C] Slider

[D] Firmware controller

67. A Visual Display Unit with IPS technology is optimized for which characteristic?

[A] Lowest response time

[B] Highest contrast

[C] Minimal power consumption

[D] Wide viewing angles

68. Which printer type is best suited for architectural blueprints?

[A] Inkjet

[B] Plotter

[C] Thermal

[D] Laser

69. What is the purpose of the fuser assembly in a laser printer?

[A] Charge the drum

[B] Transfer toner

[C] Permanently bond toner

[D] Clean the drum

70. **Statement 1 :** A digitizer provides absolute positional input.

Statement 2 : A digitizer maps every pen coordinate to a fixed point on the display surface.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

71. Which of the following are the temporary registers of the 8085 microprocessor?

[A] Stack Pointer (SP)

[B] Program Counter (PC)

[C] H & L registers

[D] W & Z registers

72. **Statement 1** : Regular defragmentation improves SSD performance significantly.

Statement 2 : SSDs store data in fixed physical tracks similar to HDDs.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

73. **Statement 1 :** Preventive maintenance reduces the system's MTTR (Mean Time To Repair).

Statement 2 : Preventive maintenance reduces the frequency of failures.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

74. In a 2D array, A with m rows and n columns stored in row-major order, the memory address of element A[i][j] (0-based indices) is

[A] base + (i × n + j) × size

[B] base + (j × n + i) × size

[C] base + (i + j × m) × size

[D] base + (i + j) × size

75. Which sorting algorithm performs the fewest swaps?

[A] Bubble sort

[B] Insertion sort

[C] Quicksort

[D] Selection sort

76. Quicksort worst case occurs when

[A] pivot is always the median

[B] pivot is the smallest/largest

[C] elements are random

[D] using three-way partitioning

77. **Statement 1 :** Heapsort maintains the heap property even if elements are equal.

Statement 2 : Equal elements in a heap always maintain their original relative positions.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

78. **Statement 1 :** A Binary Search Tree (BST) always ensures O(log n) searching.

Statement 2 : Every BST maintains balance automatically after insertion.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

79. A Layer-2 switch avoids collisions by

[A] using CSMA/CD

[B] dividing the LAN into broadcast domains

[C] providing a dedicated collision domain per port

[D] providing routing capability

80. Which multiplexing technique(s) is/are used in GSM?

[A] FDMA only

[B] TDMA only

[C] CDMA only

[D] Both FDMA and TDMA

81. Mobile Ad Hoc Networks (MANETs) primarily differ from infrastructure Wi-Fi because they

[A] support dynamic, self-organizing routing

[B] require central coordination

[C] use access points

[D] use licensed spectrum

82. Which topology ensures deterministic access control?

[A] Star

[B] Ring

[C] Mesh

[D] Bus

83. In a mesh topology, how many links are required for N computers?

[A] N(N–1)

[B] N(N+1)/2

[C] N(N+1)

[D] N(N–1)/2

84. DHCP stands for

[A] Data Host Control Protocol

[B] Dynamic Host Control Point

[C] Dynamic Host Control Protocol

[D] Dynamic Host Configuration Protocol

85. Which of the following protocols uses a 3-way handshake?

[A] ICMP

[B] ARP

[C] TCP

[D] UDP

86. **Statement 1 :** Gateway worked as a protocol converter.

Statement 2 : Gateway causes no time delay during protocol conversion.

Choose the ***correct*** option.

[A] Statement 1 is true only

[B] Statement 2 is true only

[C] Both Statement 1 and Statement 2 are true

[D] Both Statement 1 and Statement 2 are false

87. **Statement 1 :** Twisted pair cable is an unguided transmission media.

Statement 2 : Coaxial cable is a guided transmission media.

Choose the ***correct*** option.

[A] Statement 1 is true only

[B] Statement 2 is true only

[C] Both Statement 1 and Statement 2 are true

[D] Both Statement 1 and Statement 2 are false

88. In fiber communications, attenuation mainly occurs due to

[A] capacitance

[B] impedance

[C] absorption and scattering

[D] magnetic interference

89. The free-space path loss in satellite communication increases with

[A] higher frequency only

[B] lower frequency only

[C] distance only

[D] both higher frequency and distance

90. Signal attenuation in a cable is 3 dB per 100 m. What is the total attenuation for 350 m?

[A] 10.5 dB

[B] 90 dB

[C] 90.5 dB

[D] 8 dB

91. A 10 Mbps bus LAN with CSMA/CD has a minimum frame size of 512 bits. What is the minimum propagation time?

[A] 10.24 μs

[B] 5.12 μs

[C] 25.6 μs

[D] 5.6 μs

92. What is the wavelength of a 2.4 GHz Wi-Fi signal?

[A] 0.125 m

[B] 0.25 m

[C] 0.4 m

[D] 0.7 m

93. In Bluetooth, FHSS (Frequency Hopping Spread Spectrum) hops 1600 times per second. What is a hop interval?

[A] 0.625 ms

[B] 0.512 ms

[C] 1.25 ms

[D] 1.6 ms

94. In cellular networks, handoff is required primarily due to

[A] poor modulation schemes

[B] low transmit power

[C] mobility of base stations

[D] user mobility

95. Which is ***not*** a characteristic of WiMAX?

[A] Long-range connectivity

[B] High mobility support

[C] High data rate

[D] Token passing mechanism

96. **Statement 1 :** Inheritance promotes code reusability.

Statement 2 : Inheritance always increases data security.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

97. **Statement 1 :** Function overloading is a type of runtime polymorphism.

Statement 2 : Polymorphism allows the same function name to have different implementations.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

98. **Statement 1 :** Private members of a class are accessible inside derived classes.

Statement 2 : Protected members of a class are accessible inside derived classes.

Choose the ***correct*** option.

[A] Both Statement 1 and Statement 2 are correct

[B] Statement 1 is correct, but Statement 2 is incorrect

[C] Statement 1 is incorrect, but Statement 2 is correct

[D] Both Statement 1 and Statement 2 are incorrect

99. Which of the following is a primary use of JavaScript in web pages?

[A] Adding interactivity and dynamic behavior

[B] Designing database schemas

[C] Configuring firewalls

[D] Compiling server-side code

100. What is the purpose of firewalls in web security?

[A] To increase download speeds

[B] Generating HTML pages

[C] To execute JavaScript

[D] To block unauthorized access to networks

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