महाराष्ट्र राजपत्रित तांत्रिक सेवा परीक्षा-2022 परीक्षा दि. 13 मे, 2023
महाराष्ट्र विद्युत व यांत्रिकी अभियांत्रिकी मुख्य परीक्षा-2022

2022

N17

संच क्र. **A**

प्रश्नपुस्तिका – II
विद्युत व यांत्रिकी अभियांत्रिकी पेपर – 2

प्रश्नपुस्तिका क्रमांक BOOKLET NO. 400677

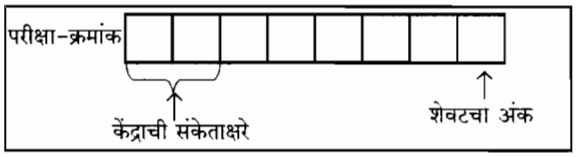
एकूण प्रश्न : 100

वेळ : 2 (दोन) तास **एकूण गुण : 200**

सूचना

(1) सदर प्रश्नपुस्तिकेत **100** अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. तसेच अन्य काही दोष आढळल्यास ही प्रश्नपुस्तिका समवेक्षकांकडून लगेच बदलून घ्यावी.

(2) आपला परीक्षा-क्रमांक ह्या चौकोनांत **न विसरता बॉलपेनने** लिहावा.



(3) वर छापलेला प्रश्नपुस्तिका क्रमांक तुमच्या उत्तरपत्रिकेवर विशिष्ट जागी उत्तरपत्रिकेवरील सूचनेप्रमाणे **न विसरता नमूद करावा.**

(4) या प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाला 4 पर्यायी उत्तरे सुचविली असून त्यांना 1, 2, 3 आणि 4 असे क्रमांक दिलेले आहेत. त्या चार उत्तरांपैकी सर्वात योग्य उत्तराचा क्रमांक उत्तरपत्रिकेवरील सूचनेप्रमाणे तुमच्या उत्तरपत्रिकेवर नमूद करावा. अशा प्रकारे उत्तरपत्रिकेवर उत्तर-क्रमांक नमूद करताना तो संबंधित प्रश्न-क्रमांकासमोर छायांकित करून दर्शविला जाईल याची काळजी घ्यावी. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

(5) सर्व प्रश्नांना समान गुण आहेत. यास्तव सर्व प्रश्नांची उत्तरे द्यावीत. घाईमुळे चुका होणार नाहीत याची दक्षता घेऊनच शक्य तितक्या वेगाने प्रश्न सोडवावेत. क्रमाने प्रश्न सोडविणे श्रेयस्कर आहे पण **एखादा प्रश्न कठीण वाटल्यास त्यावर वेळ न घालविता पुढील प्रश्नांकडे वळावे.** अशा प्रकारे शेवटच्या प्रश्नापर्यंत पोहोचल्यानंतर वेळ शिल्लक राहिल्यास कठीण म्हणून वगळलेल्या प्रश्नांकडे परतणे सोईस्कर ठरेल.

(6) उत्तरपत्रिकेत एकदा नमूद केलेले उत्तर खोडता येणार नाही. नमूद केलेले उत्तर खोडून नव्याने उत्तर दिल्यास ते तपासले जाणार नाही. एकापेक्षा जास्त उत्तरे नमूद केल्यास ते उत्तर चुकीचे धरले जाईल व त्या चुकीच्या उत्तराचे गुण वजा केले जातील.

(7) प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच ''उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची दिलेल्या चार उत्तरांपैकी सर्वात योग्य उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चुकीच्या उत्तरांसाठी 25% किंवा 1/4 गुण वजा/कमी करण्यात येतील.''

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

SEAL

ताकीद

ह्या प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपेपर्यंत ही प्रश्नपुस्तिका आयोगाची मालमत्ता असून ती परीक्षाकक्षात उमेदवाराला परीक्षेसाठी वापरण्यास देण्यात येत आहे. ही वेळ संपेपर्यंत सदर प्रश्नपुस्तिकेची प्रत/प्रती, किंवा सदर प्रश्नपुस्तिकेतील काही आशय कोणत्याही स्वरूपात प्रत्यक्ष वा अप्रत्यक्षपणे कोणत्याही व्यक्तीस पुरविणे, तसेच प्रसिद्ध करणे हा गुन्हा असून अशी कृती करणाऱ्या व्यक्तीवर शासनाने जारी केलेल्या ''परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचा अधिनियम-82'' यातील तरतुदीनुसार तसेच प्रचलित कायद्याच्या तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

तसेच ह्या प्रश्नपत्रिकेसाठी विहित केलेली वेळ संपण्याआधी ही प्रश्नपुस्तिका अनधिकृतपणे बाळगणे हा सुद्धा गुन्हा असून तसे करणारी व्यक्ती आयोगाच्या कर्मचारीवृंदापैकी, तसेच परीक्षेच्या पर्यवेक्षकीयवृंदापैकी असली तरीही अशा व्यक्तीविरुद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

1. Following statements are made in respect of SF_6 circuit breaker.

   a. SF_6 is an electronegative gas.

   b. Dielectric strength of SF_6 is 2.35 times that of air at atmospheric pressure.

   c. Moisture content in SF_6 gas presents various problems in SF_6 circuit breaker operation.

   (1) Only a and b statements are correct (2) Only b and c statements are correct

   (3) Only a and c statements are correct (4) Statements a, b and c are correct

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2. In designing an HVDC circuit breaker, which of the following problems are to be resolved ?

   (1) How to produce a current zero ? (2) How to prevent restriking ?

   (3) How to dissipate the stored energy ? (4) All of the above

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3. The pressure of SF_6 gas, in SF_6 CB is of the order of

   (1) 1 kg/cm^2 (2) 5 kg/cm^2

   (3) 0.5 kg/cm^2 (4) 30 – 40 kg/cm^2

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4. In case of HRC fuse, the term Fusing Factor is defined as follows :

   (1) Fusing factor = $\frac{\text{Current rating}}{\text{Minimum fusing current}}$

   (2) Fusing factor = $\frac{\text{Minimum fusing current}}{\text{Prospective current}}$

   (3) Fusing factor = $\frac{\text{Minimum fusing current}}{\text{Current rating}}$

   (4) Fusing factor = 0.9 × Current rating

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5. Switching over voltages may be generated in vacuum circuit breakers, which are mainly due to the following reasons

(1) Current chopping only

(2) Multiple reignition only

(3) Current chopping and/or multiple reignition

(4) None of the above

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6. It is difficult to interrupt a capacitive current because

(1) Current magnitude is very small

(2) The restriking voltage can be high

(3) Stored energy in capacitor is very high

(4) None of the above

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7. Resistance switching is employed in which of the following circuit breaker ?

(1) Air-blast circuit breaker (2) Minimum oil circuit breaker

(3) Vacuum circuit breaker (4) SF_6 circuit breaker

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8. Rated short circuit making current of a circuit breaker should be at least _____ times the rms value of ac component of rated breaking current.

(1) 1.5 (2) 2.5 (3) 3.5 (4) 10

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9. The Rate of Rise of Restriking Voltage (RRRV) depends upon the

(1) inductance of the system

(2) capacitance of the system

(3) type of circuit breaker

(4) inductance and capacitance of the system

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

10. Magnetic blow out coils are generally used in

(1) Air-break circuit breakers (2) Vacuum circuit breakers

(3) Oil circuit breakers (4) SF_6 circuit breakers

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11. A line trap in carrier current relaying often

(1) Low impedance to carrier frequency but high impedance to power frequency

(2) High impedance to carrier frequency but low impedance to power frequency

(3) Low impedance to both carrier frequency and power frequency

(4) High impedance to both carrier frequency and power frequency

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12. For large induction motors, to detect single phasing condition

(1) The relay shall depend on negative sequence current measurement

(2) The relay shall depend on zero sequence current measurement

(3) The relay shall depend on positive sequence current measurement

(4) No special type of protection is required

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13. In a biased differential relay, the setting of relay is given by ratio of

(1) no. of turns on restraining coil to no. of turns on operating coil

(2) operating coil current to restraining coil current

(3) restraining coil current to operating coil current

(4) restraining coil current to fault current

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14. Which type of relay is most suitable for current graded protection of feeder ?

(1) Inverse Definite Minimum Time (IDMT) relay

(2) High-speed high-set overcurrent relays

(3) Distance relays

(4) None of the above

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15. The magnetic inrush current in a transformer is rich in

(1) 3^{rd} harmonic component (2) 2^{nd} harmonic component

(3) 5^{th} harmonic component (4) 7^{th} harmonic component

16. An IDMT type overcurrent relay is used to protect a feeder through 500/1 A CT. The relay has a current setting of 125% and TMS = 0.5. If a fault current of 5000 A flows through the feeder, then the Plug Setting Multiplier (PSM) of the relay will be

(1) 4 (2) 8 (3) 1.25 (4) 10

17. Mho type distance relay is normally used for the protection of

(1) Short length transmission lines (2) Very short length transmission lines

(3) Medium length transmission lines (4) Long length transmission lines

18. The preferred protection for interturn faults on armature winding of alternator is

(1) Longitudinal simple differential protection

(2) Longitudinal percentage differential protection

(3) Over-current protection

(4) Transverse differential protection using split winding design of alternator

19. Maximum number of faults are generally reported for

(1) Switch gears (2) Underground cables

(3) Power transformers (4) Transmission lines

20. The component used in the output stage of static relay is

(1) Operational amplifier (2) Comparator

(3) Capacitor (4) Thyristor

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

21. The volt ampere characteristics of a non-linear resistor used in lightning arrester is given by

(1) $V = K \cdot I^n$ (2) $V = K \cdot I^3$ (3) $V = K \cdot I^{1/n}$ (4) $V = K \cdot I^{-n}$

22. In case of H.V. test on cables, a.c. voltage of _____ times the rated value is applied for _____ minutes.

(1) 1.5, 20 (2) 2.5, 10 (3) 2.5, 20 (4) 1.5, 10

23. The volt ampere characteristic of a non-linear resistor used in surge arrester is given by

(1) $V = KI^2$ (2) $V = KI^n$

(3) $V = KI^{-n}$ (4) $V = K_1 I + K_2 I^{-1}$

24. _____ is a powerful device to improve the power transfer capability as well as voltage profile of the receiving end bus.

(1) Shunt capacitors (2) Shunt inductors

(3) Synchronous compensators (4) Series capacitors

25. A surge voltage of 1000 kV is applied to an overhead line with its receiving end open. If the surge impedance of the line is 500 Ω then total surge power in the line is

(1) 2000 MW (2) 500 MW (3) 2 MW (4) 0.5 MW

26. The voltage distortion level depends on

(1) the circuit impedances and the overall harmonic current distortion

(2) the circuit impedances and the overall harmonic voltage distortion

(3) power factor and the circuit impedances

(4) none of the above

27. A low pass broadband filter is an ideal application to block

(1) single harmonic current (2) widespread harmonic frequencies

(3) zero sequence current (4) none of the above

28. A bipolar two terminal HVDC link is delivering 1000 MW at ± 500 kV at receiving end. The total losses in the circuit are 50 MW. Calculate the sending end power and sending end voltage.

(1) 1050 MW, ± 525 kV (2) 2100 MW, ± 600 kV

(3) 1050 MW, ± 550 kV (4) None of the above

29. The most common cause of impulsive transient is

(1) Switching a unloaded transmission line

(2) Switching a capacitor bank

(3) Switching a shunt reactor

(4) Lightning

30. Which curves are used to define the withstand capability of various loads and devices for protection from power quality variations ?

(1) CBEMA (2) ITIC (3) CBEMA and ITIC (4) TCC

31. Calculate electricity bill for LT residential building as per following tariff.

Units consumed = 350,

Fixed charges = Rs. 115,

Wheeling charges = Rs. 1.50/unit,

Electricity duty 16%.

Units	**0 – 100**	**101 – 300**	**301 – 500**
Energy charges rate	Rs. 3.50	Rs. 6.50	Rs. 10.00
Fuel adjustment cost rate	Re. 0.50	Rs. 1.50	Rs. 2.00

(1) Rs. 3,740 (2) Rs. 3,758 (3) Rs. 3,125 (4) Rs. 5,481

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

32. MSEDCL calculates maximum demand of a consumer on the basis of

(1) Total kWH in a day ÷ 24

(2) Largest kVA drawn at any instant in a month

(3) Largest kVA drawn during any consecutive 30 min. slot

(4) Total kVAH in a day ÷ 24

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33. Capacitors with automatic power factor controller when installed in a plant

(1) reduces the voltage of the plant

(2) increases the load current of the plant

(3) reduces the reactive power drawn from the grid

(4) reduces the active power drawn from the grid

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34. Maximum Demand (MD) of electricity used in industry as shown in a monthly utility electricity bill is the

(1) sanctioned load in kW

(2) average kVA recorded within the month

(3) highest average kVA recorded during any one demand interval within the month

(4) instantaneous highest kVA recorded during any point of time within the month

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35. Electricity Act, 2003 aimed at constituting a

(1) Central Electricity Authority

(2) Regulatory Commissions and Establishment of Appellate Tribunals

(3) Both (1) and (2)

(4) None of these

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36. Bureau of Energy Efficiency was established according to the requirement of

(1) Energy Conservation Act, 2001 (2) Electricity Act, 2003

(3) Bureau of Indian Standards, 1947 (4) Electricity Amendment Act, 2007

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK P.T.O.

37. Select the incorrect statement from options (1) to (4) with respect to following scenario.

"In system distribution loss optimization, the various options available include _____."

(1) power factor improvement.

(2) optimum loading of transformers in the system.

(3) re-routing and re-conducting such feeders and lines where the voltage drops are higher.

(4) selection of Aluminium Cored Steel Reinforced (ACSR) instead of All Aluminium Alloy Conductors (AAAC).

38. Which of the following are key objectives of India's National Energy Policy ?

a. Access at affordable prices

b. Improved energy security and independence

c. Greater sustainability and economic growth

d. Increase RE share to 100% of total capacity

(1) a and b (2) b and c (3) a, b, c (4) a, b, c, d

39. Inexhaustible energy sources are known as

(1) Primary energy sources (2) Secondary energy sources

(3) Commercial energy sources (4) Renewable energy sources

40. In the month of March 2022, the total renewable energy installed capacity of Maharashtra is

(1) 23856 MW (2) 10693 MW (3) 50 MW (4) 34157 MW

41. One lumen per square meter is same as

(1) One lux (2) One candle

(3) One foot candle (4) One lumen meter

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

42. The illumination is directly proportional to cosine of the angle made by the normal to illuminated surface with the direction of the incident flux. The above statement is associated with

(1) Lambert's cosine law (2) Planck's law

(3) Bunsen's law of illumination (4) Macbeth's law of illumination

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43. The index of refraction for a particular material is the ratio of

(1) Speed of light in vacuum to the speed of light in material

(2) Speed of light in material to speed of light in vacuum

(3) Both of the above

(4) None of the above

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44. Average life of which of the following lamp is highest ?

(1) Sodium vapour lamp (2) Mercury vapour lamp

(3) Incandescent lamp (4) Fluorescent lamp

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45. A football pitch 120 m × 60 m is to be illuminated for night play by a similar bank of equal 1000 W lamps supported on twelve towers which are distributed around the ground to provide approximately uniform illumination of the pitch. Assuming that 40% of total light emitted reaches the playing pitch and that illumination of 1000 lm/m^2 is necessary for television purpose. Calculate number of lamps on each tower. Overall efficiency of lamp is 30 lm/W.

(1) 100 (2) 200 (3) 150 (4) 50

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46. According to IS 3646 Part – II, the recommended values of illumination and limiting value of glare index for Electricity Generating Station : Turbine halls shall be

(1) 700, 19 (2) 200, 25 (3) 150, 25 (4) 300, 19

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47. Recommended illumination level according to IS 3646 Part – 1 for inspection of farm products where colour is important is

(1) 200 – 300 – 500 (2) 300 – 500 – 750

(3) 50 – 100 – 150 (4) 30 – 50 – 100

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK P.T.O.

48. The advantage of operating fluorescent lamp on DC supply instead of an AC is

(1) Improvement in efficiency (2) Reduction in cost

(3) Longer life (4) Elimination of stroboscopic effect

49. Incandescent lamps normally operates at a power factor of

(1) 0.6 lagging (2) 0.707 lagging (3) 0.8 leading (4) unity

50. LED light life span is upto

(1) 1,000 hours (2) 3,000 hours

(3) 4,000 hours (4) 1,00,000 hours

51. If connected load is 650 kW, diversity factor is 1.86, % loading is 70% and p.f. is 0.8 for 100% loading, then rating of DG set must be

(1) 568 kW (2) 500 kVA (3) 500 kW (4) 625 kVA

52. Capacity of UPS battery cell is measured in

(1) Watt hours (2) Watts (3) Amperes (4) Ampere-hour

53. Following is not the advantage of adopting diesel power plant

(1) less pollution

(2) low installation cost

(3) most efficient plant performance

(4) minimum cooling water requirements

54. The auxiliary power consumption of diesel engine power plants are

(1) 2 – 4% (2) 1.3 – 2.1% (3) 8 – 10% (4) 5 – 8%

55. In DG sets, diesel engine is typically running at speeds of

(1) 500 – 1200 rpm (2) 1300 – 3000 rpm

(3) 3000 – 5000 rpm (4) above 5000 rpm

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

56. If the input to the prime mover of an alternator is kept constant but excitation is changed, then the

(1) reactive component of the output is changed

(2) active component of the output is changed

(3) power factor of the load remains constant

(4) both, active and reactive power components changed

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57. Consider the following statement/s and choose correct option.

a. Parallel operation of DG set with grid would involve operational risks like, reverse power, voltage and frequency swings.

b. Two independent earthings are necessary for body and neutral for adequate protection while installing DG sets.

(1) a is true, b is false (2) a is false, b is false

(3) a is true, b is true (4) a is false, b is true

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58. Which is not a parameter affecting WHR from flue gases in DG installation ?

(1) DG set loading, temperature of exhaust gases

(2) Hours of operation of DG sets

(3) Back pressure on DG sets

(4) Load diversity factor

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59. In respect of DG sets, consider the following statement/s and choose correct option.

a. Increase in altitude reduces power output of DG.

b. Increase in intake and cooling water temperature increases power output of DG.

(1) a is true, b is true (2) a is false, b is true

(3) a is false, b is false (4) a is true, b is false

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60. The sequence of strokes in four stroke diesel engine is

(1) Induction – Compression – Ignition and Power – Exhaust

(2) Compression – Induction – Exhaust – Ignition and Power

(3) Induction – Compression – Exhaust – Ignition and Power

(4) Compression – Ignition and Power – Induction – Exhaust

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61. For centrifugal pump, the head (H) v/s speed (N) characteristic is

(1) $\frac{H_1}{H_2} = \frac{N_1}{N_2}$ (2) $\frac{H_1}{H_2} = \frac{\sqrt{N_1}}{\sqrt{N_2}}$

(3) $\frac{H_1}{H_2} = \frac{N_1^2}{N_2^2}$ (4) $\frac{H_1}{H_2} = \frac{N_2}{N_1}$

62. Flow of centrifugal pump is proportional to

(1) Impeller diameter (D) (2) D^2

(3) $1/D^2$ (4) D^3

63. During the trial on compressor, following observations were noted :
(a) motor input power 100 kW (b) isothermal power 48.34 kW and (c) compressor input power 86 kW,
then isothermal efficiency would be

(1) 48.3% (2) 86%

(3) 56% (4) None of the above

64. The operating point in a pumping system is identified by

(1) Point of intersection of system curve and efficiency curve

(2) Point of intersection of pump curve and theoretical power curve

(3) Point of intersection of pump curve and system curve

(4) Cannot be determined by the pump characteristic curves

65. In a pump, water velocity is converted to pressure by

(1) Shaft (2) Diffuser

(3) Impeller (4) Discharge pipe

66. By reducing fan speed by 10%, static pressure reduces by _____ and power requirement reduces by _____.

(1) 10% and 19% (2) 19% and 27%

(3) 10% and 27% (4) 27% and 10%

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67. A centrifugal pump draws 5 kW power when running at a speed of 1750 rpm. If now pump speed is changed to 3500 rpm, what will be the power drawn by the pump ?

(1) 5 kW (2) 20 kW (3) 2.5 kW (4) 40 kW

---

68. Ratio of free air delivered to compressor displacement is called

(1) Isothermal efficiency (2) Total efficiency

(3) Volumetric efficiency (4) Air drier efficiency

---

69. For a centrifugal pump

(1) Static head is independent of flow and friction head depends on flow

(2) Static head as well as friction head depends on flow

(3) Static head is dependent on flow and friction head is independent of flow

(4) Both static head and friction head are independent of flow

---

70. Which motor is generally used in pumps ?

(1) Induction motor (2) DC motor

(3) Stepper motor (4) All of the above

---

71. The primary purpose of heating, ventilating and air conditioning in the building is

(1) to regulate the dry bulb temperature, humidity and air quality by adding or removing heat energy

(2) to cool the air temperature in room by adding or removing air

(3) to cool the air temperature by removing heat energy

(4) none of the above

---

72. What is refrigeration load in TR when 15 m^3/hr of water is cooled from 21°C to 15°C ?

(1) 15 TR (2) 25 TR (3) 29.76 TR (4) 30.24 TR

---

73. 1TR of refrigeration is

(1) 2550 kcal/hr (2) 3024 kcal/hr (3) 4100 kcal/hr (4) 4210 kcal/hr

---

74. IPLV is formulated as kW/TR with partial loads on four point basis of loading with

(1) 100%, 75%, 50%, 25% (2) 100%, 80%, 60%, 20%

(3) 100%, 60%, 36%, 20% (4) 100%, 50%, 25%, 12.5%

75. At standard atmospheric pressure, boiling point of which CFC is the lowest

(1) R – 11 (2) R – 12 (3) R – 22 (4) R – 502

76. The expansion of the refrigerant in domestic refrigerator is carried out in

(1) Accumulator (2) Drier

(3) Capillary tube (4) None of these

77. Compressor power consumption will _____ by raising evaporator temperature.

(1) Increase (2) Decrease

(3) Remains constant (4) None of the above

78. Typically, the refrigerant side heat transfer areas provided are of the order of _____ and above in evaporators.

(1) 0.10 Sq.m/TR (2) 0.25 Sq.m/TR (3) 0.40 Sq.m/TR (4) 0.50 Sq.m/TR

79. In a large capacity refrigeration system, which type of compressor is used with compression ratio as high as 25 : 1 ?

(1) Reciprocating compressor (2) Rotary compressor

(3) Screw compressor (4) Centrifugal compressor

80. The COP equation is

(1) $COP_{Carnot} = \frac{t_{evap}}{t_{cond} - t_{evap}}$ (2) $COP_{Carnot} = \frac{t_{cond}}{t_{cond} - t_{evap}}$

(3) $COP_{Carnot} = \frac{t_{cond} - t_{evap}}{t_{evap}}$ (4) $COP_{Carnot} = \frac{t_{cond} - t_{evap}}{t_{cond}}$

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81. If length of cable increases, its insulation resistance

(1) decreases (2) increases

(3) remains same (4) none of the above

---

82. In gas filled cables generally _____ gas is used at a pressure of about _____.

(1) Hydrogen, 12 to 15 atmospheres (2) Nitrogen, 12 to 15 atmospheres

(3) Oxygen, 5 to 10 atmospheres (4) Sulphur, 5 to 10 atmospheres

---

83. The tower footing resistance may be reduced by

(1) driving rods near the tower and connecting them to the tower base

(2) burying counterpoise wires in the ground and connecting them to the tower base

(3) both (1) and (2)

(4) none of the above

---

84. When single line to ground fault occurs on an ungrounded neutral system, the capacitive current in the two healthy phases rises to _____ times the normal value.

(1) $\sqrt{2}$ (2) 3 (3) $\sqrt{3}$ (4) 2

---

85. Dielectric hysteresis loss in a cable varies as

(1) impressed voltage (2) $(\text{impressed voltage})^2$

(3) $(\text{impressed voltage})^{1/2}$ (4) $(\text{impressed voltage})^{3/2}$

---

86. The capacitance of insulated cable is much more than the overhead transmission line due to

(1) High value of permittivity of insulating material

(2) Distance between the core and earthed sheath is small

(3) Small distance between the cores (phases) itself

(4) All of these

---

87. The purpose of bedding is to

(1) protect cable from moisture

(2) protect metallic sheath from corrosion

(3) protect cable from mechanical injury

(4) protect armouring from atmospheric conditions

---

88. For operating voltages beyond 66 kV _____ cables are used.

(1) Belted (2) H-type (3) Oil filled (4) S – L type

---

89. Surge arrestor is normally connected between _____ at the substation.

(1) Two phases (2) Phase and ground

(3) Phase and neutral (4) None of the above

---

90. Normally _____ material is used as armouring.

(1) Magnetic (2) Non-magnetic

(3) Both (1) and (2) (4) None of the above

---

91. Indian Standard Code of Practice for earthing is

(1) IS 3043 (2) IS 3403 (3) IS 3040 (4) IS 4030

---

92. For same voltage level, when outdoor substation is compared with indoor substation, the cost will be _____ and fault diagnosis will be _____.

(1) low, easier (2) low, difficult (3) high, easier (4) high, difficult

---

93. The dielectric strength of the porcelain insulator is

(1) $30\ ^{kV}/_{cm}$ (2) $60\ ^{kV}/_{cm}$ (3) $100\ ^{kV}/_{cm}$ (4) $110\ ^{kV}/_{cm}$

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94. Stay wire used in electrical installation to support poles, is of size
(SWG = Standard Wire Gauge)

(1) 1 SWG to 3 SWG (2) 3 SWG to 5 SWG

(3) 5 SWG to 7 SWG (4) 8 SWG to 10 SWG

95. The fire taking place in the environment when live wires exists can be extinguished by

(1) Dry powder extinguisher (2) Water extinguisher

(3) Soda acid extinguisher (4) Foam extinguisher

96. In electrical installation, the maximum voltage drop should be upto _____, at the consumer premises from the point of entry of the circuit to the farthest point.

(1) 3% (2) 5% (3) 7% (4) 10%

97. _____ scheme is useful for most of the purposes where the loads and continuity of supply justify additional costs.

(1) Single bus (2) Double bus double breaker

(3) Both (1) and (2) (4) None of the above

98. The length of the flexible conduit used for connection between the terminal boxes of motor and starters shall not exceed

(1) 500 cm (2) 1.25 metres (3) 2 metres (4) 5 metres

99. In staircase wiring, the number of switches required are _____ and of the type _____.

(1) 2, single way (2) 2, two way (3) 3, single way (4) 3, two way

100. Pole substations are erected for mounting distribution transformers of capacity upto

(1) 50 kVA (2) 100 kVA (3) 250 kVA (4) 500 kVA

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सूचना – (पृष्ठ 1 वरून पुढे.....)

(8) प्रश्नपुस्तिकेमध्ये विहित केलेल्या विशिष्ट जागीच कच्चे काम (रफ वर्क) करावे. प्रश्नपुस्तिकेव्यतिरिक्त उत्तरपत्रिकेवर वा इतर कागदावर कच्चे काम केल्यास ते कॉपी करण्याच्या उद्देशाने केले आहे, असे मानले जाईल व त्यानुसार उमेदवारावर शासनाने जारी केलेल्या ''परीक्षांमध्ये होणाऱ्या गैरप्रकारांना प्रतिबंध करण्याबाबतचे अधिनियम-82'' यातील तरतुदीनुसार कारवाई करण्यात येईल व दोषी व्यक्ती कमाल एक वर्षाच्या कारावासाच्या आणि/किंवा रुपये एक हजार रकमेच्या दंडाच्या शिक्षेस पात्र होईल.

(9) सदर प्रश्नपत्रिकेसाठी आयोगाने विहित केलेली वेळ संपल्यानंतर उमेदवाराला ही प्रश्नपुस्तिका स्वत:बरोबर परीक्षा कक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.**

नमुना प्रश्न

Pick out the correct word to fill in the blank :

Q. No. **201.** I congratulate you _____ your grand success.

(1) for (2) at

(3) on (4) about

ह्या प्रश्नाचे योग्य उत्तर ''(3) on'' असे आहे. त्यामुळे या प्रश्नाचे उत्तर ''(3)'' होईल. यास्तव खालीलप्रमाणे प्रश्न क्र. **201** समोरील उत्तर-क्रमांक ''③'' हे वर्तुळ पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्र. क्र. **201.** ① ② ● ④

अशा पद्धतीने प्रस्तुत प्रश्नपुस्तिकेतील प्रत्येक प्रश्नाचा तुमचा उत्तर-क्रमांक हा तुम्हाला स्वतंत्ररीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्न-क्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

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