TPSC JE Gr-VB

Previous Year Paper
(Electrical)
08 Oct, 2023

(97)

DO NOT OPEN THIS TEST BOOKLET UNTIL YOU ARE ASKED TO DO SO.

TR/SET/ELECTRICAL/PRE/DIPLOMA/2023

TEST BOOKLET

GENERAL STUDIES & ENGINEERING APTITUDE

Test Booklet Series

A

_____

(Signature of the Candidate)

_____

(Invigilator's Signature)

Time Allowed : Two (2) hours   Maximum Marks : 100

INSTRUCTIONS

1. PLEASE CHECK THE TEST BOOKLET DOES NOT HAVE ANY UNPRINTED OR TORN OR MISSING PAGES OR ITEMS ETC. IF SO, GET IT REPLACED BY A COMPLETE TEST BOOKLET.

2. **ENCODE CLEARLY THE TEST BOOKLET SERIES A,B,C OR D AS THE CASE MAY BE IN THE APPROPRIATE PLACE IN THE ANSWER SHEET BY BLACK BALL POINT PEN ONLY.**

3. This Test Booklet contains 100 items (questions). Each question has four responses (answers). You will select the responses which you want to mark on the Answer Sheet. In case you feel that there is more than one correct response, mark the response which you consider the most appropriate. In any case, choose ONLY ONE response for each item.

4. You have to mark all your responses ONLY on the separate Answer Sheet provided. See directions in the Answer Sheet.

5. All items carry equal marks.

6. Before you proceed to mark on the Answer Sheet the responses to various items in the Test Booklet, you have to fill in some particulars in the Answer Sheet as per instructions sent to you with your Admission Certificate.

7. After you have completed filling in responses on the Answer Sheet and the Examination is completed, you should handover the Answer Sheet to the Invigilator only. You are permitted to take away the Test Booklet.

8. Sheets for rough work are appended on the Test Booklet at the end.

9. **Penalty for wrong answers :**

   (a) There will be four alternatives for the answer to every question. For each question for which a wrong answer has been given by the candidate, **one-fourth** of the marks assigned to that question will be deducted as penalty.

   (b) If a candidate gives more than one answer, it will be treated as a **Wrong Answer** even if one of the given answers happens to be correct and there will be same penalty as above to that question.

   (c) If a question is left blank, i.e., no answer is given by the candidate, there will be **no penalty** for that question.

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Four options are given against each of the following questions. Select the correct option from the four options and encode it in the Answer Sheet by using **Black Ball Point Pen** only as per example given below :

Example : P : Aunt Polly wanted to trap Tom ——— damaging confessions.

     (A) into   (B) with   (C) by   (D) on

Example Q : Let's watch ——— movie ; I mean 'Pather Panchali'.

     (A) a   (B) an   (C) the   (D) No article is needed

PART – A

Direction for Question Nos. 1 to 4.

Choose the appropriate prepositions/articles for the blank spaces from the given alternatives.

1. Fix the portrait _____ the TV.

     (A) inside   (B) over

     (C) under   (D) above

2. This will be very useful _____ me.

     (A) to   (B) for

     (C) with   (D) of

3. Kolkata stands on _____ Ganges.

   (A) the

   (B) an

   (C) a

   (D) No article is needed

4. My brother has settled in ____ United States.

   (A) a

   (B) an

   (C) the

   (D) No article is needed

Direction for Question Nos. 5 and 6

Find out words having the same or nearly the same meaning to the underlined words in the sentences from the given options.

5. Narayana Hemachandra's dress was rather <u>queer</u>.

   (A) Clumsy

   (B) Dirty

   (C) Strange

   (D) Funny

6. Do not <u>tread</u> on the flower beds.

   (A) Jump

   (B) Walk

   (C) Run

   (D) Cross

Direction for Question Nos. 7 and 8

Choose from the given options/words opposite in meaning to the underlined words in the sentences.

7. She has not <u>strength</u> enough to walk upstairs.

   (A) Weakness

   (B) Courage

   (C) Diffidence

   (D) Promptness

8. We must get to the <u>bottom</u> of this mystery.

(A) profile   (B) border

(C) height   (D) top

Direction for Question Nos. 9 and 10

The underlined and lettered parts of each sentences below may contain an error in grammar, usage, words choice (diction). or expression (idiom). Read each sentence carefully and identify which item if any, contains an error. If it contains no error, answer is D.

9. <u>At the conclusion</u> of the meeting, the new members <u>sweared</u> that they would

          A   B

<u>never reveal</u> the secret.   <u>No error</u>

          C   D

(A) At the conclusion   (B) Sweared

(C) Never reveal   (D) No error

10. <u>With the development</u> of antitoxins and serums, there are hardly <u>no</u> cases of smallpox

          A   B

or yellow fever <u>anywhere</u> in the world.   <u>No error</u>

                        C   D

(A) With the development   (B) No

(C) Anywhere   (D) No error

11. Tripura acceded to the Indian Union on

(A) 15th August, 1947   (B) 9th September, 1949

(C) 15th October, 1949   (D) 21st January, 1972

(92)

12. Who was the Chief Justice of the Supreme Court of India just before the Chief Justice of the Supreme Court of India, Shri D. Y. Chandrachud ?

(A) Justice S. N. Kaul
(B) Justice K. M. Joseph
(C) Justice C. R. Mathur
(D) Justice U. U. Lalit

13. Where is the Kuno National Park situated ?

(A) Uttar Pradesh
(B) Madhya Pradesh
(C) Uttarakhand
(D) Rajasthan

14. Where was the venue of the 108th Indian Science Congress that was held in January, 2023 ?

(A) Nagpur
(B) Indore
(C) Pune
(D) Hyderabad

15. In the year 2022, Maharaja Bir Bikram College of Tripura celebrated the

(A) Silver Jubilee
(B) Golden Jubilee
(C) Platinum Jubilee
(D) Centenary

16. In which Cricket Tournament female umpire officiated for the first time in India ?

(A) Duleep Trophy
(B) Deodhar Trophy
(C) Vijay Hazare Trophy
(D) Ranji Trophy

17. What is the fixed interest rate declared in 2023 for the 'Mahila Samman Bhachat Patra' ?

(A) 7%

(B) 7.5%

(C) 8%

(D) 8.5%

18. India's first ever Night Sky Sanctuary set up in which State to boost Astro Tourism ?

(A) Ladakh

(B) Jammu and Kashmir

(C) Uttarakhand

(D) Himachal Pradesh

19. P M Narendra Modi has recently launched the World's longest river cruise 'Ganga Vilas' from Varanasi to

(A) Guwahati (Assam)

(B) Dibrugarh (Assam)

(C) Dhaka (Bangladesh)

(D) Kolkata (West Bengal)

20. Which country has formally adopted the Euro as its currency, making it the 20th member State of European Union ?

(A) Greece

(B) Croatia

(C) Romania

(D) Slovenia.

PART – B

21. D.C series machine employs

    (A) small number of turns of small cross-section

    (B) large number of turns of small cross-section

    (C) small number of turns of large cross-section

    (D) large number of turns of large cross-section

22. A conductor has a resistance of 2Ω. What will be the resistance of a second conductor of same material having one-fourth the diameter and four times the length of the first conductor ?

    (A) 16Ω   (B) 64Ω

    (C) 128Ω   (D) None of these

23. The range of medium resistances is

    (A) 1Ω to 1000Ω   (B) 0.1Ω to 1000Ω

    (C) 1Ω to 10000Ω   (D) 1Ω to 100000Ω

24. Ten numbers 2 Volt cells are connected in parallel manner, then the output voltage will be

    (A) 20 Volts   (B) 5 Volts

    (C) 2 Volts   (D) None are correct

25. In D.C machines, the torque angle between the axes of field flux and armature mmf is

    (A) 0°   (B) 90°

    (C) 45°   (D) None of these

26. Corona loss is maximum in

    (A) unstranded wire   (B) stranded wire

    (C) transposed wire   (D) ACSR

27. Which of the following statements is incorrect about an IGBT ?

(A) It has high input impedance

(B) It has low on-state conduction losses

(C) It is inherently faster than a BJT

(D) Its switching speed is superior to MOSFET

28. S.I unit of luminous flux is

(A) lumen

(B) candela

(C) weber

(D) None of these

29. A three winding transformer uses a delta-connected tertiary winding to

(A) reduce the zero-sequence impedance

(B) increase the zero-sequence impedance

(C) achieve unity power factor

(D) None of these

30. The efficiency of a circuit obeying maximum power transfer theorem is

(A) 25%

(B) 50%

(C) 75%

(D) 100%

31. Which of the following statements is incorrect about a potential transformer ?

(A) It operates with its secondary nearly under open circuit condition

(B) Its primary current does not depend upon the secondary burden

(C) The flux density varies over a restricted range

(D) The exciting current varies over a restricted range

32. In a positive edge triggered JK Flip-Flop, the output goes to TOGGLE state when its control inputs

   (A) J and K are both low

   (B) J is low and K is high

   (C) J is high and K is low

   (D) Both J and K are high

33. Which of the following methods is not commonly employed for starting of squirrel-cage induction motors ?

   (A) Stator impedance starting

   (B) Autotransformer starting

   (C) Reduced voltage starting

   (D) Rotor-resistance starting

34. If shunt capacitors are added to a transmission line, its stability

   (A) increases

   (B) decreases

   (C) remains the same

   (D) may increase or decrease

35. In a first and second quadrant DC-DC converter

   (A) both load current and load voltage can be either positive or negative

   (B) both load current and load voltage is always positive

   (C) load current is either positive or negative but load voltage is always positive

   (D) load current is always positive but load voltage can be either positive or negative

36. Any control system that has excessive noise would most likely suffer from

   (A) Oscillations

   (B) Vibrations

   (C) Loss of gain

   (D) Saturation in the amplifying stages

37. In synchronous machines, the slope of the power-angle characteristic at the operating point is known as the

   (A) Synchronizing angle coefficient

   (B) Synchronizing power coefficient

   (C) Synchronizing acceleration coefficient

   (D) Synchronizing speed coefficient

38. Which of the following statements is incorrect about armature reaction in alternators ?

   (A) The armature reaction flux is constant in magnitude

   (B) The armature reaction flux rotates at synchronous speed

   (C) The armature reaction does not depend on the power factor of the load

   (D) The armature reaction is the effect of the armature flux on the flux produced by the rotor field poles

39. The value of capacitance of a capacitor is specified as $1.5 \mu F \pm 2\%$. The limit within which the capacitance is guaranteed to lie is

   (A) 1.49 to 1.51 μF (B) 1.48 to 1.52 μF

   (C) 1.47 to 1.53 μF (D) 1.51 to 1.53 μF

40. Which of the following statements is incorrect about depletion region in a p-n junction ?

   (A) Depletion region is devoid of free carriers

   (B) It has high resistivity

   (C) Most of the battery voltage appears across it in forward-biased condition

   (D) Very little voltage appears across it in reverse-biased condition

41. If a voltmeter is connected across a load, it will measure

    (A) the load current

    (B) power of the load

    (C) the load voltage

    (D) None are correct statement

42. In two-wattmeter method of power measurement in three phase circuits, one of the wattmeter reads zero and the other reads total power when power factor is

    (A) Zero

    (B) 0.5

    (C) 1

    (D) None of these

43. Murray loop test is used for

    (A) localization of cable faults

    (B) measurement of phase angle

    (C) measurement of power factor

    (D) measurement of frequency

44. In case of half wave rectifiers, the ripple factor is

    (A) 1.11

    (B) 1.21

    (C) 1.31

    (D) None of these

45. An ammeter can be converted into voltmeter by making a connection of suitable

    (A) low resistance in series with it

    (B) high resistance in parallel with it

    (C) low resistance in parallel with it

    (D) high resistance in series with it

46. The unit for electric displacement field is

    (A) Coulomb/sq.m

    (B) Coulomb/m

    (C) Ampere/sq.m

    (D) Ampere/m

47. In creep test for energy meters, the voltage applied is

    (A) 90% of marked value

    (B) 100% of marked value

    (C) 110% of marked value

    (D) 120% of marked value

48. The temperature coefficient of Zener breakdown voltage is

(A) Zero

(B) Positive

(C) Negative

(D) Infinity

49. To measure 10A current with the help of a 6A, 2 ohm ammeter it is necessary to connect

(A) 3 ohm resistance in series

(B) 0.3 ohm resistance in series

(C) 3 ohm resistance in parallel

(D) 0.3 ohm resistance in parallel

50. In an infinite busbar system

(A) voltage remains constant but frequency may vary

(B) frequency remains constant but voltage may vary

(C) both voltage and frequency remain constant

(D) both voltage and frequency may vary

51. Two resistors when joined in parallel to a 12V battery, absorbs 48W. If one resistor is 6Ω, the other resistor is

(A) 3Ω

(B) 6Ω

(C) 9Ω

(D) 12Ω

52. Kirchhoff's laws are valid for

(A) D.C circuit only

(B) A.C circuit only

(C) Both A.C and D.C circuits

(D) None of these

53. The voltage applied to the field of a rotating cylindrical rotor type alternator is

(A) high D.C voltage

(B) high A.C voltage

(C) low D.C voltage

(D) low A.C voltage

54. An electric motor has 200 conductors each exerting a force of 10N at a radius of 90 mm. Determine the power developed by the motor rotating at a speed of 840 rpm.

(A) 7920W

(B) 15840W

(C) 31680W

(D) None of these

55. A low resistance comprises

(A) Two current terminals and two potential terminals

(B) Four current terminals and two potential terminals

(C) Two current terminals and four potential terminals

(D) Four current terminals and four potential terminals

56. The form factor for a sinusoidal AC voltage is

(A) 1.41

(B) 1.11

(C) 1.00

(D) 0.707

57. In a synchronous machine, the air gap line represents a linear relation between

(A) E_f and I_f

(B) E_f and I_a

(C) I_f and I_a

(D) E_f and V_t

58. In a single phase moving iron type rotating field power factor meter, we have

(A) two fixed coils displaced by 90° in space

(B) two fixed coils displaced by 180° in space

(C) three fixed coils displaced by 120° in space

(D) None of these

59. The ratio of maximum demand of a system to the rated capacity of the system is called

(A) Load factor

(B) Diversity factor

(C) Plant factor

(D) Utilization factor

60. If the value of damping ratio for a particular system is unity, the system response will be

(A) overdamped

(B) underdamped

(C) critically damped

(D) oscillatory

61. The test carried out in DC motors to obtain windage and friction loss is

(A) Swinburne's Test

(B) Hopkinson's Test

(C) Retardation Test

(D) None of these

62. In Fleming's right-hand rule, the directions are given as

(A) thumb gives motion, first finger gives magnetic field, second finger gives induced current

(B) thumb gives motion, second finger gives magnetic field, first finger gives induced current

(C) thumb gives magnetic field, first finger gives motion, second finger gives induced current

(D) thumb gives magnetic field, second finger gives motion, first finger gives induced current

63. A lead acid storage battery rated at 120 amp-hours discharge rate will deliver a current of 5 amps for approximately

(A) 24 hours

(B 12 hours

(C) 5 hours

(D) 120 hours

64. The decimal equivalent of an octal number 253 is

(A) 168

(B) 171

(C) 174

(D) 177

65. In a single phase transformer, the shunt branch parameters of the equivalent circuit can be determined by

(A) Open Circuit test

(B) Short Circuit test

(C) Polarity test

(D) None of these

66. Ferranti effect is observed when

(A) a short transmission line is open circuited

(B) a short transmission line is short circuited

(C) a long transmission line is open circuited

(D) a long transmission line is short circuited

67. A single phase series R-L circuit takes a current of 10A at 150V, where the current lags by 30° behind the applied voltage. Frequency is 50 Hz. Calculate the resistance of the circuit.

(A) 6.44Ω

(B) 12.99Ω

(C) 19.485Ω

(D) None of these

68. For torque angle δ, the condition for maximum power transmission through a transmission line is

(A) δ = 0°

(B) δ = 45°

(C) δ = 60°

(D) δ = 90°

69. In a three phase induction motor, the maximum torque is independent of

(A) rotor resistance

(B) rotor reactance

(C) synchronous speed

(D) None of these

70. The ability of a material to set up a magnetic field is called its

(A) permeability

(B) permittivity

(C) retentivity

(D) coercivity

71. Lumped-parameter delay line in a CRO can be constructed using cascaded

(A) RC networks

(B) LR networks

(C) LC networks

(D) None of these

72. For an Op-Amp, the voltage gain for the difference signal (A_d) and the voltage gain for the common-mode signal (A_c) should be

(A) Both A_d and A_c low

(B) A_d high and A_c low

(C) A_d low and A_c high

(D) Both A_d and A_c high

73. Which of the following statements is incorrect for a synchronous machine ?

(A) In over-excited condition, the machine absorbs reactive power

(B) In under-excited condition, the machine absorbs reactive power

(C) In over-excited condition, the machine delivers reactive power

(D) In normal-excitation condition, the machine neither absorbs nor delivers reactive power

74. Which of the following statements is incorrect about skin effect ?

(A) For a conductor carrying AC current tends to crowd near surface of the conductor

(B) Skin effect increases with increasing frequency

(C) Skin effect decreases with increasing conductor diameter

(D) Skin effect increases with increasing permeability

75. Energy stored in a charged capacitor is given as

(A) $\frac{1}{2}CV^2$

(B) $\frac{1}{2}CV$

(C) CV^2

(D) CV

76. Which of the following statements is correct about Surge Impedance Loading (SIL) ?

(A) SIL is proportional to the sending end line voltage

(B) SIL is proportional to the square of the sending end line voltage

(C) SIL is proportional to the receiving end line voltage

(D) SIL is proportional to the square of the receiving end line voltage

77. In a four-point starter used for D.C motor starting, the four terminals available from the starter are marked as

(A) L, F, F, A

(B) L, L, F, A

(C) L, F, A, A

(D) None of these

78. For a sine wave, the ratio of half-cycle average to maximum value is

(A) $\frac{1}{\pi}$

(B) $\frac{2}{\pi}$

(C) $\frac{4}{\pi}$

(D) $\frac{1}{2\pi}$

79. In a PMMC ammeter, the range can be increased by introducing

   (A) a low resistance in series with the meter movement

   (B) a high resistance in series with the meter movement

   (C) a low resistance in parallel with the meter movement

   (D) a high resistance in parallel with the meter movement

80. In a series R-L circuit, the applied voltage

   (A) lags the current   (B) leads the current

   (C) is in phase with the current   (D) $90°$ ahead of the current

81. 1 kWh is equal to

   (A) 3.6 kJ   (B) 36 J

   (C) 3.6 MJ   (D) None of these

82. The negative phase sequence in a three-phase synchronous motor exists when

   (A) motor is under loaded   (B) motor is over loaded

   (C) unbalanced voltage is supplied (D) None of these

83. In general, if a sine wave is fed into a Schmitt trigger, the output will be

   (A) a square wave   (B) a rectangular wave

   (C) an amplified sine wave (D) None of these

84. Under force current analogy, which of the following is analogous to voltage ?

   (A) Mass   (B) Momentum

   (C) Displacement   (D) Velocity

85. For an ideal transformer, which of the following statements is false ?

(A) The primary winding has zero resistance

(B) The core loss is considered zero

(C) There is no leakage flux

(D) The core has zero permeability

86. In a purely inductive circuit, the active power over a complete cycle is

(A) Zero

(B) 0.5

(C) 1

(D) Infinity

87. If two heaters of each power 1 kW are connected in parallel to a 250V supply, their combined rate of heating will be

(A) 2000W

(B) 1000W

(C) 5000W

(D) 250W

88. A thyristor operating in on-state can be turned off by reducing the forward current to a level below the

(A) avalanche current

(B) holding current

(C) reverse blocking current

(D) None of these

89. For a step-down transformer, the number of turns in the primary as compared to secondary would be

(A) fewer

(B) the same

(C) greater

(D) exactly one turn less

90. In a diode-based three phase full wave bridge rectifier, the ratio of rms output voltage to peak phase voltage is

(A) 0.8277

(B) 1.6554

(C) 1.4336

(D) None of these

91. When the rate of change of current is unity, induced e.m.f. is equal to

(A) thickness of coil

(B) number of turns in coil

(C) coefficient of self-induction

(D) total flux linked with coil

92. Which of the following can be used as a delay circuit ?

(A) Astable multivibrator

(B) Bistable multivibrator

(C) Monostable multivibrator

(D) None of these

93. For a three-phase induction machine, if slip is s > l, the machine is operating in

(A) motoring mode

(B) generating mode

(C) braking mode

(D) standstill condition

94. An electric lamp is marked 60W, 240V. If it operates at 200V the current through it will be

(A) 0.18A

(B) 0.21A

(C) 0.25A

(D) 0.30A

95. The Avogadro's number is 6×10^{23} per grant mole and electric charge is 1.6×10^{-19} Coluomb. The Faraday's number is

(A) $6 \times 10^{23} \times 1.6 \times 10^{-19}$

(B) $6 \times 10^{23} \times 1.6 \times 10^{-19}$

(C) $1/6 \times 10^{23} \times 1.6 \times 10^{-19}$

(D) $1.6 \times 10^{-19} / 6 \times 10^{23}$

96. Same current is being passed through a copper voltameter and a silver voltameter. The rate of increase in weights of the cathodes in the two voltameters will be in proportional to

(A) relavite densities

(B) atomic masses

(C) atomic numbers

(D) None of these

97. In DC generators, the characteristic that gives variation of armature terminal voltage with load current for constant speed and fixed field current is called

    (A) No-load characteristic

    (B) Load characteristic

    (C) External characteristic

    (D) Armature characteristic

98. In 8085 microprocessor, order of priority (highest to lowest) of the interrupt inputs is

    (A) INTR, RST 5.5, RST 6.5, RST 7.5, TRAP

    (B) TRAP, RST 5.5, RST 6.5, RST 7.5, 1NTR

    (C) INTR, RST 7.5, RST 6.5, RST 5.5, TRAP

    (D) TRAP, RST 7.5, RST 6.5, RST 5.5, INTR

99. The hexadecimal equivalent of the binary number 1010 1001 1101 0111 is

    (A) A9D7

    (B) B9D8

    (C) A8C8

    (D) B9C7

100. Which of the following statements is incorrect about a series RLC resonant circuit ?

    (A) The magnitude of overall circuit impedance is a minimum

    (B) The supply voltage and supply current are in phase

    (C) The magnitude of the supply current is a minimum

    (D) The power absorbed by the circuit is a maximum.