उपअभियंता (विद्युत यांत्रिकी), महाराष्ट्र अभियांत्रिकी सेवा, गट-अ चाळणी परीक्षा-२०१२

परीक्षा दि: 02-12-2012

प्रश्नपुस्तिका क्रमांक
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प्रश्नपुस्तिका

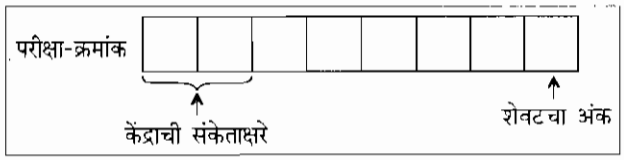
वेळ : $1\frac{1}{2}$ (दिड) तास

चाळणी परीक्षा/SCREENING TEST

एकूण प्रश्न : 150
एकूण गुण : 150

सूचना

(1) सदर प्रश्नपुस्तिकेत **150** अनिवार्य प्रश्न आहेत. उमेदवारांनी प्रश्नांची उत्तरे लिहिण्यास सुरुवात करण्यापूर्वी या प्रश्नपुस्तिकेत सर्व प्रश्न आहेत किंवा नाहीत याची खात्री करून घ्यावी. असा 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 उत्तरक्रमांक नमूद करताना तो संबंधित प्रश्नक्रमांकासमोर 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 प्रश्नाकडे 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.

(7) **प्रस्तुत परीक्षेच्या उत्तरपत्रिकांचे मूल्यांकन करताना उमेदवाराच्या उत्तरपत्रिकेतील योग्य उत्तरांनाच गुण दिले जातील. तसेच ''उमेदवाराने वस्तुनिष्ठ बहुपर्यायी स्वरूपाच्या प्रश्नांची अचूक उत्तरेच उत्तरपत्रिकेत नमूद करावीत. अन्यथा त्यांच्या उत्तरपत्रिकेत सोडविलेल्या प्रत्येक चार चुकीच्या उत्तरांसाठी एका प्रश्नाचे गुण वजा करण्यात येतील''.**

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

पर्यवेक्षकांच्या सूचनेविना हे सील उघडू नये

SEAL

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1. विभक्ती व त्याचे कारकार्थ अनुषंगाने खालीलपैकी कोणती जोडी चुकीची आहे ?

(1) द्वितीया – कर्म (2) तृतीया – अधिकरण
(3) चतुर्थी – संप्रदान (4) पंचमी – अपादान

2. खालीलपैकी संधीतील कोणती जोडी चुकीची आहे ?

(1) अच् + आदी — आजादी (2) वाग् + पती — वाक्पती
(3) बहिः + अंग — बाह्यांग (4) सत् + शिष्य — सच्छिष्य

3. खालीलपैकी कोणता शब्द शुद्ध आहे ?

(1) दृष्टीक्षेप (2) दृष्टीशेप (3) दृष्टिक्षेप (4) द्रुष्टिक्षेप

4. मला हा प्रश्न सोडवला पाहिजे.

_____ या वाक्यातील दर्शक सर्वनाम ओळखा.

(1) मला (2) हा (3) प्रश्न (4) सोडवला

5. खालील उदाहरणातील संयुक्त क्रियापद ओळखा.

(1) त्याने पुस्तक काढले (2) त्याने पुस्तक लिहून काढले
(3) त्याने काढले (4) या पैकी कोणताच पर्याय योग्य नाही

6. जेंव्हा वाक्यातील कर्माच्या लिंग वचनाप्रमाणे क्रियापदाचे रूप बदलते त्यास _____ प्रयोग म्हणतात.

(1) कर्मणि (2) कर्तरी
(3) भावे (4) या पैकी कुठलाच पर्याय योग्य नाही

7. शब्दांच्या पुनरूक्तीतून जे जोड शब्द तयार होतात त्यांना _____ म्हणतात.

(1) अभ्यस्त (2) शब्दसाधिते (3) समासघटित (4) प्रत्यय

8. खालील शब्दांचा समास ओळखा.

गृहस्थ

(1) द्विगु (2) उपपद तत्पुरुष
(3) नय तत्पुरुष (4) या पैकी कोणताच पर्याय योग्य नाही

9. जेव्हा वाक्यातील क्रियापदाच्या रूपावरून कर्तव्य, इच्छा, शक्यता या गोष्टींचा बोध होतो त्या अर्थाच्या वाक्यास म्हणतात.

(1) संकेतार्थ (2) विद्यर्थ (3) स्वार्थ (4) आज्ञार्थ

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10. 'मुलगा रोज अभ्यास करतो' या वाक्यातील उद्देश्य ओळखा.
(1) करतो (2) अभ्यास (3) रोज (4) मुलगा

11. 'संप्रदान' कोणत्या विभक्तीचा कारक अर्थ आहे ?
(1) प्रथमा (2) चतुर्थी (3) सप्तमी (4) संबोधन

12. 'संबोधन' – विभक्तींचा अर्थ सांगा.
(1) कर्ता (2) हाक मारणे
(3) संबंध (4) या पैकी कोणताच पर्याय नाही

13. 'अभ्यास करणारी मुले सहज उत्तीर्ण होतात' — या वाक्याचा प्रकार ओळखा.
(1) संयुक्त वाक्य (2) केवलवाक्य
(3) मिश्रवाक्य (4) सहजवाक्य

14. खालील वाक्यातील क्रियापदाचा प्रकार ओळखा.
'त्यांनी अनेक ग्रंथ जमवले'
(1) अकर्मक (2) सकर्मक
(3) क्रियाविशेषण अव्यय (4) रीतिवाचक क्रियाविशेषण

15. 'त्रिभुवन' – शब्दाचा समास लिहा.
(1) द्विगु (2) कर्मधारय
(3) अव्ययीभाव (4) या पैकी कोणताच पर्याय योग्य वाटत नाही

16. खालील सामासिक शब्दांचा विग्रह करा.
'चक्रपाणि'
(1) चक्र आहे वाणीत ज्याच्या तो (2) जो चक्रांचा मुख्य आहे तो
(3) चक्र आहे हातात ज्याच्या तो (4) चक्रात पाणी आहे ज्याच्या तो

17. 'देवमान्य' – समासप्रकार ओळखा.
(1) द्वितीया तत्पुरुष (2) तृतीया तत्पुरुष
(3) नञ् तत्पुरुष (4) पंचमी तत्पुरुष

18. खालील पर्यायी उत्तरातील योग्य म्हण ओळखा.
(1) आयत्या पिठावर नागोबा (2) आयत्या पिठावर भाकरी
(3) आयत्या पिठावर मीठ (4) आयत्या पिठावर रेघोटया

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प्र.क्र. 19 ते 25 खालील उतारा नीट वाचून प्रश्नांची उत्तरे द्या.

सौंदर्य ही मूल्यकल्पना आहे. सौंदर्यशास्त्र हे बुद्धिवादी तत्त्वज्ञानाच्या कुटुंबातील एक शास्त्र आहे. साहित्य या कलेच्या सौंदर्याचे तत्त्वज्ञान म्हणजे साहित्याचे सौंदर्यशास्त्र आणि जडवादी तत्त्वज्ञानाच्या पायावर उभारलेले सौंदर्यशास्त्र हे बुद्धिवादी सौंदर्यशास्त्रच होय. जे अपरिहार्य आहे, जे संभाव्य आहे, तेच सौंदर्यकृतीत येते. अपरिहार्यता आणि संभाव्यता हे कार्यकारण भावाचेच तत्त्व आहे. तो बुद्धीचा प्रतीत्यसमुत्पादच आहे. जे बुद्धीला पटत नाही, जीवनासंबंधीचे सत्य जे सांगत नाही ते साहित्यकृतीत येणेच अशक्य आणि ते आले तर साहित्यकृती ही सौंदर्याकृती म्हणून कुरूप होईल.

19. 'प्रतीत्यसमुत्पाद' हे काय आहे ?

(1) सौंदर्याचे तत्त्व (2) मूल्याचे तत्त्व

(3) कार्यकारणभावाचे तत्त्व (4) साहित्यशास्त्राचे तत्त्व

20. लेखकाच्या मते सौंदर्यशास्त्र हे कोणत्या तत्त्वज्ञानाच्या कुटुंबातील एक शास्त्र आहे ?

(1) कलावादी (2) चैतन्यवादी (3) परंपरावादी (4) बुद्धिवादी

21. लेखकाच्या मते मूल्यकल्पना कोणती आहे ?

(1) नीती (2) साहित्य (3) सौंदर्यशास्त्र (4) सौंदर्य

22. बुद्धिवादी सौंदर्यशास्त्र कशाच्या पायावर उभे आहे ?

(1) जडवादी तत्त्वज्ञान (2) चैतन्यवादी तत्त्वज्ञान

(3) अध्यात्मवादी तत्त्वज्ञान (4) मार्क्सवादी तत्त्वज्ञान

23. लेखकाच्या मते कार्यकारणभावाचे तत्त्व कोणते ?

(1) शक्यता व संभाव्यता (2) अपरिहार्यता आणि अशक्यता

(3) अपरिहार्यता व संभाव्यता (4) अक्षरत्व व चैतन्यत्व

24. लेखकाच्या मते साहित्यकृतीत काय येणे शक्य असते ?

(1) जे बुद्धीला पटत नाही, जे जीवनासंबंधी सत्य सांगत नाही ते

(2) जे बुद्धीला पटते, जे जीवनासंबंधी सत्य सांगते ते

(3) जे सत्य बुद्धी आणि जीवनाशीसंबंधीत नसते ते

(4) जे खोटे आणि असत्य असते ते

25. साहित्याचे सौंदर्यशास्त्र म्हणजे काय ?

(1) साहित्याचे बाह्य तत्त्वज्ञान (2) साहित्यकृतीच्या कौरूप्याचे तत्त्वज्ञान

(3) सौंदर्याचे तत्त्वज्ञान (4) साहित्य या कलेच्या सौंदर्याचे तत्त्वज्ञान

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26. A technique of encoding and decoding messages is called

(1) Lithography (2) Cartography

(3) Cryptography (4) Seismography

27. The main object of the 'Curiosity Rover' that landed on Mars on 6th August, 2012, was to

(1) search signs of existence of living organisms

(2) search places of water

(3) collect samples of minerals, elements

(4) establish communication system

28. Which of the following gases is ***not*** responsible for air pollution ?

(1) Nitrogen (2) Carbon dioxide

(3) Sulphur dioxide (4) Hydrogen sulphide

29. Which of the following is used as a fuel in rockets ?

(1) Liquid ammonia (2) Liquid carbon dioxide

(3) Solid carbon dioxide (4) Liquid oxygen

30. India's largest 9900 MW-Jaitapur (Ratnagiri) nuclear power plant will be set up in collaboration with

(1) France (2) Japan (3) Germany (4) Switzerland

31. Which of the following is correct about the phenomenon of 'capillary action' ?

a. Ignition of kerosene lamp.

b. Working of blotting paper.

c. Existence and growth of tall trees.

d. Drinking of soft drink by straw.

Answer options :

(1) Only a and b (2) Only a, b and d

(3) Only a, b and c (4) All a, b, c and d

32. India's heaviest Satellite, GSAT-10, was launched from Kourou, French Guiana, to boost telecommunication and DTH broadcasting on

(1) September 19, 2012 (2) September 9, 2012

(3) September 29, 2012 (4) September 21, 2012

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33. Who postulated the Special Theory of Relativity ?

(1) Darwin (2) Newton

(3) Einstein (4) Galileo

34. The chemical acids and bases neutralize each other to form

(1) salt and water (2) salt and gas

(3) gas and water (4) only salt

35. Adding salt and sugar to food substances helps in preserving them for a longer duration. It is because excess salt and sugar

(1) plasmolyse the microbial cells

(2) cause rupturing of microbial cells

(3) cause changes in the shape of microbial cells

(4) remove water directly from food substances

36. Which one of the following is included in the World List of Biosphere Reserves by UNESCO ?

(1) Kinnaur Region (2) Spiti Valley

(3) Nallamalai Hills (4) Sunderbans

37. Which of the following is ***not*** an insecticide ?

(1) D.D.T. (2) Potash alum (3) Endrin (4) Folidol

38. Match the following :

a.	Barometer	I.	Light
b.	Thermometer	II.	Pressure
c.	Lux meter	III.	Current
d.	Ammeter	IV.	Temperature

	a	b	c	d
(1)	IV	II	III	I
(2)	II	IV	I	III
(3)	IV	II	I	III
(4)	II	IV	III	I

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

39. Bats can fly at night because their wings generate

(1) Ultraviolet rays (2) Radio waves

(3) Ultrasonic waves (4) Intrasonic waves

40. The thumb of human hand moves more freely than other fingers due to

(1) Pivotal joint (2) Gliding joint

(3) Hinge joint (4) Saddle joint

41. Nanotechnology is the term used for study of objects having size

(1) 1 – 100 nanometers

(2) 1 – 10 micrometers

(3) more than 100 nanometers

(4) less than one micrometer

42. Diamond and Graphite are polymorphs of the element carbon. Which of the following is correct about Diamond and Graphite ?

a. Diamond is hard, Graphite is soft.

b. Diamond and Graphite, both are electrical insulators.

c. Diamond is transparent, Graphite is opaque.

d. Diamond is the ultimate abrasive, Graphite is a good lubricant.

Answer options :

(1) Only a and b (2) Only a, b and c

(3) Only a, c and d (4) All a, b, c and d

43. Identify the following element group, which is responsible for production of living organisms on the Earth ?

(1) Hydrogen, Oxygen, Sodium

(2) Carbon, Hydrogen, Nitrogen

(3) Oxygen, Calcium, Phosphorus

(4) Carbon, Hydrogen, Potassium

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

44. ARTI is an institute associated with

(1) Industrial Development
(2) Urban Development
(3) Rural Technology
(4) Road Development

45. Which of the following is ***not*** an allotrope of carbon ?

(1) Fullerene (2) Carbon Nanotube
(3) Diamond (4) Benzene

46. The direction of magnetic field around a straight conductor carrying current is given by

(1) The Right Hand Rule (2) Fleming's Left Hand Rule
(3) Fleming's Right Hand Rule (4) None of these

47. Atoms and molecules follow laws formulated by which of the following theories ?

(1) Quantum Mechanics (2) Celestial Mechanics
(3) Thermodynamics (4) Theory of Relativity

48. The output device of computer is

(1) Motherboard
(2) Central Processing Unit
(3) Keyboard
(4) Monitor

49. The DNA in our body cell has which of the following structures ?

(1) Spherical (2) Spiral
(3) Ring-like (4) Double helix

50. The mobile phones which run on solar energy were first manufactured by

(1) Samsung (2) Nokia
(3) Motorola (4) Reliance

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

51. The current drawn by a 120 V d.c. motor having armature resistance of 0·5 Ω and back e.m.f. 110 V is

(1) 240 Amp (2) 20 Amp (3) 220 Amp (4) 05 Amp

52. Choose the correct answer :

A moving coil type instrument can be modified to measure voltages by

(1) using thicker wire in the coil.

(2) using a high resistance shunt.

(3) adding resistance in series.

(4) adding resistance in parallel.

53. The moving coil in a dynamometer wattmeter is connected

(1) in series with the fixed coil

(2) across the supply

(3) in series with the load

(4) across the load

54. Which of the following motors is usually used in household refrigeration ?

a. Reluctance motor

b. Synchronous motor

c. Single phase induction motor

d. 3-phase induction motor

Answer options :

(1) a only (2) b only

(3) c and d only (4) c only

55. Choose correct answer :

Secondary output voltage of the transformer increases if

(1) Supply frequency of transformer decreases.

(2) Cross-section area of magnetic core of a transformer increases.

(3) Flux density of core of transformer decreases.

(4) Secondary number of turns in a transformer decreases.

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

56. Two transformers of different kVA rating working in parallel, share the load in proportion to their rating when their

(1) per unit leakage impedance on the same kVA base is the same

(2) per unit leakage impedance on their respective rating is equal

(3) ohmic values of the leakage impedance are inversely proportional to their rating

(4) ohmic values of the magnetizing reactances are same

57. The resistance and reactance of a 100 kVA, 11000/400 V, Δ-Y, distribution transformer are 0·02 and 0·07 pu respectively. The phase impedance of the transformer referred to the primary is

(1) $(0{\cdot}02 + j0{\cdot}07)\,\Omega$ (2) $(0{\cdot}55 + j1{\cdot}925)\,\Omega$

(3) $(15{\cdot}125 + j52{\cdot}94)\,\Omega$ (4) $(72{\cdot}6 + j254{\cdot}1)\,\Omega$

58. The equivalent circuit of a transformer has leakage reactance X_1, X_2' and magnetizing reactance X_m. Their magnitude must satisfy

(1) $X_1 >> X_2' \geq X_m$ (2) $X_1 << X_2' \leq X_m$

(3) $X_1 = X_2' >> X_m$ (4) $X_1 = X_2' \geq X_m$

59. Match the following :

a.	Core loss of a transformer	I.	depends on input voltage
b.	Efficiency of a transformer	II.	depends on maximum flux density in the core
c.	Secondary output voltage of a transformer	III.	depends on load
d.	The number of primary turns of a transformer	IV.	depends on power factor

	a	b	c	d
(1)	I	II	III	IV
(2)	II	I	IV	III
(3)	IV	III	II	I
(4)	III	II	I	IV

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

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60. Choose the correct answer :

A synchronous machine can operate

(1) only as a generator (2) only as a motor

(3) Both as generator and as motor (4) None of the above

61. Four point starter on d.c. motor is used

a. to increase field current.

b. to decrease field current.

c. to protect no volt coil.

d. not to affect field current passing through field on coil even if any change takes place in field current.

Answer options :

(1) a and b only (2) b only

(3) d only (4) All of the above

62. A sinusoidal voltage of frequency 1 Hz is applied to the field of d.c. generator. The armature voltage will be

(1) 1 Hz square wave (2) 1 Hz sinusoidal wave

(3) d.c. voltage wave (4) No EMF generated

63. A good transformer must have high regulation as far as possible.
Select the best option.

(1) 95 – 98% (2) 92 – 94% (3) 90 – 91% (4) 87 – 89%

64. What will happen if percentage impedance of two transformers working in parallel is different ?

a. Parallel operation is not possible.

b. Two transformers will operate at different power factor than common load.

c. Transformers will be overloaded.

d. Power factor will be same for both.

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

65. Match the following :

a.	Silicon steel used in transformer core	I.	To reduce eddy current loss
b.	Transformer core is laminated	II.	To reduce hysterisis loss
c.	The iron core in a transformer	III.	To dissipate the heat generated in the winding
d.	Cooling of transformer is required	IV.	Provides low reluctance path to the main flux

	a	b	c	d
(1)	I	II	III	IV
(2)	II	I	III	IV
(3)	I	II	IV	III
(4)	II	I	IV	III

66. Choose correct answer :

At a certain speed and flux, the voltage generated by a d.c. generator is 230 volts. If the speed is increased by 20% and the flux is simultaneously reduced by 10%, the voltage will be

(1) increased by 10% (2) reduced by 20%

(3) increased by 8% (4) decreased by 8%

67. A 4 pole generator with 16 coils has a two layer lap winding. The pole pitch is

(1) 32 (2) 16 (3) 8 (4) 4

68. Synchronous motor having its field winding shorted on themselves placed in a cylindrical rotor will

(1) not start

(2) start but not run at synchronous speed

(3) start as an induction motor and then run as synchronous motor

(4) start and run as a synchronous motor

69. A synchronous generator connected to an infinite bus is overexcited. Considering only the reactive power, from the point of view of the system, the machine acts as

(1) capacitor (2) inductor

(3) resistor (4) None of the above

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70. No-load test on a 3-phase induction motor was conducted at different supply voltages and a plot of input power versus voltage was drawn. This curve was extrapolated to intersect the Y-axis. This intersection point is

(1) core loss (2) stator copper loss

(3) stray load loss (4) friction and windage loss

---

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

(1) Zero power factor method of an alternator is used to find its voltage regulation.

(2) The frequency of voltage generated by an alternator having four poles and rotating at 1800 r.p.m. is 60 Hz.

(3) At lagging loads, armature reaction in an alternator is cross magnetizing.

(4) With a unity load p.f., the effect of armature reaction on the main field flux of an alternator is distortional.

---

72. In induction machines, which of the following statements is true ?

(1) When rotor is at standstill slip is one.

(2) When the motor runs at synchronous speed slip is zero.

(3) Frequency of current in rotor is known as slip frequency.

(4) All the above statements are true

---

73. If the iron loss and full load Cu losses are given, then the load at which two losses would be equal is given by

a. Full load $\times \dfrac{\text{Iron loss}}{\text{Cu loss}}$ b. Full load $\times \dfrac{(\text{Iron loss})^2}{\text{Cu loss}}$

c. Full load $\times \sqrt{\dfrac{\text{Iron loss}}{\text{Cu loss}}}$ d. Full load $\times \sqrt{\dfrac{\text{full Cu loss}}{\text{Iron loss}}}$

Answer options :

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

---

74. When a bank of two single phase transformers in open delta arrangement is used, each of them supplies :

a. 33·3% of its output rating b. 66·6% of its output rating

c. 48·6% of its output rating d. 100% of its output rating

Answer options :

(1) a only (2) c only

(3) b only (4) None of the above

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75. In a four pole d.c. machine

(1) alternate poles are north and south

(2) two north poles follow two south poles

(3) all the four poles are south poles

(4) all the four poles are north poles

---

76. Form factor is defined by

(1) $K_f = \frac{\text{r.m.s. value}}{\text{Average value}}$ (2) $K_f = \frac{\text{r.m.s. value}}{\text{Maximum value}}$

(3) $K_f = \frac{\text{Average value}}{\text{Peak value}}$ (4) None of the above

---

77. The magnetic strength is inversely proportional to the distance from the conductor in which current flows. This law is known as

a. Lenz law b. Biot law

c. Biot-Savart law d. Ampere's law

Answer options :

(1) c and d only (2) c only

(3) a only (4) b only

---

78. The injected e.m.f. in the rotor of induction motor must have

(1) low frequency

(2) same frequency as the slip frequency

(3) same phase as the rotor e.m.f.

(4) All of the above

---

79. The induction motor is started using the methods given below to reduce the current during start.

(1) Direct on line starting (2) Star-Delta starting

(3) Autotransformer starting (4) Both (2) and (3)

---

80. A voltmeter using 50 micro ampere meter movement has a sensitivity of

a. 500 ohm per volt b. 5000 ohm per volt

c. 2000 ohm per volt d. 20,000 ohm per volt

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

81. The main type of failure in wind power generating plant is in

(1) electrical system (2) mechanical system

(3) aerodynamic system (4) both (1) and (2)

82. The basic requirements of surge diverter or surge arrester are

a. break down as quickly as possible when the abnormal voltage arrives.

b. pass no current at normal voltage.

c. interrupt the power frequency follow on current after flash over.

d. pass large current on arrival of abnormal voltage.

Identify correct requirements.

Answer options :

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

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

83. Time-Of-Day (TOD) tariffs are said to be effective in

a. reducing the maximum demand.

b. reducing the harmonics.

c. reducing the commercial losses.

d. increasing the revenue of the utility.

Which of the above option/s is/are correct ?

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

84. Sheaths are used in power cables in order to

(1) increase the strength of the cable

(2) prevent moisture from entering the cable

(3) provide adequate insulation

(4) None of the above

85. Corona loss is reduced by using hollow conductors because of

a. better ventilation. b. eddy current elimination.

c. flux density reduction. d. increased radius of the conductor.

Which of the option/s is/are correct ?

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

86. Auto reclosing circuit breakers improve stability as these breakers

a. open when fault is detected and auto reclose after set time.
b. reopen and reclose again if fault persists as before.
c. one more trial of reopen and reclose is carried out.
d. if the fault still persists, the breaker remains closed.

Pick correct option

Answer options :

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

87. A fuel cell converts chemical energy into electricity. The positive and negative electrodes are supplied respectively with

(1) oxygen and hydrogen (2) oxygen and nitrogen
(3) nitrogen and hydrogen (4) nitrogen and oxygen

88. A distance relay measures

(1) current difference (2) voltage difference
(3) impedance difference (4) distance between two CT's

89. For very large capacity turbo alternators in thermal power plants, hydrogen cooling is desirable as it allows

a. lower windage losses.
b. increase in life of insulation.
c. avoidance of fire hazard in machine.
d. for same frame size, increased power output.

Which is the correct option ?

(1) a, b, c and d (2) a, b and c
(3) a, b and d (4) None of the above

90. In high head hydro power stations a surge tank is provided in order to

a. allow constant storage of specific quantity of water.
b. reduce the water hammer effect.
c. avoid creation of vacuum in the water system.
d. help stabilize water velocity and pressure in penstock.

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

91. Klydonograph when used for measurement of voltages provides information on

(1) magnitude and polarity (2) polarity and frequency

(3) magnitude and frequency (4) all the above

92. The load flow solution is always assured in case of

(1) Gauss method

(2) Gauss – Seidel method

(3) Newton – Raphson method

(4) None of these methods guarantees

93. Voltage control of a power transmission line is achieved by

(1) tap-changing transformer (2) booster transformer

(3) injection of reactive power (4) All the above

94. According to the provisions of the Electricity Act 2003, undue preference shall not be shown to any consumer of electricity in the determination of tariff, but consumers may be differentiated according to the

a. voltage, power factor, load factor.

b. geographical location or purpose of supply or total consumption during specific period.

c. nature of supply and the purpose for which supply is required.

d. category of economically weaker section or BPL (Below Poverty Line) family.

Answer options :

(1) d only (2) b and c only

(3) a, b and c only (4) a and d only

95. For a long distance transmission line under no load condition, if V_s and V_r are the sending end and the receiving end voltages respectively, then

(1) $V_r < V_s$ (2) $V_s < V_r$ (3) $V_s = V_r$ (4) $V_r = \frac{V_s}{\sqrt{2}}$

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

96. In large coal based thermal power plants most efficient and widely used dust and ash collection is through ESP (Electro Static Precipitator) because

a. it can remove dust particles even upto 0·01 micron.

b. it allows reduction in I.D. Fan ratings.

c. dust collection is in dry form and can be easily removed.

d. it is relatively cheaper than mechanical separators.

Identify the correct reasons.

Answer options :

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

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

97. The overall efficiency of thermal power station is low mainly due to low efficiency of

(1) Alternator (2) Boiler

(3) Steam turbine and condenser (4) Non-salient pole or cylindrical rotor

98. A thermal power station has an overall efficiency of 30 percent. For generating 1 kWh of electrical energy, 0·5 kg of coal is burnt. If heat equivalent of 1 kWh is 900 kcal, then the calorific value of the fuel is

(1) 6000 kcal/kg (2) 54000 kcal/kg

(3) 13500 kcal/kg (4) 4500 kcal/kg

99. In substations cheaper form of switches known as isolators are used in conjunction with high voltage equipments. These isolators

a. can close live circuits. b. can open live circuits.

c. cannot close live circuits. d. cannot open live circuits.

Which of these are true ?

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

100. In nuclear reactor, energy produced by fission reaction of Uranium, U-235 having mass of atom 'm' and velocity of light 'c' is given by

(1) mc (2) mc^2 (3) $\frac{1}{2} m^2c$ (4) $\frac{1}{2} mc^2$

101. Which of the following circuit breakers has the lowest operating voltage ?

(1) SF_6 gas (2) Air break (3) Air blast (4) Minimum oil

102. Of the following factors which one should ideally be equal to 1·0 ?

a. Demand factor
b. Load factor
c. Diversity factor
d. Plant use factor

Answer options :

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

103. The following condition causes transient instability in power system :

(1) Short circuit
(2) Loss of excitation in a generator
(3) Switching operations on the line
(4) All of the above

104. Sub-stations which receive power at some voltage and deliver it at some other voltage are called as

(1) Converting sub-stations (2) Switching sub-stations
(3) Transformer sub-stations (4) Delivery sub-stations

105. Pumped storage hydro plants are peculiar in the sense that these

a. operate as a power sink during off peak hours.
b. operate as a power source during peak hours.
c. restrict the flexibility in schedule of operation.
d. improve the load factor of the overall plant.

Identify the correct statements.

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

106. In a SCADA system, interface between sub-station and remote control centre is made via :

a. Remote Terminal Unit
b. PC with microwave link
c. PC with fibre optic link
d. PC with telephone line link

Answer options :

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

107. What advantages does the output module of PLC using solid state switching elements have ?

a. Fast switching speed
b. Overload restrictions
c. No contact arcing
d. No switching noise
e. Possibility of false tripping

Answer options :

(1) a, c and d (2) b, d and e
(3) a, c and e (4) All of the above

108. Fibre-optic communication for relaying is used nowadays because

a. It is complete dielectric, not affected by ground loops, not affected by inductive pick-up and lightning and less losses.
b. It is semi-dielectric, not affected by lightning, small and light in weight.
c. It is small and light in weight with high bandwidth.
d. It is complete dielectric and not affected by inductive pick-up, but affected by lightning.

Answer options :

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

109. Out of the following, which is/are ***not*** a binary I/O device/devices :

a. Alarm Bell
b. Thermocouple
c. Proximity Switch
d. Tachogenerator
e. Indicating Lamp

Answer options :

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

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

110. Advantages of distance relay over current relay is/are

a. Fixed zone of protection, independent of system changes, requiring less setting maintenance.

b. Lower impedance of load.

c. Lower sensitivity.

d. Lower instantaneous trip coverage.

Answer options :

(1) a and b only

(2) a only

(3) b, c and d only

(4) c and d only

---

111. A __x__ converter located in an output module of a controller may convert __y__ signal into 4 mA to 20 mA range.

a. D to A b. A to D c. Analog d. Digital

Answer options :

(1) x = a, y = d (2) x = b, y = c

(3) x = b, y = c (4) x = d, y = b

---

112. Main components used for analog to digital conversion are

a. Buffer amplifier and low pass filter b. Sample and hold unit

c. A/D converter and sensor d. Rectifier and multiplexer

Answer options :

(1) a and b only (2) b, c and d only

(3) a, b and c only (4) c and d only

---

113. The difficulties associated with differential protection are

a. Difference in length of pilot wires

b. Relay operating time

c. C.T. Ratio errors

d. Saturation of magnetic circuit

Answer options :

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

(3) b, c and d (4) All of the above

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

114. Buchholz relay is an example of

(1) Electrodynamic type relay (2) Physico-electric relay

(3) Moving coil type relay (4) Static relay

---

115. Type test/s conducted as short circuit test/s on circuit breaker are

a. making capacity test b. breaking capacity test

c. temperature rise test d. one minute dry withstand test

Answer options :

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

---

116. In an oil circuit breaker, the heat generated decomposes the oil and following gases are liberated :

a. Hydrogen b. Acetylene c. Methane d. Oxygen

Answer options :

(1) b, c and d only (2) a, b and c only

(3) b and c only (4) a only

---

117. Which of the following relay/relays is/are ***not*** required for protection of a transformer ?

a. Over Load (Relay) b. Buchholz (Relay)

c. Distance (Relay) d. Rotor Fault Protection (Relay)

Answer options :

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

---

118. Static relays are commonly used for

a. EHV lines b. UHV lines

c. LV distribution d. HV distribution

Answer options :

(1) a (2) b

(3) a and b (4) c and d

---

119. A.C. rating of a C.B. is 200 A and 500 V. Its D.C. rating will be

(1) 200 A, 500 V (2) less than 200 A, 500 V

(3) more than 200 A, 500 V (4) more than 200 A, 1000 V

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

P.T.O.

120. Commonly used A/D converters is/are

a. ramp converter
b. successive approximation converter
c. ramp and successive approximation simultaneously
d. ramp and successive approximation alternately

Answer options :

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

---

121. Identify the ***incorrect*** statement :

(1) Circuit breaker carries rated current without any damage.
(2) Circuit breaker opens and closes the circuit only on no-load.
(3) Circuit breaker carries rated current without overheating of components.
(4) Circuit breaker is capable of carrying short circuit current for a very short time.

---

122. For a SCADA system operating at a low rate data communication system, supervisory instruction's signal communication is from

(1) RTU to RTU (2) RTU to MTU
(3) CPU to MTU (4) MTU to RTU

---

123. Transducers in the remote units of SCADA system are used to convert following quantities to direct current or voltage form :

a. Voltage b. Current c. Watts d. VARs

Answer options :

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

---

124. Distance relay may be of following type :

a. Offset and Restricted relay
b. Reactance relay
c. Admittance relay
d. Percentage differential relay

Answer options :

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

---

125. In a carrier system, drift and spurious signals are important because

(1) they modulate the carrier
(2) they do not modulate the carrier
(3) it is easier to achieve a stable carrier than a stabilized d.c. source
(4) None of the above

कच्च्या कामासाठी जागा / SPACE FOR ROUGH WORK

126. The desirable properties of earth mat used in power systems include :
(1) high dielectric strength and low insulation resistance
(2) low dielectric strength and high insulation resistance
(3) high dielectric strength and high insulation resistance
(4) low dielectric strength and low insulation resistance

127. If the speed of a centrifugal pump is doubled, its power consumption increases _____ times.
(1) 3 (2) 6 (3) 8 (4) no change

128. The operating point in a pumping system is identified by
(1) cannot be determined by the pump characteristics curve
(2) point of intersection of pump curve and theoretical power curve
(3) point of intersection of pump curve and system curve
(4) point of intersection of system curve and efficiency curve

129. All power stations and sub-stations need d.c. supply for which purpose ?
(1) Generation and protection (2) Protection and control
(3) Control and generation (4) Generation, protection and control

130. For a lead-acid battery, if η_{AH} and η_{WH} denote ampere-hour efficiency and watt-hour efficiency, then the following statement is true ?
(1) $\eta_{AH} > \eta_{WH}$ always
(2) $\eta_{AH} < \eta_{WH}$ always
(3) both η_{AH} and η_{WH} are nearly equal
(4) their values depend on the application

131. The moving part of a centrifugal pump is called a
(1) Diffuser (2) Suction Nozzle
(3) Volute (4) Impeller

132. What geometrical shape does charging characteristic of a battery follow ?
(1) Straight line (2) Exponential curve
(3) Ellipse (4) None of the above

133. What will a small portable green coloured fire extinguisher contain ?
(1) Carbon dioxide (2) Halon gas
(3) Purple K dry powder (4) Foam

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134. Internal resistance of primary cell varies
(1) inversely with the surface area of electrodes
(2) directly with the distance between electrodes
(3) with the nature of electrodes
(4) All of the above

135. Resistivity of earth is normally
(1) 200 Ω-m (2) 100 Ω-m (3) 50 Ω-m (4) 400 Ω-m

136. The following is the only electronically synthesized high quality power source.
(1) AC Mains (2) Diesel Generator
(3) UPS (4) None of the above

137. The magnitude of 'let go current' adopted in calculating maximum permissible step and touch potentials (as per IEEE-80-1976) for man is
(1) 6 mA (2) 9 mA (3) 9 A (4) 9 μA

138. What is the basic requirement of an electric motor to be employed in lift applications ?
(1) High running torque (2) Low running torque
(3) High starting torque (4) High starting current

139. The earth resistance of power stations shall be
(1) upto 50 Ω (2) more than 0·5 Ω
(3) more than 5 Ω (4) less than 0·5 Ω

140. Which cell has the reversible chemical reaction ?
(1) Lead acid (2) Mercury oxide
(3) Carbon zinc (4) Silver oxide

141. The term "B" (Bend of useful life) for a UPS battery refers to the fact that these batteries
(1) do not require fluid (2) require fluid
(3) require specific fluid (4) require any fluid

142. Open circuit voltage of a fully charged lead acid cell is
(1) 1·9 V (2) 2·0 V (3) 2·7 V (4) 2·5 V

143. Ni-Cd batteries do ***not*** emit
(1) Hydrogen gas (2) Oxygen gas
(3) Hydrogen and oxygen gas (4) Corrosive gas

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144. The indication of the state of charge of a battery is best given by

(1) specific gravity of electrolyte (2) temperature of electrolyte

(3) colour of electrolyte (4) level of electrolyte

145. The primary determinant of the voltage developed by a battery is

(1) the nature of the materials in the reaction

(2) the size of the electrodes

(3) the overall size of the galvanic cells

(4) the age of the battery

146. Chopper control for d.c. motor provides variation in

(1) input voltage (2) frequency

(3) current (4) None of the above

147. In a GTO, anode current begins to fall when gate current

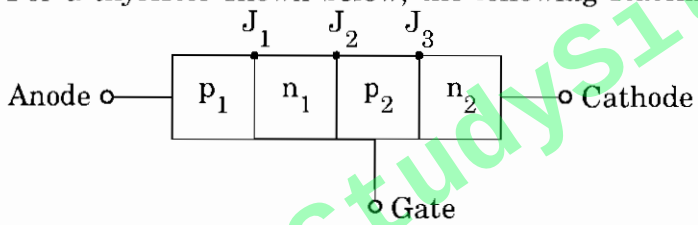
(1) is negative peak at time t = 0

(2) is negative peak at time $t = t_s$

(3) just begins to become negative at t = 0

(4) None of these

148. For a thyristor shown below, the following statement is true.



(1) All the three junctions are forward biased

(2) J_1, J_2 are forward biased, J_3 is reverse biased

(3) J_1 is forward biased, J_2 and J_3 are reverse biased

(4) J_1 and J_2 are reverse biased, J_3 is forward biased

149. A step-down chopper is operated in continuous conduction mode in steady state with a constant duty ratio D. If V_o is the magnitude of the d.c. output voltage and if V_s is the magnitude of d.c. input voltage, the ratio V_o / V_s is given by

(1) D (2) 1 – D (3) 1/(1 – D) (4) D/(1 – D)

150. In a single phase full-wave a.c. regulator, varying the delay angle α from 0 to 180° can vary the r.m.s. output voltage from

(1) V_s to $V_s/4$ (2) V_s to $V_s/2$ (3) V_s to $3V_s/2$ (4) V_s to zero

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सूचना - (पृष्ठ 1 वरुन 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 स्वतः बरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षा कक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.**

नमुना प्रश्न

Q. No. 201. The Catch varies inversely with the size of the

(1) nozzle (2) droplet (3) obstruction (4) sprayer

ह्या प्रश्नाचे योग्य उत्तर "(3) obstruction" असे आहे. त्यामुळे या प्रश्नाचे उत्तर "(3)" होईल. आता **खालीलप्रमाणे** प्र.क्र. **201** समोरील उत्तर-क्रमांक "③" चा कंस खालीलप्रमाणे पूर्णपणे छायांकित करून दाखविणे आवश्यक आहे.

प्रश्न क्र. **201.** ① ② ● ④

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

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