दि. 23 जून, 2019

2019

Z12 संच क्र. **A**

प्रश्नपुस्तिका क्रमांक
BOOKLET No.

प्रश्नपुस्तिका

मराठी, इंग्रजी, सामान्य अध्ययन आणि अभियांत्रिकी अभियोग्यता चाचणी

वेळ : 1½ (दीड) तास

महाराष्ट्र अभियांत्रिकी सेवा संयुक्त

एकूण प्रश्न : 100
एकूण गुण : 100

सूचना (पूर्व) प - 2019

(1) सदर प्रश्नपुस्तिकेत **100 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.

परीक्षा-क्रमांक							

केंद्राची संकेताक्षरे   शेवटचा अंक

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

(4) (अ) 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.**

(ब) आयोगाने ज्या विषयासाठी मराठी बरोबर इंग्रजी माध्यम विहित केलेले आहे. त्याच विषयाचा प्रत्येक प्रश्न मराठी बरोबर इंग्रजी भाषेत देखील छापण्यात आला आहे. त्यामधील इंग्रजीतील किंवा मराठीतील प्रश्नामध्ये मुद्रणदोषांमुळे अथवा अन्य कारणांमुळे विसंगती निर्माण झाल्याची शंका आल्यास, उमेदवाराने संबंधित प्रश्न पर्यायी भाषेतील प्रश्नाशी ताडून पहावा.

(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 दिलेल्या चार उत्तरांपैकी सर्वात योग्य 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 व्यक्तीविरूद्ध उक्त अधिनियमानुसार कारवाई करण्यात येईल व दोषी व्यक्ती शिक्षेस पात्र होईल.

पुढील सूचना प्रश्नपुस्तिकेच्या अंतिम पृष्ठावर पहा

पर्यवेक्षकांकच्या सूचनेविना हे सील उघडू नये

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

1. 'बाजीरावाचा नातू असणे' या वाक्प्रचाराचा अर्थ सांगा
   (1) श्रीमंत माणूस
   (2) वशिल्याचा माणूस
   (3) मिजासखोर माणूस
   (4) अति लांबचा किंवा दूरचा माणूस

2. कुलीन हा शब्द शब्दसिद्धीच्या कोणत्या उपप्रकारातील आहे ?
   (1) उपसर्गघटीत
   (2) शब्दसाधित
   (3) अभ्यस्त
   (4) सामासिक

3. समानार्थी शब्दाच्या जोड्या लावा :

	'अ'		*'ब'*
अ.	फूल	i.	एकाक्ष
ब.	कावळा	ii.	अंडज
क.	डोळा	iii.	सुम
ड.	पक्षी	iv.	चक्षू

   पर्यायी उत्तरे :

	अ	ब	क	ड
(1)	iv	i	ii	iii
(2)	ii	iii	i	iv
(3)	iii	i	iv	ii
(4)	i	ii	iii	iv

4. 'वशिला असलेली माणसं मोठ्या पदावर सहज जातात', या वाक्यातील उद्देश्यविस्तार ओळखा.
   अ. माणसं मोठ्या पदावर
   ब. वशिला असलेली माणसं
   क. वशिला
   ड. वशिला असलेली
   (1) फक्त ड बरोबर
   (2) फक्त ब बरोबर
   (3) ब आणि ड बरोबर
   (4) फक्त क बरोबर

5.   'कोल्हा काकडीला राजी' या म्हणीचे समर्पक स्पष्टीकरण कोणते ?

अ.   जे मिळाले तेवढयात समाधान असणे.

ब.   वाईट गोष्ट ही शेवटपर्यंत वाईटच असते.

क.   क्षुद्र माणसे क्षुद्र वस्तुंना भाळतात.

ड.   गर्विष्ट माणसाला शेवटी अपमानित होण्याची पाळी येते.

पर्यायी उत्तरे :

(1)   फक्त अ आणि ब बरोबर

(2)   फक्त ब बरोबर

(3)   फक्त क बरोबर

(4)   फक्त अ आणि ड बरोबर

प्र. क्र 6 ते 10 उतास्यावरी प्रश्न :

आधुनिक काळात सहकार हा जीवनाचा मार्ग झाला आहे. सध्याच्या स्पर्धेमध्ये सहकारच टिकू शकते. सहकारातून बऱ्याच सहकारी संस्थांनी उभारी घेतली आहे. त्या संस्थांनी फार मोठा परिसर विकासाच्या क्षेत्राखाली आणला आहे. जागतिकीकरणाच्या प्रक्रियेत उद्योग आणि सेवा या दोन्ही क्षेत्रावर दूरगामी परिणाम होत आहेत. सहकारी चळवळ ही देखील त्याला अपवाद राहणार नाही. म्हणून आपली सहकारी चळवळ दुर्बल बनता कामा नये, याकडे लक्ष पुरविणे आवश्यक आहे. आपली ग्रामीण आणि कृषिप्रधान अर्थरचना सहकारी चळवळीमुळेच सशक्त बनू शकते आणि ही अर्थरचना सशक्त राहिली तरच भारतीय अर्थकारणाचा कणा मजबूत राहू शकतो.

सहकारी क्षेत्रातील उणिवांकडे लक्ष दिले पाहिजे. सहकारी क्षेत्रातील काही घोटाळ्यांमुळे ती चळवळच पूर्णतः कुचकामी आहे असे समजणे दुदैवी ठरेल. सहकारी चळवळीतील उणिवा लक्षात घेऊन त्यांच्या क्षमतांचा विकास करणे अगत्याचे आहे. सहकारी चळवळीमध्ये नव्या युगाला पोषक बदल घडवून आणांवा लागेल. त्यासाठी त्यामध्ये सुधारणा कराव्या लागतील. त्या सुधारणांसाठी स्वातंत्र्य देऊन नवीन दृष्टिकोन स्वीकारला पाहिजे. परिवर्तनाचे आव्हान स्वीकारले पाहिजे. आपणास प्रभावीपणे पेलेल अशी सहकारी तत्त्वांची भक्कम पायाची पुन:स्थापना केली पाहिजे.

सहकारी चळवळ ही नैतिक आणि आध्यात्मिक सद्गुणांवर उभारलेली चळवळ आहे. आज त्यातील नैतिक व आध्यात्मिक जाणिवांची दुर्बलता प्रकर्षाने जाणवत आहे. या क्षेत्रात ज्या महर्षींनी कार्य केले उदा. श्री. वैकुंठभाई मेहता, श्री. धनंजयराव गाडगीळ अशांची उणीव अद्याप भरून निघालेली नाही. या थोर विभूतींच्या प्रतिष्ठेला साजेल अशा नैतिक व बौद्धिक क्षमतेच्या व्यक्तींची आज नितांत गरज आहे. सहकार क्षेत्रात प्रगत आणि प्रशिक्षित मनुष्यबळाचा अभाव आहे. सहकारी संस्थांना सामर्थ्य प्रदान करण्याची गरज आहे. बदलत्या वातावरणात सहकारी चळवळ टिकावी, वाढीवी आणि तिला बलशाही रूप प्राप्त व्हावे म्हणून तिला सक्षम करण्याच्या उपायांचा शोध घेणे आवश्यक आहे. त्या चळवळीचा त्याग करण्याची गरज नाही. प्रभावशाली यंत्रणा निर्माण करून त्या चळवळीला नवीन सैद्धांतिक मांडणी करण्याची संधी प्राप्त करून देण्याची गरज आहे.

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6. सहकारी चळवळीतील क्षमतांचा विकास करण्यासाठी कशाकडे लक्ष दिले पाहिजे ?

    (1) उणिवा

    (2) सामर्थ्य

    (3) घोटाळे

    (4) राजकारण

7. सहकारी चळवळीत कोणत्या जाणिवांची उणीव आहे ?

    (1) राजकीय व भक्तीपर

    (2) नैतिक व आध्यात्मिक

    (3) साहित्य व सांस्कृतिक

    (4) विकास व सुधारणावादी

8. सहकारी संस्था सामर्थशाळी होण्यासाठी कशाची गरज आहे ?

    (1) प्रशिक्षित मनुष्यबळ

    (2) आधुनिक तंत्रज्ञान

    (3) सैद्धांतिक मांडणी

    (4) व्यावहारिक उपाययोजना

9. या उताऱ्याला योग्य शीर्षक या

    (1) सहकार

    (2) समस्या आणि सहकार

    (3) सहकार महर्षी

    (4) सहकारी चळवळीची पुन:स्थापना

10. सेवा आणि उद्योग या क्षेत्रांवर कशाचा दूरगामी परिणाम होत आहे ?

    (1) औद्योगिकरण

    (2) भांडवलशाही

    (3) जागतिकीकरण

    (4) मुक्त अर्थव्यवस्था

11. You could forgive all his **asperities** when he smiled.

    Identify the correct meaning of the word underlined.
    (1) cruelty   (2) malignity
    (3) malice   (4) roughness

12. Choose the correct word which is the most opposite to the meaning of the underlined word in the sentence.

    At night much of the activity comes to **rest**.

    (1) cessation   (2) tranquility

    (3) pause   (4) exertion

13. Match the synonyms :

a.	agile	I.	royal
b.	human	II.	permanent
c.	majestic	III.	active
d.	perennial	IV.	gentle

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

14. All his efforts proved to be a **mare's nest** in the long run.

    Identify the correct meaning of the underlined.
    (1) irrelevant
    (2) unimportant
    (3) worthless
    (4) insincere

15. He is a **man of the world**. His honest advice will help us a lot.
    Identify the correct meaning of the underlined.
    (1) an important person
    (2) an experienced person
    (3) a social person
    (4) a genius

Read the following passage carefully and choose the most correct option given below each question. (Q. No. 16 to 20)

The third great defect of our civilization is that it does not know what to do with its knowledge. Science has given us powers fit for the gods, yet we use them like small children. For example, we do not know how to manage our machines. Machines were made to be man's servants; yet he has grown so dependent on them that they are in a fair way to become his masters. Already most men spend most of their lives looking after and waiting upon machines. And the machines are very sterm masters. They must be fed with coal, and given petrol to drink, and oil to wash with, and they must be kept at the right temperature. And if they do not get their meals when they expect them, they grow sulky and refuse to work, or burst with rage, and blow up, and spread ruin and destruction all around them. So we have to wait upon them very attentively and do all that we can to keep them in a good temper. Already we find it difficult either to work or play without the machines, and a time may come when they will rule us altogether, just as we rule the animals.

And this brings me to the point at which I asked, "What do we do with all the time which the machines have saved for us, and the new energy they have given us ?" On the whole, it must be admitted, we do very little. For the most part we use our time and energy to make more and better machines; but more and better machines will only give us still more time and still more energy, and what are we to do with them ? The answer, I think, is that we should try to become more civilized. For the machines themselves, and the power which the machines have given us, are not civilization but aids to civilization. But you will remember that we agreed at the beginning that being civilized meant making and linking beautiful things, thinking freely, and living rightly and maintaining justice equally between man and man. Man has a better chance today to do these things than he ever had before; he has more time, more energy, less to fear and less to fight against. If he will give his time and energy which his machines have won for him to making more beautiful things, to finding out more and more about the universe, to removing the causes of quarrels between nations, to discovering how to prevent poverty, then I think our civilization would undoubtedly be the greater, as it would be the most lasting that there has ever been.

– CEM JOAD

16. The machines themselves and the powers they have given to us _____ .
   a. are nothing but civilization.
   b. are only the aids to civilization.
   c. are only to multiply the production.
   d. are ways to make the people wealthy.

   Answer options :
   (1) 'a' and 'c' are correct
   (2) 'a' and 'd' are correct
   (3) 'b' is correct
   (4) 'c' is correct

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17. The passage is about

    a.   civilization.

    b.   only the defects of civilization.

    c.   making the things more beautiful using the power given by machines.

    d.   removing the causes of quarrels between the nations and overcoming poverty.

Answer options :

  (1)   Only 'a' is correct   (2)   Only 'b' is correct

  (3)   'a', 'c' and 'd' are correct   (4)   'b', 'c' and 'a' are correct

18. We use, according to the writer, the powers that are given by science unlike _____ .

    a.   God

    b.   small children

    c.   servants

    d.   masters

Answer options :

  (1)   Only 'b' is correct   (2)   Only 'c' is correct

  (3)   'a' and 'b' are correct   (4)   'c' and 'd' are correct

19. If the machines do not get their meal in time, they will _____ .

    a.   grow sulky and refuse to work.

    b.   obey their masters.

    c.   burst with rage and blow up.

    d.   not cause ruin and destruction.

Answer options :

  (1)   'a' and 'b' are correct   (2)   'b' and 'c' are correct

  (3)   'c' and 'd' are correct   (4)   'a' and 'c' are correct

20. We all agree that being civilized means _____ .

    a.   earning more and more money.

    b.   making and linking beautiful things.

    c.   grabbing property of others.

    d.   maintaining justice equally between men and women.

Answer options :

  (1)   'b' and 'd' are correct   (2)   'a' and 'b' are correct

  (3)   'c' and 'd' are correct   (4)   'd' and 'a' are correct

21. खालील विधाने विचारात घ्या :

अ. सरासरी ग्राहक किंमत निर्देशांक भाववाढ 2014-15 मध्ये 5·9% पासून 2015-16 मध्ये 4·9% घटली.

ब. सरासरी किंमतवाढ आधारित घाऊक किंमत चा निर्देशांक 2014-15 मध्ये 2·0% पासून 2015-16 मध्ये (उणे) 2·5% नी घटला.

क. एप्रिल – डिसेंबर 2016 या काळात सरासरी किंमतवाढ 2·9% होती.

वरीलपैकी कोणते/ती विधान/ने *बरोबर* आहे/त ?

(1) अ व ब
(2) ब व क
(3) अ व क
(4) वरीलपैकी सर्व

Consider the following statements :

a. The average C.P.I. inflation declined to 4·9% in 2015 – 16 from 5·9% in 2014 – 15.

b. The average inflation based on the Whole-sale Price Index declined to (–) 2·5% in 2015 – 16 from 2·0% in 2014 – 15.

c. The average inflation was 2·9% during April – December 2016.

Which of the statement/s given above is/are *correct* ?

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

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22. खालील विधाने विचारात घ्या :

अ. भारतीय नियोजन हे सुचक आर्थिक नियोजन आहे.

ब. भारतीय नियोजन हे भौतिक नियोजन आहे.

क. भारतीय नियोजन हे सामाजिक नियोजन आहे.

वरीलपैकी कोणते/ती विधान/ने बरोबर आहे/त ?

(1) अ व ब
(2) ब व क
(3) अ व क
(4) वरीलपैकी सर्व

Consider the following statements :

a. Indian planning is indicative economic planning.

b. Indian planning is physical planning.

c. Indian planning is social planning.

Which of the statements given above are *correct* ?

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

23. वस्तुच्या आयात व निर्यातीवर लावल्या जाणाऱ्या करास _____ असे म्हणतात.

  (1) सीमा शुल्क   (2) अबकारी कर

  (3) मुल्यवर्धित कर   (4) वस्तू आणि सेवा कर

The tax imposed on import and export of commodities is called as _____ .

  (1) Custom duties   (2) Excise duties

  (3) VAT   (4) GST

24. मागील कांही वर्षात आवश्यक अन्नधान्याची बाजार किंमत स्थिर ठेवण्यासाठी _____ द्वारे खुल्या बाजारात तांदुळ व गव्हाची विक्री केली जाते.

  (1) एफ्.सी.आय.   (2) नाबार्ड

  (3) ए.पी.एम्.सी.   (4) नाफेड

During the last few years _____ used the open market sale of rice and wheat to check market price of these essential food-grains.

  (1) FCI   (2) NABARD

  (3) APMC   (4) NAFED

25. स्वातंत्र्यपूर्व काळात भारताची सर्वाधिक निर्यात कोणत्या देशाकडे होती ?

  (1) रशिया   (2) जपान

  (3) ब्रिटन   (4) अमेरिका

To which country India exported the most, before independence ?

  (1) Russia   (2) Japan

  (3) Britain   (4) U.S.A.

26. भारताच्या दहाव्या पंचवार्षिक योजनेत वार्षिक विकास दराचे उद्दिष्ट किती ठेवण्यात आले होते ?

  (1) 7 टक्के   (2) 8 टक्के

  (3) 9 टक्के   (4) 10 टक्के

How much annual growth rate was targeted in Tenth Five Year Plan of India ?

  (1) 7 per cent   (2) 8 per cent

  (3) 9 per cent   (4) 10 per cent

27. सरपंचपदाची निवडणूक थेट जनतेद्वारे खालीलपैकी कोणकोणत्या राज्यात होते ?
    अ.   मध्यप्रदेश
    ब.   गुजरात
    क.   महाराष्ट्र

    (1)   फक्त अ   (2)   फक्त ब आणि क
    (3)   अ, ब आणि क   (4)   फक्त अ आणि क

    In which of the following States, election to the post of Sarpanch is made directly by the people ?
    a.   Madhya Pradesh
    b.   Gujarat
    c.   Maharashtra
    (1)   Only a   (2)   Only b and c
    (3)   a, b and c   (4)   Only a and c

28. ग्रामीण पायाभूत सुविधा विकास निधि (RIDF) खालीलपैकी कोणी उभारला ?
    (1)   नाबार्ड   (2)   आर.बी.आय.
    (3)   भारत सरकार   (4)   अर्थ मंत्रालय

    Rural Infrastructure Development Fund (RIDF) was instituted by which of the following ?
    (1)   NABARD   (2)   RBI
    (3)   Government of India   (4)   Finance Ministry

29. अमेरिकेने नुकतेच 'इस्लामिक रिव्होल्यूशनरी गार्ड कोअर' नामक सेनेला दहशतवादी संघटना घोषित केले आहे. ती कोणत्या देशाशी संबंधित आहे ?
    (1)   इराण   (2)   पाकिस्तान
    (3)   सिरिया   (4)   अफगाणिस्तान

    The United States has recently declared an army called 'Islamic Revolutionary Guard Corps' as a terrorist organisation. Which country is it related to ?
    (1)   Iran   (2)   Pakistan
    (3)   Syria   (4)   Afghanistan

30. 2019 च्या सार्वत्रिक निवडणूकी दरम्यान महाराष्ट्रातील पुढीलपैकी कोणत्या लोकसभा मतदारसंघात सर्वाधिक मतदार होते ?
    (1)   मुंबई-दक्षिण   (2)   ठाणे
    (3)   गडचिरोली-चिमूर   (4)   रत्नागिरी-सिंधूदुर्ग

    Which of the following Lok Sabha constituencies in Maharashtra had largest voters during 2019 general elections ?
    (1)   Mumbai – South   (2)   Thane
    (3)   Gadchiroli – Chimur   (4)   Ratnagiri – Sindhudurg

31. 2019 मध्ये निर्वाचित झालेल्या स्लोवाकियाच्या पहिल्या महिला राष्ट्रपतीचे नांव काय ?

(1) निना जॉर्ज
(2) मेडी फॉक्स
(3) जुजाना कैपुतोवा
(4) एलुआना लार्स

Who was elected the first woman President of Slovakia in 2019 ?

(1) Nina Jorge
(2) Medie Fox
(3) Zuzana Caputova
(4) Eluna Lars

32. 2019 हे वर्ष महाराष्ट्रातील तीन नामवंत व्यक्तींचे जन्मशताब्दी वर्ष म्हणून साजरे होत आहे. ते म्हणजे

(1) पु.ल. देशपांडे – ग.दि. माडगूळकर – राजा परांजपे
(2) बाबा आमटे – पु.ल. देशपांडे – राजा नवाथे
(3) सुधीर फडके – पु.ल. देशपांडे – ग.दि. माडगूळकर
(4) सुधीर फडके – कुमार गंधर्व – प्र.के. अत्रे

Maharashtra is celebrating birth centenary of three eminent personalities in 2019. They are

(1) P.L. Deshpande – G.D. Madgulkar – Raja Paranjape
(2) Baba Amte – P.L. Deshpande – Raja Nawathe
(3) Sudhir Phadke – P.L. Deshpande – G.D. Madgulkar
(4) Sudhir Phadke – Kumar Gandharva – P.K. Atre

33. 2019 हे वर्ष _____ ह्या ऐतिहासिक घटनेचे शताब्दी वर्ष आहे.

(1) लंडन येथे भारतीय होमरूल सोसायटीची स्थापना
(2) टिळकांची मंडाले कारागृहात हद्दपारी
(3) मीठाचा सत्याग्रह
(4) जालीयनवाला बाग हत्याकांड

2019 is the centenary year of the historical event of _____ .

(1) Formation of Indian Home Rule Society in London
(2) Deportation of Tilak to Mandalay Jail
(3) Salt Agitation
(4) Jalianwala Bagh Massacre

34. 2019 मध्ये भारताच्या पहिल्या लोकपालपदी कोणाची नियुक्ति करण्यात आली ?

(1) न्यायमूर्ति दीपक मिश्रा
(2) न्यायमूर्ति दिलीप भोसले
(3) न्यायमूर्ति अजयकुमार त्रिपाठी
(4) न्यायमूर्ति पिनाकी चंद्र घोष

Who was appointed the first Lokpal of India in 2019 ?

(1) Justice Dipak Mishra
(2) Justice Dilip Bhosale
(3) Justice Ajaykumar Tripathi
(4) Justice Pinaki Chandra Ghose

35. भारतीय कृषी आयोगाच्या मते अवर्षणचे प्रकार कोणते ?

अ. वातावरणीय अवर्षण, जलीय अवर्षण, कृषी अवर्षण

ब. वातावरणीय अवर्षण, जलीय अवर्षण

क. कृषी अवर्षण, तीव्र अवर्षण, जलीय अवर्षण

ड. साधारण अवर्षण, तीव्र अवर्षण, कृषी अवर्षण

वरीलपैकी कोणते विधान/विधाने बरोबर आहे ?

(1) फक्त अ   (2) फक्त ब आणि क

(3) फक्त अ आणि ब   (4) फक्त ड

What are the types of droughts as per 'Krishi Ayog' of India ?

a. Meteorological drought, Hydrological drought, Agricultural drought.

b. Meteorological drought, Hydrological drought.

c. Agricultural drought, Intense drought, Hydrological drought.

d. Normal drought, Intense drought, Agricultural drought

Which of the statements given above is/are correct ?

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

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

36. खालीलपैकी कोणत्या राज्यांना सरदार सरोवर जलसिंचनासाठी पाणी पुरवेल ?

(1) गुजरात – मध्य प्रदेश

(2) महाराष्ट्र – गुजरात

(3) गुजरात – राजस्थान

(4) राजस्थान – पंजाब

Sardar Sarovar will provide water for irrigation to which of the following states ?

(1) Gujarat – Madhya Pradesh

(2) Maharashtra – Gujarat

(3) Gujarat – Rajasthan

(4) Rajasthan – Punjab

37. थॉमस पेनच्या लिखाणाने प्रभावित झालेल्या समाज सुधारकाचे नाव सांगा.

    (1)   गोपाळ गणेश आगरकर   (2)   डॉ. बाबासाहेब आंबेडकर

    (3)   न्यायमूर्ति रानडे   (4)   महात्मा ज्योतिराव फुले

Write the name of social reformer who was impressed by writings of Thomas Paine.

    (1)   Gopal Ganesh Agarkar   (2)   Dr. Babasaheb Ambedkar

    (3)   Justice Mr. Ranade   (4)   Mahatma Jyotirao Phule

38. संयुक्त महाराष्ट्र चळवळीला पाठिंबा म्हणून कोणी केंद्र सरकारच्या अर्थमंत्री पादाचा राजीनामा दिला ?

    (1)   यशवंतराव चव्हाण   (2)   बाळासाहेब खेर

    (3)   सी.डी. देशमुख   (4)   के.एम. पान्नेकर

Who resigned from the post of Finance Minister of India to support the Sanyukta Maharashtra movement ?

    (1)   Yeshwantrao Chavan   (2)   Balasaheb Kher

    (3)   C.D. Deshmukh   (4)   K.M. Pannikar

39. _____ रोजी कोयना येथे तीव्र भूकंप आला होता.

    (1)   30 सप्टेंबर 1963   (2)   26 जुलै 1965

    (3)   11 मार्च 1966   (4)   11 डिसेंबर 1967

A severe earthquake occurred at Koyna on _____ .

    (1)   30 September, 1963   (2)   26 July, 1965

    (3)   11 March, 1966   (4)   11 December, 1967

40. पुढील विधानांपैकी कोणते विधान/विधाने *अयोग्य* आहे/आहेत ?

    अ.   पवनार शहर काटेपूर्णा नदीच्या काठावर वसलेले आहे.

    ब.   वैनगंगा नदीचा उगम बैतुल या ठिकाणी आहे.

    क.   तेरणा ही मांजरा नदीची उपनदी आहे.

    (1)   फक्त अ   (2)   फक्त ब

    (3)   अ आणि ब   (4)   अ, ब आणि क

Which of the following statements is/are *incorrect* ?

    a.   Pavnar city is located on the bank of river Katepurna.

    b.   The origin of river Wainganga is at Betul.

    c.   Terna is a tributary of river Manjira.

    (1)   Only a   (2)   Only b

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

41. Two equal forces acting at a right angle having resultant $\sqrt{32}$, then find magnitude of each force.

   (1) 2

   (2) 4

   (3) 8

   (4) 16

42. Two unlike parallel forces, each of magnitude 50 kN are 200 mm apart from each other. What will be the magnitude of moment of couple formed by these two forces ?

   (1) 5 kN m   (2) 10 kN m

   (3) 20 kN m   (4) 0

43. When two surfaces are in contact with each other during motion, it requires more force even on horizontal surface to move which is due to friction. But frictional force does not depend on _____ .

   (1) Normal reaction from surface

   (2) Force tending to cause motion

   (3) Roughness of surface

   (4) Area of contact between two surfaces

44. The ratio of static friction to dynamic friction is always

   (1) equal to one

   (2) less than one

   (3) greater than one

   (4) None of the above

45. What is the moment of inertia of a quarter circle with respect to x-axis which is passing through the center of a circle whose radius is 20 mm ?

   (1) 3.14 cm^4

   (2) 0.878 cm^4

   (3) 0.785 cm^4

   (4) 0.393 cm^4

46. In three dimensional analysis, equilibrium of parallel forces along x-axis requires

(1) $\sum Fx = 0,\ \sum Fy = 0,\ \sum Fz = 0$

(2) $\sum Fx = 0,\ \sum Mx = 0,\ \sum My = 0$

(3) $\sum Fx = 0,\ \sum My = 0,\ \sum Mz = 0$

(4) $\sum Fx = 0,\ \sum Fy = 0,\ \sum Mz = 0$

47. If a body acted upon by a number of co-planar non-concurrent forces it may
(1) rotate about itself without moving
(2) move in any one direction rotating about itself
(3) be completely at rest
(4) All of the above

48. Radial component of velocity and acceleration in curvilinear motion are

(1) $\dot{r}$ and $\ddot{r} - r(\dot{\theta})^2$

(2) $r\dot{\theta}$ and $r\ddot{\theta} + 2\dot{r}\dot{\theta}$

(3) $\ddot{r}$ and $r\dot{\theta}$

(4) $\dot{r}$ and $r\ddot{\theta}$

49. If the horizontal range of a projectile is maximum then the angle of the projectile must be _____ with horizontal.
(1) 90°   (2) 75°
(3) 45°   (4) 30°

50. "The rate of change of momentum is directly proportional to the impressed force, and takes place in the same direction, in which the force acts". This is the statement of _____

(1) D'Alembert's principle

(2) Newton's first law of motion

(3) Newton's second law of motion

(4) Newton's third law of motion

51. Ball A of mass 1 kg moving with velocity of 2 m/s strikes directly on a ball of mass 2 kg rest. What are the velocities of the two balls after impact if coefficient of restitution is 0·5 ?

    (1) 0 and 1 m/s

    (2) 1 and 2 m/s

    (3) 2 and 2 m/s

    (4) 1 and 1 m/s

52. A ball which is thrown upward at an angle 'α', returns to the ground describing a parabolic path during its flight

    (1) Vertical component of velocity remains constant

    (2) Horizontal component of velocity remains constant

    (3) Speed of the ball remains constant

    (4) Kinetic energy of the ball remains constant

53. What will be the deformation of the spring if a block of weight 100 N is kept on it. Take stiffness of spring 1000 N/m.

    (1) 10 m   (2) 0·1 m   (3) 0·01 m   (4) 1 m

54. If u_1 and u_2 are the velocities of two moving bodies in the same direction before impact and V_1 and V_2 are their velocities after impact, then coefficient of restitution is given by

    (1) $\dfrac{V_1 - V_2}{u_1 - u_2}$

    (2) $\dfrac{V_2 - V_1}{u_1 - u_2}$

    (3) $\dfrac{u_1 - u_2}{V_1 - V_2}$

    (4) $\dfrac{u_2 + u_1}{V_2 + V_1}$

55. How much is the carbon content (%) in high tensile steel ?

(1) 0·7 – 0·9%   (2) 0·3 – 0·5%   (3) 0·6 – 0·8%   (4) 0·8 – 1·0%

56. How much is the measuring capability of digital planimeter w.r.t. an ordinary planimeter ?

(1) 10 times larger   (2) 2 times larger

(3) 20 times larger   (4) 100 times larger

57. Type of surveying in which the shape of the earth is taken into account is known as

(1) Topographical survey   (2) Cadastral survey

(3) Geodetic surveying   (4) Plane surveying

58. Out of the following, which is clay stone with vesicular texture ?

(1) Laterite   (2) Sandstone   (3) Limestone   (4) Granite

59. What is carbon content (%) in mild steel ?

(1) 2·0 – 3·0   (2) 0·5 – 0·8

(3) 0·05 – 0·1   (4) 0·15 – 0·3

60. Out of the following, which is the component of G.I.S. ?

(1) Computer system   (2) Software

(3) Data management   (4) All of the above

61. By which rule, the total error in latitude and departure is distributed in proportion to the lengths of the traverse legs ?

(1) Transit Rule   (2) Bowditch's Rule

(3) Third Rule   (4) Simpson's Rule

62. What is the minimum live load (N/m^2) of floor area to be considered for residential buildings ?

(1) 3000   (2) 4000   (3) 2000   (4) 5000

63. The component in cement which has the property of hydrating rapidly and is responsible to provide not only early strength but also the ultimate strength is

(1) Dicalcium Silicate   (2) Tricalcium Silicate

(3) Tricalcium Aluminate   (4) Tetra Calcium Alumino ferrite

64. In Ordinary Portland cement the percentage of lime constitutes :

(1) 60 to 67   (2) 50 to 57   (3) 74 to 78   (4) 51 to 56

65. In a governor, the vertical distance which the sleeve travels due to change in equilibrium speed is called _____.

(1) Sleeve distance   (2) Sleeve fit

(3) Sleeve height   (4) Sleeve lift

66. The thermal conductivity of _____ varies with square root of the absolute temperature.

(1) solid   (2) liquid

(3) gas   (4) None of the above

67. Name the boiler which can generate superheated steam without additional accessories.

(1) Cornish boiler

(2) Locomotive boiler

(3) Lancashire boiler

(4) Cochran boiler

68. The power transmitted by belt drive is designed on the basis of

(1) angle of lap on the smaller pulley

(2) angle of lap on the larger pulley

(3) average angle of lap of two pulleys

(4) angle of lap of the driver pulley whether smaller or larger

69. A four bar chain has

(1) all turning pairs

(2) all sliding pairs

(3) one turning pair and others are sliding pairs

(4) one sliding pair and others are turning pairs

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

    (1)   Weldability   (2)   Formability

    (3)   Machinability   (4)   Hardenability

71. _____ is the property of a material to resist fracture due to high impact blows like hammer blows.

    (1)   Fatigue

    (2)   Creep

    (3)   Toughness

    (4)   Malleability

72. The casting produced by forcing molten metal under pressure into a permanent metal mould is called as _____ casting.

    (1)   sand mould

    (2)   slush

    (3)   die

    (4)   All of the above

73. The process of removal of metal by rotating the cutter in the direction of travel of work piece is called

    (1)   up milling

    (2)   down milling

    (3)   straddle milling

    (4)   saw milling

74. _____ is the process by which great pressure is applied to a heated metal billet or blank causing it to flow through a restricted orifice.

    (1)   Extrusion

    (2)   Hot rolling

    (3)   Tubing

    (4)   Cold rolling

75. Find the current through resister R_4 in the figure given below :
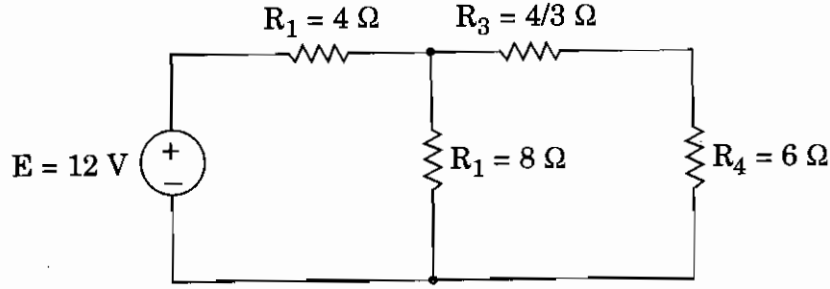
(1)   0·6 A   (2)   0·8 A   (3)   0·5 A   (4)   1·0 A

76. Number of equations required to be analyzed in a given network by nodal analysis is equal to

(1)   The number of independent loops

(2)   One less than the number of loops

(3)   The number of nodes

(4)   One less than the number of nodes

77. Two capacitors of 80 µF and 50 µF are connected in series. Find the maximum energy stored in the circuit when 200 V at 50 Hz are applied across the series circuit.

(1)   1230 J   (2)   1·23 J

(3)   123 J   (4)   980 J

78. The admittance of a branch with $\overline{Z} = 3 + j4$ ohm in an ac circuit is _____

(1)   (0·3 − j0·25) mho   (2)   (0·6 + j0·8) mho

(3)   (0·25 − j0·3) mho   (4)   (0·6 − j0·8) mho

79. Which of the following 3-phase systems is sometimes also called as 3-phase, 4-wire system ?

(1)   3-phase star-connected

(2)   3-phase delta-connected

(3)   3-phase zig-zag connected

(4)   any 3-phase system

80. Three similar resistors are connected in star across 400 V, 3-phase lines. The line current is 5 A. Calculate the value of each resistor.

   (1) 46·2 Ω   (2) 80 Ω

   (3) 138·40 Ω   (4) None of the above

81. In a transformer, maximum voltage regulation occurs at _____ .

   (1) leading power factor of the load

   (2) lagging power factor of the load

   (3) unity power factor of the load

   (4) None of the above

82. The core of a transformer is assembled with thin laminated sheets so as to

   (1) Reduce hysterisis loss

   (2) Reduce eddy current loss

   (3) Reduce both hysterisis and eddy current losses

   (4) ensure good magnetic coupling between primary and secondary winding.

83. When a transformer is operating on no load the primary applied voltage is approximately balanced by

   a. Primary Induced emf

   b. Secondary Induced emf

   c. Terminal voltage across the secondary

   d. Voltage drop across the resistance and reactance

   Which statement/s is/are correct ?

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

   (3) Only c and d   (4) Only d

84. The resistance and reactance in a series R-C circuit are 7·5 Ω each. In this circuit

   (1) voltage leads the current by 45°

   (2) current leads the voltage by 45°

   (3) voltage leads the current by 60°

   (4) current leads the voltage by 15°

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85. Find the Eigen values and Eigen vectors of the following matrix

$$\begin{bmatrix} -5 & 2 \\ 2 & -2 \end{bmatrix}$$

(1) $(-1, -6)$ $\begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$ $\begin{Bmatrix} 2 \\ -1 \end{Bmatrix}$

(2) $(1, 6)$ $\begin{Bmatrix} 1 \\ -2 \end{Bmatrix}$ $\begin{Bmatrix} -2 \\ 1 \end{Bmatrix}$

(3) $(1, -6)$ $\begin{Bmatrix} -1 \\ -2 \end{Bmatrix}$ $\begin{Bmatrix} 2 \\ -1 \end{Bmatrix}$

(4) $(-1, 6)$ $\begin{Bmatrix} 1 \\ 2 \end{Bmatrix}$ $\begin{Bmatrix} 2 \\ 1 \end{Bmatrix}$

86. Which of the following is the inverse of the matrix $A = \begin{bmatrix} 3 & 0 \\ 1 & 2 \end{bmatrix}$

(1) $\begin{bmatrix} \dfrac{1}{3} & 0 \\ -\dfrac{1}{6} & \dfrac{1}{2} \end{bmatrix}$

(2) $\begin{bmatrix} 0 & \dfrac{1}{6} \\ -\dfrac{1}{6} & \dfrac{1}{2} \end{bmatrix}$

(3) $\begin{bmatrix} \dfrac{1}{3} & -\dfrac{1}{6} \\ \dfrac{1}{3} & \dfrac{1}{2} \end{bmatrix}$

(4) $\begin{bmatrix} \dfrac{1}{3} & 0 \\ 0 & \dfrac{1}{2} \end{bmatrix}$

87. Pick up the *incorrect* statement from the following options.

If A is Coefficient Matrix, K is Augmented Matrix and R is the Rank of Matrix

(1) If R (A) ≠ R (K), the equations are inconsistent and have no solutions

(2) If R (A) = R (K) = n, the equations are consistent and have unique solutions

(3) If R (A) = R (K) < n, the equations are consistent and have infinite number of solutions

(4) If R (A) = R (K) > n, the equations are consistent and have infinite number of solutions

88. If $u = x^y$ choose the correct option

(1) $\dfrac{\partial^3 u}{\partial x^2 \, \partial y} = \dfrac{\partial^3 u}{\partial x \, \partial y \, \partial x}$

(2) $\dfrac{\partial^3 u}{\partial x \, \partial y^2} = \dfrac{\partial^3 u}{\partial y \, \partial x \, \partial y}$

(3) $\dfrac{\partial^3 u}{\partial x \, \partial y^2} = \dfrac{\partial^3 u}{\partial x^2 \, \partial y}$

(4) $\dfrac{\partial^2 u}{\partial x^2} = \dfrac{\partial^2 u}{\partial y^2}$

89. A function $f(x, y)$ is said to be homogeneous of degree n in the variables x and y if it can be expressed in the form

(1) $x^n \phi \left(\dfrac{y}{x} \right)$

(2) $y^n \phi \left(\dfrac{x}{y} \right)$

(3)   Both (1) and (2)

(4)   None of the above

90. Choose the correct option for the following sentences.

a.   A function $f(x, y)$ is said to have a maximum value at $x = a$, $y = b$ if
     $f(a, b) > f(a + h, b + k)$

b.   A function $f(x, y)$ is said to have a maximum value at $x = a$, $y = b$ if
     $f(a, b) < f(a + h, b + k)$

(1)   Both a and b are wrong

(2)   Both a and b are true

(3)   a is true, b is wrong

(4)   b is true, a is wrong

91. Match the following :

a. $\dfrac{\partial^2 u}{\partial t^2} = C \dfrac{\partial^2 u}{\partial x^2}$ I.   Two-dimensional Poisson equation

b. $\dfrac{\partial u}{\partial t} = C \dfrac{\partial^2 u}{\partial x^2}$ II.   One-dimensional wave equation

c. $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = 0$ III.   One-dimensional heat equation

d. $\dfrac{\partial^2 u}{\partial x^2} + \dfrac{\partial^2 u}{\partial y^2} = f(x, y)$ IV.   Two-dimensional Laplace equation

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

92. Particular integral of

$$\frac{d^2y}{dx^2} + 3\frac{dy}{dx} + 2y = 5 \text{ is}$$

(1) $\frac{2}{5}$

(2) $\frac{1}{5}$

(3) $\frac{5}{2}$

(4) $\frac{3}{2}$

93. Cauchy's linear differential equation $x^n \dfrac{d^n y}{dx^n} + a_1 x^{n-1} \dfrac{d^{n-1}y}{dx^{n-1}} + ... + a_n y = f(x)$ can be reduced to linear differential equation with constant coefficient by using substitution

(1) $x = e^z$

(2) $y = e^z$

(3) $z = e^x$

(4) $z = e^y$

94. To reduce the differential equation $(x + 5)^2 \dfrac{d^2y}{dx^2} - (x + y) \dfrac{dy}{dx} + y = 10x + 8$ to linear differential equation with constant coefficient, the substitution is

(1) $x + 5 = e^{-z}$

(2) $x + 5 = e^z$

(3) $z = e^{x+5}$

(4) $z = x + 5$

95. Given that

x :	4	4·2	4·4	4·6	4·8	5·0	5·2
log x :	1·3863	1·4351	1·4816	1·5261	1·5686	1·6094	1·6484

Evaluate $\displaystyle\int_{4}^{5\cdot2} \log x \, dx$ by Trapezoidal Rule.

(1) 1·827887

(2) 1·827655

(3) 1·827867

(4) 1·82780

96. Given that

x	$\dfrac{1}{1+x^2}$
0	1
1	0·5
2	0·2
3	0·1
4	0·0588
5	0·0385
6	0·027

Evaluate $\displaystyle\int_{0}^{6}\dfrac{dx}{1+x^2}$ using Simpson's $\dfrac{3}{8}$ rule.

(1) 1·3574

(2) 1·3569

(3) 1·3576

(4) 1·3571

---

97. The triple integral is used to compute

(1) Volume

(2) Area

(3) Both Volume and Area

(4) None of the above

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98. Evaluate

$$\int\limits_0^1 \int\limits_{y^2}^1 \int\limits_0^{1-x} x\, dz\, dx\, dy$$

(1) $\dfrac{2}{35}$ (2) $\dfrac{4}{35}$

(3) $\dfrac{4}{17}$ (4) $\dfrac{2}{17}$

---

99. Change the order of integration in

$$\int\limits_0^a \int\limits_y^a \frac{x}{x^2+y^2}\, dx\, dy$$

(1) $\displaystyle\int\limits_0^a \int\limits_0^x \frac{x}{x^2+y^2}\, dy\, dx$

(2) $\displaystyle\int\limits_0^a \int\limits_x^a \frac{x}{x^2+y^2}\, dy\, dx$

(3) $\displaystyle\int\limits_x^a \int\limits_0^y \frac{x}{x^2+y^2}\, dy\, dx$

(4) $\displaystyle\int\limits_x^a \int\limits_y^a \frac{x}{x^2+y^2}\, dy\, dx$

---

100. Evaluate the following integral $\displaystyle\int\limits_0^a \int\limits_0^a \int\limits_0^a (xy + xz + yz)\, dx\, dy\, dz$.

(1) $\dfrac{3}{4}\, a^3$ (2) $\dfrac{2}{3}\, a^5$

(3) $\dfrac{3}{4}\, a^5$ (4) $\dfrac{5}{3}\, a^3$

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 परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षाकक्षाबाहेर जाण्यापूर्वी उमेदवाराने आपल्या उत्तरपत्रिकेचा भाग-1 समवेक्षकाकडे न विसरता परत करणे आवश्यक आहे.**

नमुना प्रश्न

प्र. क्र. 201. सतीची चाल नष्ट करण्यासाठी कोणी मूलत: प्रयत्न केले ?

    (1)   स्वामी दयानंद सरस्वती   (2)   ईश्वरचंद्र विद्यासागर

    (3)   राजा राममोहन रॉय   (4)   गोपाळकृष्ण गोखले

    ह्या प्रश्नाचे योग्य उत्तर ''(3) राजा राममोहन रॉय'' 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 स्वतंत्रीत्या पुरविलेल्या उत्तरपत्रिकेवरील त्या त्या प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगामार्फत **"महाराष्ट्र अभियांत्रिकी सेवा, संयुक्त (पूर्व) परीक्षा - 2019"** या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ञांचे अभिप्राय विचारात घेऊन, आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

उत्तरतालिका - KEY

प्रश्न क्रमांक	संच A	संच B	संच C	संच D	प्रश्न क्रमांक	संच A	संच B	संच C	संच D
1	3	3	3	1	26	2	3	3	3
2	2	1	1	3	27	3	4	4	1
3	3	2	3	2	28	3	4	4	2
4	1	1	2	3	29	1	1	1	3
5	3	4	3	3	30	2	#	1	3
6	1	2	1	2	31	3	4	3	4
7	2	3	4	1	32	3	3	2	4
8	1	1	3	4	33	4	4	3	1
9	4	3	1	3	34	4	3	3	#
10	3	3	2	1	35	1	4	1	4
11	4	2	3	4	36	#	4	2	4
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13	3	4	4	3	38	3	1	3	1
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16	3	1	4	1	41	2	3	4	2
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18	1	1	1	3	43	4	3	2	2
19	4	4	3	1	44	3	1	1	#
20	1	3	1	3	45	1	4	1	1
21	4	3	1	3	46	3	4	3	4
22	4	3	#	4	47	4	2	3	2
23	1	1	4	3	48	1	3	3	2
24	1	2	3	4	49	3	2	2	1
25	3	3	4	3	50	3	1	1	2

 # ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

प्रश्न क्रमांक	उत्तरे				प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D		संच A	संच B	संच C	संच D
51	1	4	2	1	76	4	3	3	3
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54	2	1	#	1	79	1	1	4	2
55	3	1	1	3	80	1	#	3	2
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57	3	3	2	2	82	2	4	3	4
58	1	3	2	3	83	1	1	4	3
59	4	2	1	1	84	2	2	1	1
60	4	1	2	#	85	1	1	3	4
61	2	2	1	2	86	1	3	3	4
62	3	4	1	4	87	4	2	1	2
63	2	2	4	1	88	1	2	2	3
64	1	#	1	2	89	3	4	2	2
65	4	1	3	1	90	3	3	2	1
66	3	1	3	3	91	2	1	3	4
67	2	2	2	2	92	3	3	4	3
68	1	2	3	2	93	1	4	3	2
69	1	1	1	4	94	#	1	1	1
70	3	2	#	3	95	2	3	4	1
71	3	1	2	1	96	4	3	4	3
72	3	1	4	3	97	1	1	2	3
73	2	4	1	4	98	2	2	3	3
74	1	1	2	1	99	1	2	2	2
75	2	3	1	3	100	3	2	1	1

Date: 05th Aug, 2019

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

A → संच क्रमांक

2019

T13

प्रश्नपुस्तिका क्रमांक
BOOKLET NO.

प्रश्नपुस्तिका - I

स्थापत्य अभियांत्रिकी पेपर - 1

वेळ : 2 (दोन) तास

एकूण प्रश्न : 100

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 बॉल्पेनने** लिहावा.

परीक्षा-क्रमांक

↑ केंद्राची संकेताक्षरे   ↑ शेवटचा अंक

(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 बॉल्पेन 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.

(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 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 तरतुदींनुसार तसेच प्रचलित कायद्याच्या तरतुदींनुसार 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 ही सील उघडू नये

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

1. For the formwork design, IS-456-2000 suggested the deviation from specified dimensions of cross section of columns and beams at _____.

   (1) + 12 mm , − 6 mm   (2) + 50 mm , − 12 mm

   (3) + 25 mm , − 25 mm   (4) + 12 mm , − 12 mm

2. If the compressive strength of concrete increases, then tensile strength is also increases, but at a _____.

   (1) Increasing rate   (2) Decreasing rate

   (3) Constant rate   (4) Exponential increasing rate

3. The brick piece obtained by cutting a triangular portion of the brick such that half a headers and half a stretcher are obtained on adjoining cut faces is called as :

   (1) Queen closer   (2) Mitred closer

   (3) King closer   (4) Three-Quarter Bat

4. Maximum water-cement ratio and minimum cement content for moderate exposure used in plain cement concrete are _____ ; _____ respectively, as per IS-456-2000.

   (1) 0.60 ; 220 kg/m^3 (2) 0.60 ; 240 kg/m^3

   (3) 0.50 ; 250 kg/m^3 (4) 0.55 ; 260 kg/m^3

5. Which of the following tests is **not** a test for evaluating workability of concrete ?

   (1) Slump Test   (2) Flow Test

   (3) Compacting factor Test   (4) Le-Chatellier Test

6. A well caisson is a foundation facilating structure sunk in the ground or water ; which is :

   (1) Open at top as well as at bottom.

   (2) Open at top and closed at bottom.

   (3) Open at bottom and closed at top.

   (4) Closed at top as well as at bottom.

7. One of the following is **not** a principle related to thermal insulation :

    (1) Thermal resistance is directly proportional to thickness of a material.

    (2) Provision of air gap plays an important role in thermal insulation.

    (3) Transfer of heat from outside to inside increases.

    (4) Thermal resistance of a building depends on orientation also.

8. _____ are provided as a protective coatings to walls at its top to prevent seepage of water.

    (1) Corbels   (2) Cornica   (3) Copings   (4) Floating

9. Who had discovered direct relationship between water-cement ratio and strength of concrete ?

    (1) Jon Abraham   (2) Abraham Lincoln

    (3) Duff Abrams   (4) Albert Pinto

10. One of the following measure **could not** reduce or eliminate plastic shrinkage cracks :

    (1) Erect temporary wind breakers.

    (2) Concrete should be poured in layers.

    (3) Erect temporary roof.

    (4) Reduce the time between placing and finishing.

11. How much is the Carbon Content (%) in hard-steel ?

    (1) 0.5 - 0.8   (2) 0.8 - 1.5   (3) 0.3 - 0.5   (4) 0.15 - 0.3

12. Fire load, a fire risk criteria to classify occupancies, for a building having an area of 100 m² with combustible material of 1,000 kg having calorific value of 4,000 kcal/kg will be :

    (1) 4,00,000 kcal/m²   (2) 40,000 kcal/m²

    (3) 250 kcal/m²   (4) 25 kcal/m²

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

13. The shear force and bending moment are zero at the free end of a cantilever beam, if it carries a :

    (1) Point load at the free end.

    (2) Point load at the middle of its length.

    (3) Uniformly distributed load over the whole length.

    (4) None of the above.

14. A steel rod of c/s area 100 mm² and 1 m long is subjected to a tensile force of 40 kN. What is the total elongation of the rod ? If modulus of elasticity of steel is 200 GPa.

    (1) 0.5 mm   (2) 0.7 mm   (3) 1.2 mm   (4) 2.0 mm

15. A simply supported beam carries couple at a point on its span, the shear force :

    (1) Varies by cubic law   (2) Varies by parabolic law

    (3) Varies linearly   (4) Is uniform throughout

16. Euler buckling load for one end fixed and the other hinged is given by :

    (1) $\dfrac{\pi^2 EI}{l^2}$ (2) $\dfrac{2\pi^2 EI}{l^2}$ (3) $\dfrac{4\pi^2 EI}{l^2}$ (4) $\dfrac{\pi^2 EI}{4l^2}$

17. A point in a strained material is subjected to two mutually perpendicular stresses of 150 MPa (tensile) and 50 MPa (compressive), then what will be the magnitude of maximum shear stress in the component ?

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

18. Euler's formula for buckling of column does not hold good if slenderness ratio $\left(\dfrac{le}{K}\right)$ is _____ for mild steel column.

    (1) Less than 80   (2) Greater than 90

    (3) 120 - 160   (4) 90 - 120

19. Maximum deflection of a simply supported beam with the total uniformly distributed load 'W' is :

(1) $\dfrac{Wl^3}{384EI}$ (2) $\dfrac{5}{384}\dfrac{Wl^3}{EI}$ (3) $\dfrac{Wl^3}{48EI}$ (4) $\dfrac{5}{48}\dfrac{Wl^3}{EI}$

20. If a prismatic bar of uniform c/s 'A' and length 'L' is suspended from top, then the elongation of bar due to its self weight only is _____. Where, E is modulus of elasticity of bar material and γ is the density of bar.

(1) $\dfrac{\gamma L^2}{2E}$ (2) $\dfrac{\gamma L^2}{3E}$ (3) $\dfrac{\gamma L^2}{5E}$ (4) $\dfrac{\gamma L^2}{6E}$

21. The relation governing the simple bending of beam is :

(1) $\dfrac{\sigma}{y}=\dfrac{M}{E}=\dfrac{1}{R}$ (2) $\dfrac{\sigma}{y}=\dfrac{M}{R}=\dfrac{E}{1}$ (3) $\dfrac{\sigma}{E}=\dfrac{M}{I}=\dfrac{y}{R}$ (4) $\dfrac{\sigma}{y}=\dfrac{M}{I}=\dfrac{E}{R}$

22. A steel bar of 5 mm is heated from 15° to 40°C and it is free to expand. The bar will induce _____.
    (1) No stress   (2) Shear stress
    (3) Tensile stress   (4) Compressive stress

23. A simply supported beam AB of span 10 m carries a point load $\dot{W}=10$ kN at C such that AC = 3 m and BC = 7 m, maximum deflection occur _____.
    (1) at C   (2) at centre of span
    (3) between A and C   (4) between B and C

24. Which of the following is **true** in the following figure ?
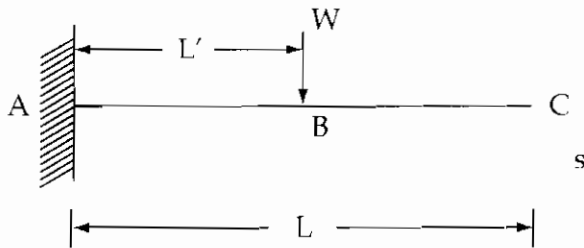

(1) Deflection at C = deflection at $B+\theta_B(L-L')$

(2) Deflection at $C=\dfrac{L}{L'}\times$ deflection at B

(3) Deflection at C = deflection at $B+\theta_C(L-L')$

(4) Both (1) and (3)

कच्च्या कामासाठी जागा/**SPACE FOR ROUGH WORK**

**25.** A statically indeterminate structure is the one which :

(1) Cannot be analyzed at all

(2) Can be analyzed using equations of statics only

(3) Can be analyzed using equations of statics and compatibility equations

(4) Can be analyzed using equations of compatibility only

---

26. In the propped cantilever as shown in figure, the value of propped reaction 'R' will be :
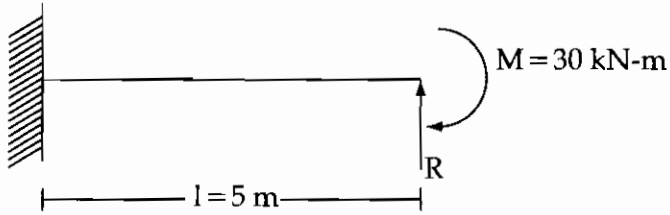
(1) 9 kN   (2) 6 kN   (3) 3 kN   (4) 2 kN

---

27. A fixed beam AB of length 'l' having constant flexural rigidity EI carries two loads P at its third points C and D as shown in figure.
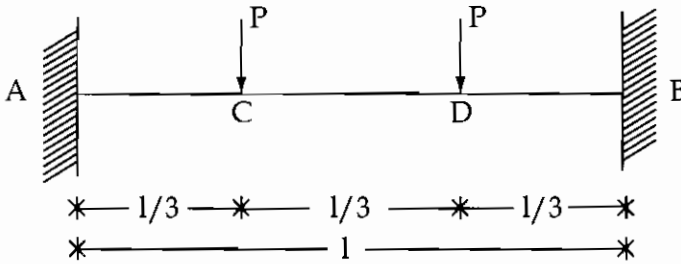
Numerically, maximum bending moment will occur :

(1) at C and at D and will be equal to $\dfrac{2}{9}Pl$

(2) between C and D and will be equal to $\dfrac{Pl}{9}$

(3) at A and at B and will be equal to $\dfrac{2}{9}Pl$

(4) between A and C and also between B and D and will be equal to $\dfrac{Pl}{9}$

कच्च्या कामासाठी जागा/**SPACE FOR ROUGH WORK**

P.T.O.

28. Maximum deflection for a simply supported beam subjected to udl 'W' throughout span 'l' is :

(1) $\dfrac{Wl^3}{48EI}$

(2) $\dfrac{Wl^4}{48EI}$

(3) $\dfrac{5}{384}\dfrac{Wl^3}{EI}$

(4) $\dfrac{5}{384}\dfrac{Wl^4}{EI}$

29. The moment required to rotate the near end of a prismatic beam through a unit angle without translation, the far end being simply supported, is given by :

(1) $\dfrac{3EI}{l}$

(2) $\dfrac{4EI}{l}$

(3) $\dfrac{2EI}{l}$

(4) $\dfrac{EI}{l}$

30. A two hinged semi-circular arch of radius R carries a concentrated load W at the crown. Assuming uniform flexural rigidity, the horizontal thrust at each support will be :

(1) $\dfrac{W}{2\pi}$

(2) $\dfrac{W}{\pi}$

(3) $\dfrac{4}{3}\cdot\dfrac{WR}{\pi}$

(4) $\dfrac{W}{2}$

31. A two span continuous beam ABC is as shown in figure below. The distribution factors at joint B are :
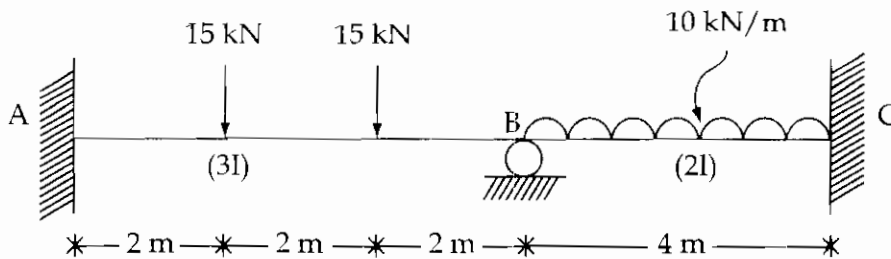
(1) 0.4, 0.6   (2) 0.6, 0.4   (3) 0.5, 0.5   (4) 0.55, 0.45

32. The deflection at the free end of a cantilever of rectangular cross-section due to certain loading is 0.8 cm. If the depth of the section is doubled keeping the width same, then the deflection at the free end due to the same loading will be :

(1) 0.1 cm   (2) 0.4 cm   (3) 0.8 cm   (4) 1.6 cm

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

33. What is the force in member AB of the pin-jointed frame as shown below ?

(1) P (tension)

(2) P (compression)

(3) $\dfrac{P}{\sqrt{2}}$ (compression)

(4) Zero

---

34. A cantilever beam AB of span 'L' is subjected to a moment 'M' at the free end as shown in figure. What is the slope and deflection at free end B ?

Consider same c/s and material. (i.e, EI is same)

(1) $\dfrac{ML}{EI}$, $\dfrac{ML^2}{2EI}$

(2) $\dfrac{M}{LEI}$, $\dfrac{ML^2}{EI}$

(3) $\dfrac{2ML}{EI}$, $\dfrac{2ML^2}{EI}$

(4) $\dfrac{ML}{EI}$, $\dfrac{2ML^2}{EI}$

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

35. Influence line diagram for B.M. at P for cantilever as shown is :

(1)

(2) $C\dfrac{(L-C)}{L}$

(3)   C/L

(4)   C
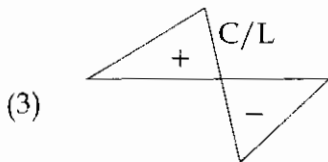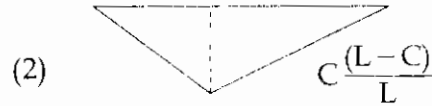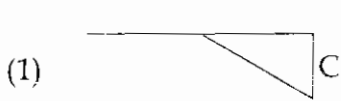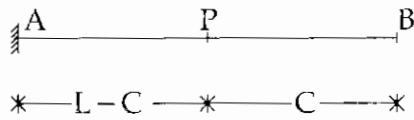
36. Displacement coordinators for the beam are as shown in figure. The flexibility matrix is given by :
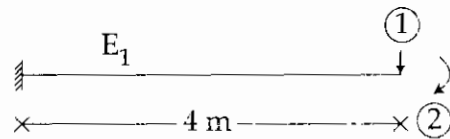
(1) $\dfrac{1}{E_1}\begin{bmatrix} 64/3 & -8 \\ -8 & 64 \end{bmatrix}$

(2) $\dfrac{1}{E_1}\begin{bmatrix} 64/3 & 8 \\ 8 & -64/3 \end{bmatrix}$

(3) $\dfrac{1}{E_1}\begin{bmatrix} 64/3 & 8 \\ 8 & 4 \end{bmatrix}$

(4) $\dfrac{1}{E_1}\begin{bmatrix} 4 & -8 \\ -8 & 64/3 \end{bmatrix}$

37. Displacement coordinators for the beam are as shown in figure. The stiffness matrix is given by :
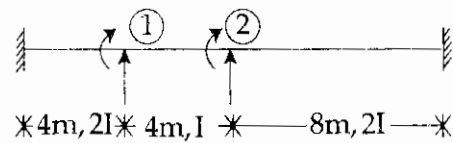
(1) $E_1\begin{bmatrix} 3 & 1 \\ 1 & 2 \end{bmatrix}$

(2) $E_1\begin{bmatrix} 3 & -0.5 \\ -0.5 & 2 \end{bmatrix}$

(3) $E_1\begin{bmatrix} 3 & 0 \\ 0 & 2 \end{bmatrix}$

(4) $E_1\begin{bmatrix} 3 & 0.5 \\ 0.5 & 2 \end{bmatrix}$

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

38. A parabolic three hinged arch ABC is supporting Uniformly Distributed Load of 500 N/m over its entire span of 100 m. The center point 'B' is vertically 25 m high from supports A and C. The reactions shall be _____.

   (1) 50 kN horizontal and vertical reactions at each support

   (2) 25 kN horizontal and 50 kN vertical reaction at each support

   (3) 50 kN horizontal and 25 kN vertical reaction at each support

   (4) 25 kN horizontal and vertical reactions at each support

39. The stiffness matrix of a beam is given as :

$$K \times \begin{bmatrix} 12 & 4 \\ 4 & 5 \end{bmatrix}$$

Calculate the flexibility matrix.

Flexibility matrix will be _____.
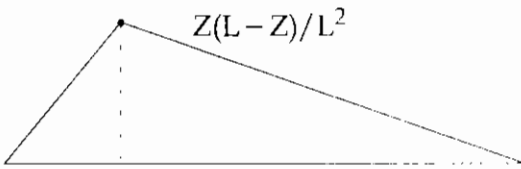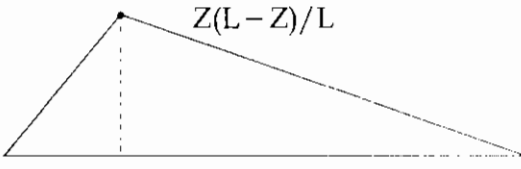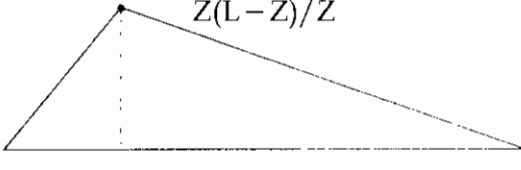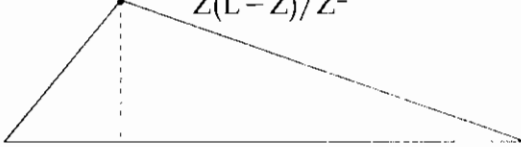
   (1) $\dfrac{K}{44} \begin{bmatrix} 12 & -4 \\ -4 & 5 \end{bmatrix}$

   (2) $\dfrac{K}{44} \begin{bmatrix} 12 & 4 \\ 4 & 5 \end{bmatrix}$

   (3) $\dfrac{1}{44\,K} \begin{bmatrix} 12 & -4 \\ -4 & 5 \end{bmatrix}$

   (4) $\dfrac{1}{44\,K} \begin{bmatrix} 5 & -4 \\ -4 & 12 \end{bmatrix}$

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

40. For a simply supported beam AB of span L with point load W at point C, Z m from left support, ILD for bending moment at C (M_c) is :

(1) $Z(L-Z)/L^2$

(2) $Z(L-Z)/L$

(3) $Z(L-Z)/Z$

(4) $Z(L-Z)/Z^2$

41. The cable and arch are subjected to axial forces respectively as, _____.

(1) Tensile and Compressive
(2) Compressive and Tensile
(3) Tensile and Tensile
(4) Compressive and Compressive

42. Degree of static indeterminancy for the frame shown below is _____

Internal hinge   Internal hinge
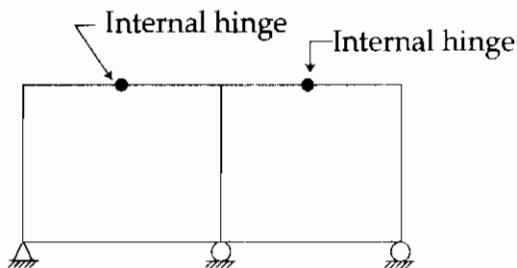
(1) 8   (2) 7   (3) 6   (4) 5

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

43. For the continuous beam shown in figure, the ILD for reaction at D is _____ .

Internal hinge

A   B   C   D

L $\frac{L}{2}$ L/2

(1)   A   B   C   D

(2)   A   B   C   D   1

(3)   A   B   1/2   3/4   C   D   1

(4)   A   B   1/2 $\triangle$ 3/4 $\triangle$ C   D $\triangle$
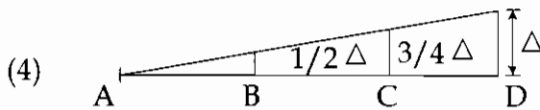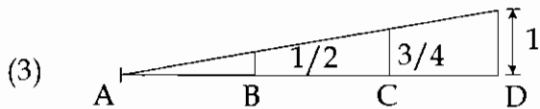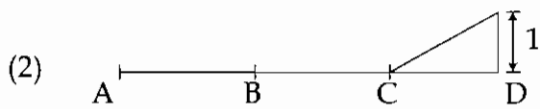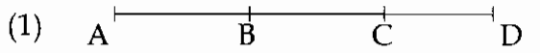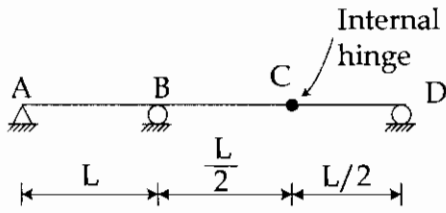
44. A cable of span 120 m and dip 10 m carries a load of 6 kN/m of horizontal span. The maximum tension in the cable is _____ .

V_A V_B

H   A   B   H

10 m

— 120 m —
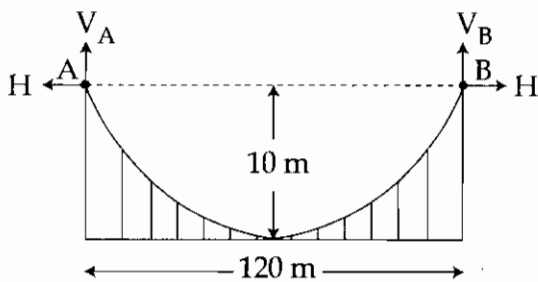
(1)   1238.42 kN   (2)   1138.42 kN   (3)   1038.42 kN   (4)   1338.42 kN

कच्च्या कामासाठी जागा/**SPACE FOR ROUGH WORK**

P.T.O.

45. For simply supported beam of span 10 m, Influence line diagram is drawn for bending moment at a section 4 m from left hand support. The maximum bending moment at the section due to moving point load of 160 kN is equal to _____.

    (1) 640 kN-m   (2) 960 kN-m   (3) 384 kN-m   (4) 400 kN-m

46. Spot welding is used when two plates are placed :

    (1) One below the other   (2) One butting against the other

    (3) One next to other   (4) At right angles to each other

47. An angle section can be used as purlin when slope of the roof truss is :

    (1) between 40° and 70°   (2) less than 30°

    (3) greater than 30°   (4) less than 45°

48. The purpose of stiffness in a plate girder is to :

    (1) Prevent buckling of web

    (2) Increase moment carrying capacity of the girder

    (3) Reduce the shear stress

    (4) Take care of bearing stress

49. The anchor bolts are provided to check the :

    (1) settlement of foundation   (2) punching shear of base plate

    (3) uplift of base plate   (4) moment of base plate

50. The economical range of spacing of roof trusses is :

    (1) $\frac{1}{2}$ to $\frac{1}{3}$ of span   (2) $\frac{1}{2}$ to $\frac{1}{4}$ of span

    (3) $\frac{1}{4}$ to $\frac{1}{6}$ of span   (4) $\frac{1}{3}$ to $\frac{1}{5}$ of span

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

51. The behaviour of a beam column cross section is expressed by which of the following relationship ?

    (1) Moment - Curvature   (2) Moment - Axial compression

    (3) Axial compression - Curvature   (4) Moment - Curvature - Axial compression

52. The plate used as a connecting piece at the intersection of two or more members in a roof truss is called as :

    (1) Template   (2) Gusset plate   (3) Base plate   (4) Shoe plate

53. The thickness of the base plate is determined from the :

    (1) Flexural strength of the plate.

    (2) Shear strength of the plate.

    (3) Bearing strength of the concrete pedestal.

    (4) Punching criteria.

54. The metal added at the joint while welding is known as _____.

    (1) weld metal   (2) filler

    (3) fillet metal   (4) all the above are correct

55. Which of the following statement is **correct** for reducing web buckling due to diagonal compression ?

    (1) Not providing web stiffners to increase shear strength

    (2) Providing web stiffner to reduce shear strength

    (3) Increasing depth to thickness ratio

    (4) Reducing depth to thickness ratio

56. The design shear stress for which of the following weld types is same as that for fillet welds ?

    (1) Plug weld only   (2) Slot weld only

    (3) Plug and Slot weld only   (4) Slot and Butt weld only

कच्च्या कामासाठी जागा/**SPACE FOR ROUGH WORK**

57. A column c/s 300 mm × 400 mm, 2250 mm long fixed at one end and free at other end. The ratio of effective length to the least lateral dimension is :

   (1) 7.5   (2) 15   (3) 11.25   (4) 9

58. In design of slab, as per IS-456, what should be minimum percent of distribution steel if Fe 415 reinforcement is used ?

   (1) 0.12% of total cross section   (2) 0.15% of total cross section

   (3) 0.50% of total cross section   (4) 1% of total cross section

59. What is the maximum diameter of main reinforcement used in the slab of overall thickness 160 mm as per IS 456-2000 ?

   (1) 10 mm   (2) 12 mm   (3) 16 mm   (4) 20 mm

60. For the design of staircase, self weight of waist slab is calculated as _____. Where, T = Tread, R = Riser and D = depth of waist slab, γ_c = density of R.C.C.

   (1) $\gamma_c \cdot D$

   (2) $\gamma_c \cdot D \cdot \left(\dfrac{T}{\sqrt{R^2 + T^2}} \right)$

   (3) $\gamma_c \cdot \dfrac{\sqrt{T^2 + R^2}}{T}$

   (4) $\gamma_c \cdot D \cdot \dfrac{\sqrt{T^2 + R^2}}{T}$

61. What is the effective span of staircase supported at each end by edge of the landing slab, which spans parallel, with the risers, if width of both landings is 2.5 m and going of stair is 2.2 m (see fig.) :
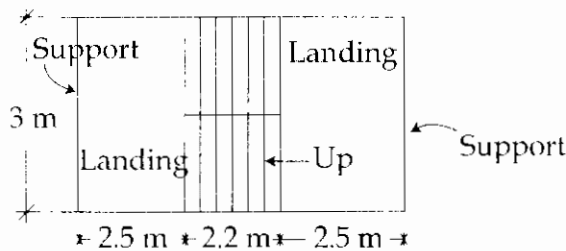
   (1) 7.2 m   (2) 4.7 m   (3) 4.2 m   (4) 2.2 m

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

62. In the design of retaining wall, both, active earth pressure and passive earth pressure is considered due to soil available on both sides (with different heights) of R.C.C. retaining wall. If angle of repose, $\phi = 30°$, then what will be the relation between coefficient of active earth pressure (K_a) and passive earth pressure (K_p) ?

(1) $K_a = \dfrac{1}{3}K_p$ (2) $K_a = 3K_p$ (3) $K_a = 9K_p$ (4) $K_a = \dfrac{1}{9}K_p$

63. What is the effective span of staircase, supported at each end by landing spanning parallel with the risers, if the width of landing is 2.5 m, width of starting passage is 1.5 m and going of the stair is 2.2 m ?

(1)   6.2 m (2)   4.2 m (3)   3.95 m (4)   4.5 m

64. The minimum area of tension reinforcement shall be not less than _____ for design of beam.

(1) $\dfrac{0.87}{f_y}\, bD$ (2) $\dfrac{0.85}{f_y}\, bd$ (3) $\dfrac{0.67}{f_y}\, bD$ (4) $\dfrac{0.76}{f_y}\, bd$

65. For high yield strength deformed bars of grade Fe 500, the permissible stress in direct tension and flexure tension shall be _____ used in working stress method.

(1) $0.87\, f_y$ (2) $0.67\, f_y$ (3) $0.55\, f_y$ (4) $0.48\, f_y$

66. If, in any given plane, one end of the column is unrestrained, its unsupported length 'l' shall not exceed _____. Where 'b' is width and 'D' is depth of cross section in plane under consideration.

(1) $\dfrac{100\, b}{D}$ (2) $\dfrac{100\, b^2}{D}$ (3) $\dfrac{100\, D}{b}$ (4) $\dfrac{100\, D^2}{b}$

67. If top of earth retained is horizontal, the coefficient of passive earth pressure for retaining wall become :

(1) $C\rho = \dfrac{1 - \sin\phi}{1 + \sin\phi}$ (2) $C\rho = \dfrac{1 + \sin\phi}{1 - \sin\phi}$

(3) $C\rho = \dfrac{\sin\phi - 1}{\sin\phi + 1}$ (4) $C\rho = \dfrac{\sin\phi + 1}{\sin\phi - 1}$

68. A concrete beam is post-tensioned by a cable carrying an initial stress of 1000 N/mm², the slip at jacking end was observed to be 5 mm, modulus of steel is 210 kN/mm² and span of beam is 30 m; what is % of loss of stress due to anchorage ?

    (1) 3.5%   (2) 2.5%   (3) 1.5%   (4) 4.0%

69. The rate of increase of stress is large in case of :

    (1) Bonded beams   (2) Unbonded beams

    (3) Tensioned beams   (4) Anchorage beams

70. A simply supported prestressed concrete beam of span 10 m is subjected to a point load of 10 kN at centre. Prestressing force of 2000 kN is applied through inclined tendon, zero eccentricity at support and 'e' at mid-span. To nullify the external point load effect, how much 'e' should be provided ? Neglect the self weight of beam.

    (1) 12.5 mm   (2) 50 mm   (3) 70 mm   (4) 85 mm

71. In a prestressed concrete beam, the ratio of applied prestressing force (P) to the concrete capacity of the section in compression is known as

    (1) Moment ratio (R)   (2) Eccentricity Ratio (ϵ)

    (3) Reinforcement Ratio (m)   (4) Efficiency factor (ρ)

72. The minimum transverse reinforcement in prestressed concrete beam is given by formula :

    (1) $\dfrac{b\,S_V}{A_{S_V}} = \dfrac{0.87\,f_y}{0.4}$

    (2) $\dfrac{A_{S_V}}{b\,S_V} = \dfrac{0.4}{0.87\,f_y}$

    (3) $\dfrac{A_{S_V}}{0.87\,f_y} = \dfrac{0.4}{b\,S_V}$

    (4) $\dfrac{b\,S_V}{0.87\,f_y} = \dfrac{A_{S_V}}{0.4}$

73. The net downward force of pre-stressed concrete beam with bent tendon is given as :

    (1) $w - 2p\,\sin\theta$ (2) $w + 2P\,\sin\theta$

    (3) Zero   (4) 2

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74. High tensile bars threaded at the ends are used in :
    (1) Freyssinet system
    (2) Gifford - Udall system
    (3) Lee - McCall system
    (4) Magnel - Blaton system

75. A post tensioned concrete beam is prestressed by means of three cables each 100 mm² area and stressed to 1100 MPa. All three cables are straight and located at an eccentricity of 50 mm. If modular ratio (m) = 6 and stress in concrete at the level of steel (f_c) = 5 MPa, then what is the loss of stress in cables due to elastic shortening if all cables are simultaneously tensioning and anchoring ?
    (1) 90 MPa   (2) 60 MPa   (3) 30 MPa   (4) 0 MPa

76. At the time of initial tensioning, the maximum tensile stress f_{pi} immediately behind the anchorage shall not exceed _____ of the ultimate tensile strength f_{pu} of the wire or bar or strand.
    (1) 55%   (2) 69%   (3) 76%   (4) 85%

77. A system usually adopted in the production of pre-tensioned members like railway sleepers, poles, etc on large scale is _____.
    (1) Magnel-Blaton system
    (2) P.S.C. Monowire system
    (3) Hoyer system
    (4) Gifford-Udall system

78. On the areas immediately behind external anchorages, the permissible unit bearing stress on the concrete, after accounting for losses due to relaxation of steel, elastic shortening and seating of anchorages, shall not exceed _____.

    (1) $0.48 f_{ci} \sqrt{\dfrac{A_{bearing}}{A_{punching}}}$ or $0.8 f_{cK}$ whichever is smaller

    (2) $0.45 f_{ci} \sqrt{\dfrac{A_{bearing}}{A_{punching}}}$ or $0.40 f_{cK}$ whichever is smaller

    (3) $0.48 f_{ci} \sqrt{\dfrac{A_{bearing}}{A_{punching}}}$ or $0.76 f_{cK}$ whichever is smaller

    (4) $0.40 f_{ci} \sqrt{\dfrac{A_{bearing}}{A_{punching}}}$ or $0.78 f_{cK}$ whichever is smaller

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P.T.O.

79. Independent float of an activity (i, j) is denoted by IF (i, j). The earliest occurrence times of i and j are denoted by E_i and E_j respectively. The latest occurrence times of i and j are denoted by L_i and L_j respectively. $D(i, j)$ indicates the duration of the activity. Select **correct** option giving IF (i, j) :

   (1) $E_j - L_i - D(i, j)$ (2) $L_j - E_i - D(i, j)$

   (3) $L_j - E_j - D(i, j)$ (4) $E_j - E_i$

80. A part of quality management system, that indicates the degree to which design quality is achieved in the actual construction work is called :

   (1) Quality Assurance   (2) Quality of design

   (3) Quality of conformance   (4) Quality of performance

81. Which among the following equipment found suitable for removing material from coffer dam, sewer manholes and well foundations ?

   (1) Clamshell   (2) Power shovel   (3) Dragline   (4) Back hoe

82. The following technique is not a quality control method _____.

   (1) Inspection   (2) Testing   (3) Designing   (4) Sampling

83. The PERT is a management tool, having expected mean time (t_m), optimistic time (t_o) and persimistic time (t_p), where the variance is given by _____.

   (1) $\dfrac{t_p - t_o}{6}$ (2) $\dfrac{t_o + 4\,t_m + t_p}{6}$

   (3) $(t_p - t_o)^2$ (4) $\left(\dfrac{t_p - t_o}{36}\right)^2$

84. When was the National Safety Council set up in India ?

   (1) 1966   (2) 1867   (3) 1948   (4) 1962

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

85. Items of 'C' type are identified for a project using ABC analysis. Which of the following statements are true for them ?

 (a) Even rough quantity estimate is sufficient

 (b) Bulk ordering is preferred

 (c) Ordering on EOQ basis is preferred

 (d) Even junior level staff is authorized to order

 Answer Options :

 (1) All of the above

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

 (3) Only (c)

 (4) None of the above

---

86. Which of the following is **not** a type of drilling equipment ?

 (1) Jack Hammer (2) Shot drill (3) Drifter (4) Ripper

---

87. Which among the following construction equipment would you recommend for compaction of cohesive soil ?

 (1) Smooth - Wheeled Rollers (2) Sheep Foot Rollers

 (3) Vibratory Rollers (4) Tampers

---

88. A construction company has annual demand of 200 M.T. of steel. The annual cost of carrying per M.T. of steel is ₹ 2,000 and the cost to place an order is ₹ 50,000. What is the economic order quantity ?

 (1) 50 M.T. (2) 70.7 M.T. (3) 100 M.T. (4) 40 M.T.

---

89. Which are some of the factors to be considered while designing site layout ?

 (a) Construction sequence (b) Quantity of materials to be stored

 (c) Parking of workers (d) Sanitary facilities

 (e) Soil conditions

 Answer Options :

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

 (2) All of the above

 (3) (a) and (b)

 (4) (a), (b) and (e)

---

90. The convergence in the Bisection method is _____.

   (1)   non linear   (2)   linear   (3)   exponential   (4)   all of the above

91. The curve in a trapezoidal rule passing through the coordinates of a straight line has a polynomial of _____.

   (1)   First order   (2)   Second order   (3)   Third order   (4)   Fourth order

92. The Bisection method is also known as _____.

   (1)   Quaternary chopping   (2)   Tri-region chopping

   (3)   Binary chopping   (4)   Hex-region chopping

93. Newton - Raphson method has _____.

   (1)   first order convergence   (2)   second order convergence

   (3)   first order divergence   (4)   second order divergence

94. The value of $\int_{-3}^{3} x^4 \, dx$ by using Trapezoidal rule is :

   (1)   112   (2)   114   (3)   113   (4)   115

95. A river is 80 metre wide. The depth 'd' in metres at a distance 'x' metres from one bank is given, by the following table :

x :	0	10	20	30	40	50	60	70	80
d :	0	4	7	9	12	15	14	8	3

Hence the area of c/s of the river using Simpson's rule is :

   (1)   713 sq. met.   (2)   710 sq. met.   (3)   715 sq. met.   (4)   716 sq. met.

___

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96. The quadratic equation $2x^2 + 3x + 8 = 0$ is to be solved numerically starting with an initially value as $x_0 = 2$. The new estimate of x after the first iteration using Newton Raphson method is _____.

    (1)   4   (2)   1   (3)   0   (4) -1

97. Bisection method is based on the repeated application of the _____ value property.

    (1)   intermediate   (2)   mediate   (3)   convergent   (4)   divergent

98. In Gauss Jordan method which of the following transformations are allowed :

    (1)   Diagonal transformations   (2)   Column transformations

    (3)   Row transformations   (4)   Square transformations

99. A cross-section area of river flow can be calculated by using following formula _____.

    (1)   Simpson's rule   (2)   Trapezoidal rule

    (3)   Both (1) and (2)   (4)   Thumb rule

100. Evaluate $\int_{0}^{2} \frac{1}{2x+1}$ by using Trapezoidal rule. Take number of intervals $= 2$ (with each step $= 1$).

    (1)   0.867   (2)   0.933   (3)   1.267   (4)   1.333

- o 0 o -

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

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 स्वतःबरोबर परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षाकक्षाबाहेर 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 प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगामार्फत "**महाराष्ट्र स्थापत्य अभियांत्रिकी सेवा (मुख्य) परीक्षा-2019 (स्थापत्य अभियांत्रिकी पेपर क्र. 1)**" या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ज्ञांचे अभिप्राय विचारात घेऊन, आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

उत्तरतालिका - KEY

प्रश्न क्रमांक	संच A	संच B	संच C	संच D	प्रश्न क्रमांक	संच A	संच B	संच C	संच D
1	1	2	3	3	26	1	3	3	1
2	2	3	2	2	27	3	4	2	4
3	3	2	3	3	28	4	1	1	4
4	2	3	2	3	29	1	2	4	3
5	4	3	3	3	30	2	3	3	1
6	1	2	1	1	31	3	1	1	3
7	3	4	2	2	32	1	4	1	4
8	3	2	4	2	33	4	1	3	3
9	3	2	2	2	34	1	1	4	1
10	2	1	2	2	35	1	4	3	4
11	2	3	3	1	36	3	3	2	2
12	2	1	1	4	37	4	2	1	3
13	#	2	#	1	38	4	1	2	4
14	4	4	1	4	39	4	4	4	2
15	4	1	4	2	40	2	4	1	4
16	2	#	2	2	41	1	1	2	1
17	2	4	2	1	42	4	2	4	1
18	1	1	4	#	43	2	4	4	4
19	2	1	1	4	44	2	2	4	2
20	1	2	4	1	45	3	3	3	3
21	4	4	4	4	46	1	4	1	4
22	1	4	2	2	47	2	1	2	4
23	4	2	1	4	48	1	1	3	4
24	4	3	1	1	49	3	2	4	1
25	3	4	4	2	50	4	1	1	1

 # ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

प्रश्न क्रमांक	उत्तरे				प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D		संच A	संच B	संच C	संच D
51	4	3	4	1	76	3	#	3	1
52	2	#	1	3	77	3	3	3	1
53	1	2	#	3	78	1	3	3	4
54	#	4	4	#	79	1	3	#	2
55	4	4	2	2	80	3	2	2	2
56	3	3	3	2	81	1	2	3	1
57	2	3	1	3	82	3	3	3	3
58	1	2	3	4	83	#	1	1	#
59	4	3	3	3	84	1	1	3	3
60	4	3	2	3	85	2	4	2	2
61	3	4	2	2	86	4	#	4	1
62	4	1	4	4	87	2	3	2	3
63	3	2	3	2	88	3	1	1	4
64	2	2	2	2	89	2	2	1	1
65	3	4	2	2	90	2	1	2	2
66	2	4	4	4	91	1	2	3	3
67	2	2	4	1	92	3	3	3	3
68	1	1	3	3	93	2	4	2	1
69	1	3	1	3	94	4	3	3	2
70	1	1	#	1	95	2	3	4	2
71	3	3	1	#	96	3	2	1	2
72	#	4	1	1	97	1	2	1	4
73	1	1	1	1	98	3	1	2	1
74	3	1	4	3	99	3	3	2	3
75	4	1	1	3	100	2	2	3	3

11th **June**, 2020

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

A → संच क्रमांक

2019

U13

प्रश्नपुस्तिका क्रमांक
BOOKLET NO.

प्रश्नपुस्तिका - II

स्थापत्य अभियांत्रिकी पेपर - 2

वेळ : 2 (दोन) तास

एकूण प्रश्न : 100

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 हा चौकोनांत
न विसरता बॉल्पेनने लिहावा.

परीक्षा-क्रमांक

↑ केंद्राची संकेताक्षरे

↑ शेवटचा अंक

(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 बॉल्पेन 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 दिलेल्या चार उत्तरांपैकी सर्वात योग्य 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

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

1. The areas enclosed by the contours in a lake are as follows :

   Contour (m)   270 275 280 285 290

   Area (m²)   50   200 400 600 750

   The volume of water between the contours 270 m and 290 m by trapezoidal formula is _____.

   (1) 6400 m³   (2) 8000 m³   (3) 16000 m³   (4) 24000 m³

---

2. The R.L. of A is 98.75 m and the R.L. of B is 100.75 m. The horizontal distance between A and B is 10.0 m. If the contour interval is 0.25 m, the distance of 99.00 m contour line from A is _____.

   (1) 0.25 m   (2) 1.25 m   (3) 2.0 m   (4) 2.5 m

---

3. When the height of signal is not the same as that of the height of instrument, then a correction applied for measurement is known as :

   (1) Curvature correction   (2) Combined correction

   (3) Axis signal correction   (4) Refraction correction

---

4. If h is the height above datum of the object, H be the flying height above datum and r be the radial distance of the image of the object from principal point, then the relief displacement d is equal to :

   (1) $d = \dfrac{r.h}{H}$ (2) $d = \dfrac{r.H}{h}$ (3) $d = \dfrac{H.h}{r}$ (4) $d = \dfrac{r}{H}$

---

5. In surveying optical square is used to setting out right angles. The horizon glass is placed at an angle of _____ with the horizon sight and index glass is placed at an angle of _____ with the index sight.

   (1) 30° and 15°   (2) 60° and 45°   (3) 90° and 75°   (4) 120° and 105°

---

6. If an upgrade of +1.4% joins another upgrade of +0.4% and rate of change of grade is 0.1% per 20 m chain, then the length of vertical curve is :

   (1) 200 m   (2) 360 m   (3) 400 m   (4) 80 m

---

7. A rectangular plot of land of area 0.45 hectare is represented on a map by a similar rectangle of area 5 cm². Calculate R.F. of the scale of the map. Draw a scale to read upto a single metre from the map.

   (1) 1 : 5000 (2) 1 : 8000 (3) 1 : 9000 (4) 1 : 3000

8. Two points A and B were fixed on opposite bank of a river. The level was setup near A and the staff readings on A and B were observed as 1.800 m and 1.300 m, respectively. Thereafter, level was setup near B and staff readings observed on B and A were found to be 0.350 m and 0.850 m, respectively. If the R.L. of A is 101.500 m, then R.L. of B is :

   (1) 102.0 m (2) 101.0 m (3) 100.0 m (4) 100.450 m

9. The combined correction due to curvature and refraction in (m) for a distance of 2 kilometer is :

   (1) 0.224 m (2) 0.1346 m (3) 0.1570 m (4) 0.1750 m

10. In tacheometric surveying :

    (a) The intercept of the staff is maximum when the staff is normal to the line of sight.

    (b) In the tangential system, the staff is kept normal to the line of sight.

    (c) If a tacheometer is fitted with an anallatic lens, its additive constant is non zero.

    (d) It is more convenient to hold the staff normal to the line of sight than to hold it vertical.

    Select the **incorrect** statement/statements from the above.

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

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

11. Generally how much amount is provided in estimate as work charged establishment ?

    (1) 1 - 2% (2) $1 - 1\frac{1}{2}\%$ (3) $2 - 2\frac{1}{2}\%$ (4) 2 - 4%

12. In rate analysis procedure, by what % the wet volume of concrete is to be increased for determining dry volume ?

    (1) 20% (2) 30% (3) 52% (4) 25%

13. Capitalised value of a property fetching a net annual rent of ₹ 1,000 and highest rate of interest prevailing being 10% will be :

(1) 1,000 (2) 1,00,000 (3) 10,000 (4) 100

14. In the Centre Line Method of calculating quantities, the following rules for each item from foundation is applied. The total centre line length of each item is calculated and for cross walls, deductions are made as follows :

(1) ½ breadth of item at each junction (2) 1 full breadth of item at each junction

(3) 2 full breadth of item at each junction (4) no deductions

15. Which value is obtained by dismantling the building ?

(1) Book Value (2) Distress Value (3) Salvage Value (4) Scrap Value

16. The sanction of detailed estimate design calculation, quantities of work, rates and cost of the work by competent authority is called as :

(1) Administrative approval (2) Technical sanction

(3) Expenditure sanction (4) Official sanction

17. Determine the capital sum to be invested to receive annual income of ₹ 1 lakh, if the rate of interest is 5%.

(1) ₹ 50 lakh (2) ₹ 20 lakh (3) ₹ 100 lakh (4) ₹ 10 lakh

18. Which of the following methods is also called as out to out and in to in method ?

(1) Long wall and short wall method (2) Centre line method

(3) Plinth area method (4) Cubic content method

19. Detailed specification for an item of P.C.C. (1 : 2 : 4) should include following points :

(1) Quantity of material, cost of different materials, work condition.

(2) General specification, materials to be used, quality and proportion, construction method, items to include/exclude, and mode of measurement and payment.

(3) Work conditions at site, BIS requirements, labour requirement and its cost.

(4) Sources of materials, instructions by PWD, labour requirement.

20. A load of 625 T is imposed on a footing of size 2 m × 2 m.

If it is to be assumed that, stress at depth "d" is spread out at an angle of 2 vertical to 1 horizontal, find out the depth 'd' at which the intensity of stress will be $\left(\dfrac{1}{9}\right)^{th}$ of the stress at ground level.

Choose **correct** depth in metres from the following :

(1)   2 m   (2)   3 m   (3)   4 m   (4)   5 m

21. An embankment in clayey soil of 5 m height is to be constructed using factor of safety of 2.5. It is to be assumed that stability number is $\dfrac{1}{45}$ and unit weight of soil is 18 kN/m³. Find the minimum cohesive strength (in kN/m²) which the soil should have.

Choose **correct** answer from the following :

(1)   30   (2)   5   (3)   10   (4)   15

22. From the plate load test, the ultimate bearing capacity of plate of size 0.3 m × 0.3 m on sand deposit is observed to be 200 kN/m², the ultimate bearing capacity of a footing of size 1.5 m × 1.5 m will be :

(1)   200 kN/m²   (2)   1000 kN/m²   (3)   500 kN/m²   (4)   2000 kN/m²

23. In a rock core sampling method at site, the total length of drilling was 1.0 m in rocky strata. There were five intact pieces of rocks of lengths 150 mm, 200 mm, 75 mm, 50 mm, and 200 mm were collected. The value of Rock Quality Designation (RQD) for the rock sample is :

(1)   55.0%   (2)   67.5%   (3)   62.5%   (4)   40.0%

24. Poisson's ratio of a soil sample is 0.4. Using theory of elasticity, the estimated value of the coefficient of lateral earth pressure at rest in the same soil is :

(1)   0.5   (2)   0.7   (3)   0.3   (4)   1.0

25. If a concentrated load Q produces a stress of 40 kN/m² at a depth of 1 m, then the stress at 2 m depth and same radial distance will be :

(1)   20 kN/m²   (2)   80 kN/m²   (3)   40 kN/m²   (4)   10 kN/m²

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

26. Amount of compaction greatly affects :

    (1) Water content and Maximum dry density

    (2) Saturation of soil

    (3) None of the above

    (4) All of the above

27. A pile having a square cross-section of 0.5 m sides has length of 10 m. It is embedded in purely cohesive soil having uniform cohesion of 50 kN/sq. m upto 10 m depth. If adhesion factor = 0.5, the ultimate capacity of the pile considering only skin friction component will be :

    (1) 500 kN   (2) 125 kN   (3) 250 kN   (4) 200 kN

28. During unconfined compression test a soil sample failed at 150 N. The cross-sectional area of sample at failure was 2000 mm^2, then the shear strength of soil will be :

    (1) 75 kN/m^2 (2) 375 kN/m^2 (3) 133 kN/m^2 (4) 37.5 kN/m^2

29. Two reservoirs are connected by two pipes M and N of identical diameter and length, in parallel. If the friction factor of M is 04 times that of N, the ratio of discharge in M to that of N is :

    (1) 0.50   (2) 0.25   (3) 2.0   (4) 4.0

30. Bernoulli's equation is derived making assumptions that :

    (1) The flow is uniform and incompressible.

    (2) The flow is non-viscous, uniform and steady.

    (3) The flow is steady, non-viscous, incompressible and irrotational.

    (4) None of the above.

31. In a suppressed rectangular weir, the calculated discharge was found to be 3% in excess of the actual discharge. If this discrepancy was due to an error in reading the head, the measured head was :

    (1) 3% excess   (2) 2% less   (3) 2% excess   (4) 1.5% excess

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

32. A uniform body 3 m long, 2 m wide and 1 m deep floats in water. If the depth of immersion is 0.60 m, then the weight of the body is :

    (1)   3.53 kN   (2)   33.5 kN   (3)   35.31 kN   (4)   none of these

33. For a laminar flow through circular pipe, the maximum velocity is equal to _____ .

    (1)   1.5 times the average velocity   (2)   2.0 times the average velocity

    (3)   2.5 times the average velocity   (4)   None of the above

34. Coefficient of contraction is the ratio of :

    (1)   actual velocity of jet at Vena contracta to the theoretical velocity.

    (2)   loss of head in the orifice to the head of water available at the exit of the orifice.

    (3)   actual discharge through an orifice to the theoretical discharge.

    (4)   area of jet at Vena contracta to the area of orifice.

35. Model analysis of aeroplanes and projectile moving at supersonic speed is based on _____ .

    (1)   Reynold Number   (2)   Froude Number

    (3)   Mach Number   (4)   Euler Number

36. A dimensionless group formed with variables :

ρ (mass density), μ (dynamic viscosity), g (gravitational acceleration) and D (characteristic length) is :

    (1) $\dfrac{D^{3/2}}{\rho\mu g}$ (2) $\dfrac{\mu}{\rho g^{1/2} D^{3/2}}$ (3) $\dfrac{\mu}{\rho g D^{3/2}}$ (4) $\dfrac{\mu}{\rho^{1/2} D g^{1/2}}$

37. In a rectangular channel, carrying a certain discharge at a depth Y_0 and Froude number F_0, then $Y_c/Y_0 =$

    (1) F_0 (2) $F_0^{1/2}$ (3) $F_0^{3/2}$ (4) $F_0^{2/3}$

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

38. In a reciprocating pump without air vessel, the friction head in the delivery pipe is maximum at the crank angle $\theta = $?

   (1) 0°   (2) 90°   (3) 135°   (4) 180°

39. An air vessel in the delivery side of a reciprocating pump :

   (1) maintains steady discharge output.

   (2) prevents cavitation in the system.

   (3) enables suction head to be increased.

   (4) enables the pump to run at higher speed.

40. For double acting reciprocating pump, there will be no flow into or from the air valve, when the crank angle is :

   (1) 39° 32' and 140° 28'   (2) 39° 32 to 140° 28'

   (3) 0° to 39° 32'   (4) 18° 34' to 161° 26'

41. The specific speed of a centrifugal pump has the dimensions of :

   (1) $L^{3/4} T^{-3/2}$ (2) $M^0 L^0 T^0$

   (3) $M^{-1/2} L^{1/2} T^{-1/4}$ (4) $L^{3/4} T^{-1/2}$

42. The work saved by fitting an air vessel to a double acting reciprocating pump is :

   (1) 39.2%   (2) 84.8%   (3) 48.8%   (4) 92.3%

43. Match the pair :

   (a) Run of river plant   (i) Large storage

   (b) Reservoir plant   (ii) Water pumped back to the head water tank

   (c) Pumped storage plant   (iii) Sea water

   (d) Tidal plant   (iv) No storage

   Answer Options :

	(a)	(b)	(c)	(d)
(1)	(iii)	(i)	(iv)	(ii)
(2)	(iv)	(ii)	(iii)	(i)
(3)	(iv)	(i)	(ii)	(iii)
(4)	(iv)	(iii)	(i)	(ii)

44. Kaplan turbine is a propeller turbine in which the vanes fixed on the hub are :

    (1) non-adjustable   (2) adjustable

    (3) fixed   (4) none of the above

45. The cylindrical bore diameter of a single acting reciprocating pump is 200 mm and its stroke is 400 mm. The pump runs at 60 rpm. The theoretical discharge for pump in litre per second is :

    (1) 0.01256   (2) 12.56   (3) 1.256   (4) 0.1256

46. Which of the following statement is **correct** ?

    (1) Centrifugal pump convert hydraulic energy into mechanical energy.

    (2) Reciprocating pumps convert mechanical energy into hydraulic energy by means of centrifugal force.

    (3) Centrifugal pumps convert mechanical energy into hydraulic energy by means of centrifugal force.

    (4) Reciprocating pumps convert hydraulic energy into mechanical energy.

47. The design flood commonly adopted in India for spillways of major projects is the :

    (1) Standard Project Flood.   (2) Flood with a Return Period of 100 years.

    (3) Probable Maximum Flood.   (4) Flood with a Return Period of 10,000 years.

48. The Thiessen polygon is :

    (1) a polygon obtained by joining adjoining raingauge station.

    (2) a representative area used for weighing the observed station precipitation.

    (3) an area used in the construction of depth-area curve.

    (4) the descriptive term for the shape of hydrograph.

49. In a flow-mass curve study, the demand line drawn from a ridge in the curve did not intersect the mass curve again. This represents that :

    (1) the reservoir was not full at the beginning.

    (2) the storage was not adequate.

    (3) the demand cannot be met by the inflow as the reservoir will not refill.

    (4) the reservoir is wasting water by spill.

50. An instantaneous unit hydrograph is a direct run-off hydrograph :

    (1) of 1 cm magnitude due to a rainfall excess of 1 - h duration.

    (2) that occurs instantaneously due to a unit rainfall excess of duration 'D' h.

    (3) of unit rainfall excess precipitating instantaneously over the catchment.

    (4) occurring at any instant in a long storm.

51. Evaporation losses from surface of a reservoir can be reduced by sprinkling :

    (1) DDT   (2) Acetyl alcohol

    (3) Potassium permanganate   (4) None of the above

52. Dalton's law is given as :

    (1) $E_L = C[e_s + e_a]$ (2) $E_L = C[e_a - e_s]$

    (3) $E_L = C[e_s - e_a]$ (4) $E_L = C[e_s + e_w]$

53. Direct run-off is made up of :

    (1) Surface run-off, prompt interflow and channel precipitation.

    (2) Surface run-off, infiltration and evapotranspiration.

    (3) Overland flow only.

    (4) Rainfall and Evaporation.

54. The Rainfall Intensity of Light Rain is :

    (1) Upto 2.5 mm/Hz   (2) Upto 3.0 mm/Hz

    (3) Upto 5.00 mm/Hz   (4) Upto 7.5 mm/Hz

55. A plot between rainfall intensity versus time is called as :

    (1) hydrograph   (2) mass curve   (3) hyetograph   (4) isohyet

56. Which of the following is known as 'feeding bottle technique' ?

    (1) Drip Irrigation   (2) Sprinkler Irrigation

    (3) Furrow Method   (4) None of the Above

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57. This type of dam requires strong abutment :

   (1) Gravity   (2) Buttress   (3) Arch   (4) All above

58. Given that the base period is 100 days and the duty of the canal is 1000 hectares per cumec, the depth of water will be :

   (1) 0.864 cm   (2) 8.64 cm   (3) 86.4 cm   (4) 864 cm

59. In Bligh Creep Theory [L/H] is called as :

   (1) Creep Length   (2) Hydraulic Gradient

   (3) Coefficient of Creep   (4) Percolation Coefficient

60. For the upstream face of an earthen dam, the most adverse condition for stability of slope is :

   (1) sudden drawdown   (2) steady seepage

   (3) during construction   (4) sloughing of slope

61. Mean Water Training means :

   (1) Training for discharge   (2) Training for depth

   (3) Training for sediment   (4) Training for flood

62. In spillway, when the tail water depth is less than the sequent depth and river bed is composed of stiff rock, which one of the following energy dissipation device is preferred ?

   (1) Solid roller bucket   (2) Slotted roller bucket

   (3) Ski jump bucket   (4) Stilling basin

63. The main cause of meandering is :

   (1) presence of an excessive bed slope in the river.

   (2) degradation.

   (3) the extra turbulence generated by the excess of river sediment during floods.

   (4) none of the above.

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64. Lacey gave V - Q - f relation as :

(1) $V = \left[\dfrac{Qf^2}{160}\right]^{1/4}$ (2) $V = \left[\dfrac{Qf^2}{140}\right]^{1/6}$

(3) $V = \left[\dfrac{fQ^2}{160}\right]^{1/4}$ (4) $V = \left[\dfrac{Qf}{140}\right]^{1/6}$

65. Which of the following method is recommended by I.R.C. for design of flexible pavement ?

(1) Group index method (2) Westergaard method

(3) CBR method (4) None of these

66. In case of pavement design :

Match the **List - I (Type of carriageway)** with **List - II (Lane distribution factor)** :

	List - I		List - II
(a)	Undivided roads with two lane carriageway	(i)	0.75
(b)	Undivided roads with single lane carriageway	(ii)	1.0
(c)	Divided carriageway with four lanes each	(iii)	0.45
(d)	Undivided roads with four lane carriageway	(iv)	0.40

Answer Options :

	(a)	(b)	(c)	(d)
(1)	(ii)	(i)	(iv)	(iii)
(2)	(i)	(ii)	(iii)	(iv)
(3)	(iii)	(iv)	(i)	(ii)
(4)	(iv)	(iii)	(ii)	(i)

67. As per current Viscosity Graded (VG) bitumen specifications in India (IS 73 : 2006, Third revision) the Absolute Viscosity of bitumen using vacuum capillary tube viscometer is determined at _____ temperature.

(1) 135°C (2) 25°C (3) 27°C (4) 60°C

68. The super-elevation is _____.

    (1) directly proportional to the velocity of vehicles

    (2) inversely proportional to the velocity of vehicles

    (3) directly proportional to the width of pavement

    (4) inversely proportional to the width of pavement

---

69. Match the pair :

    (a) Penetration test   (i) Hardness property of stones

    (b) Plate bearing test   (ii) Hardness or softness of bitumen

    (c) CBR test   (iii) Penetration test for highway material

    (d) Abrasion test   (iv) Modulus of subgrade reaction

    Answer Options :

	(a)	(b)	(c)	(d)
(1)	(iii)	(iv)	(i)	(ii)
(2)	(ii)	(iv)	(iii)	(i)
(3)	(ii)	(iv)	(i)	(iii)
(4)	(ii)	(iii)	(i)	(iv)

---

70. Which of the following statement is/are **correct** ?

    (a) Penetration test on bitumen is carried out at 27°C.

    (b) Ductility test on bitumen is carried out at 27°C.

    (c) In softening point test on bitumen, rate of increase of temperature is 2°C per minute.

    (d) The rate of pulling of standard briquette mould specimen in ductility test is 15 mm per minute.

    Answer Options :

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

---

71. The free mean speed on a roadway is found to be 70 kmph. Under stopped condition the average spacing between vehicles is 5.0 m. The capacity flow is :

    (1) 3500 vehicles/hour/lane   (2) 3700 vehicles/hour/lane

    (3) 3200 vehicles/hour/lane   (4) 3000 vehicles/hour/lane

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72. If 'R' is the radius of curvature of a hill road, the maximum grade compensation (in percentage) is equal to :

(1) 65/R   (2) 75/R   (3) 85/R   (4) 95/R

---

73. In a particular case, the design gradient is 1 in 25. If a horizontal curve of 100 m radius is to be introduced on this gradient, the compensated gradient on this curve is _____.

(1) 0.75%   (2) 1.3%   (3) 2.7%   (4) 3.25%

---

74. In case of erection of multiple span truss bridges symmetrical about centre line, the erection is started from _____ until the centre is reached.

(1) Left end   (2) Both ends

(3) Right end   (4) None of the above

---

75. If the nature of river is at a moderate bent condition then maximum V depth of scour is taken as :

(1) 1.25 D   (2) 1.75 D   (3) 1.5 D   (4) 2 D

---

76. The effective span for main girder in case of bridges is :

(1) the distance between centres of main girders.

(2) the distance between centres of cross girders.

(3) the distance between centres of road bearings.

(4) the distance between centres of bearing plates.

---

77. In which of the following type of Abutments, wing walls are not provided :

(1) Gravity Abutments   (2) U - Abutments

(3) Tee - Abutments   (4) Abutment Pier

---

78. While designing highway bridges, the wind load acting on any exposed moving live load will be assumed to act at a height of _____ above the roadway.

(1) 1.0 m   (2) 1.2 m   (3) 1.5 m   (4) 1.75 m

---

79. As per IRC recommendations the minimum straight length of approaches on either side of the bridge should be _____.

    (1)   15 m   (2)   20 m   (3)   25 m   (4)   30 m

80. For IRC Class A loading train, the nose to tail spacing between two successive trains shall not be less than _____.

    (1)   12.5 m   (2)   15.5 m   (3)   17.5 m   (4)   18.5 m

81. The width of carriageway is expressed in terms of traffic lanes, each lane meaning the width required to accommodate one train of _____ vehicles.

    (1)   Class A   (2)   Class B   (3)   Class C   (4)   Class 70 R

82. The effective linear waterway in meters is given by :

    (1) $L = 0.75\ V^2$ (2) $L = C\sqrt{Q}$

    (3) $L = 1.811\ C\sqrt{Q}$ (4) $L = CQ^2$

83. Which of the following is **not** a patented explosive available in the market for tunnelling operations ?

    (1)   PENT   (2)   RDX   (3)   TNT   (4)   NTT

84. Which shape of tunnel is suitable for the purpose of navigation ?

    (1)   Circular Shape   (2)   D Shape

    (3)   Horse-shoe Shape   (4)   Rectangular Shape

85. Which of the following method of tunnelling is being gradually replaced by compressed air tunnelling method ?

    (1)   Needle beam method   (2)   Belgian method

    (3)   Heading and Bench method   (4)   Forepoling method

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86. Which section of tunnel is also known as segmental root section tunnel ?

(1) D section   (2) Egg Shaped Section

(3) Circular section   (4) Rectangular Section

87. Which one of the following methods of tunnelling is used in hard rocks ?

(1) Fore poling method   (2) Needle beam method

(3) Heading and Benching method (4) Shield tunnelling method

88. With reference to tunnelling which of the following factors, are to be considered for deciding the size of the shaft :

(1) System used for hoisting   (2) Size of the muck car

(3) Quantity of muck to be lifted (4) Eventual use of the shaft

89. The tunnelling method that is **not** suitable in case of soft soil is :

(1) Needle beam method   (2) Full face method

(3) Fore poling method   (4) Liner plate method

90. The procedure of removal of rock protrusions by hammering immediately after the blasting is known as :

(1) Mucking   (2) Skimming   (3) Trimming   (4) Scaling

91. Which one of the following Drift method is time consuming but provides good ventilation ?

(1) Top Drift Method   (2) Bottom Drift Method

(3) Centre Drift Method   (4) Side Drift Method

92. If the sewer is to be designed for the non-scouring velocity of 5 m/sec, which among the following material would you recommend ?

(1) Cast iron sewer   (2) Glazed brick sewer

(3) Stone ware sewer   (4) Cement concrete sewer

93. Select the **incorrect** pair from the following pairs of treatment unit and impurities removed, in waste water treatment system :

    (a) Grit chamber   - Sand, silt

    (b) Aeration tank   - Suspended impurities

    (c) Skimming tank   - Fat and Grease

    (d) Screen   - Cloth, paper

    Answer Options :

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

94. Carbon monoxide is considered as most poisonous gas in Urban areas because :

    (1) It causes loss of sense of smell.

    (2) It is carcinogenic in nature.

    (3) It reduces oxygen carrying capacity of blood.

    (4) It may cause conjunctivitis.

95. The ideal pathogenic indicator used for bacterial analysis of water is exhibited by the organism :

    (1) Escherichia coli   (2) Entamoeba histolytica

    (3) Salmonella typhi   (4) Vibro comma

96. In water treatment process, aeration of water is carried out to :

    (1) remove hardness and chlorides from water.

    (2) add calcium and magnesium to water.

    (3) remove gases like carbon dioxide, hydrogen sulfide and to add oxygen to water.

    (4) remove oxygen from water and to add carbon dioxide to impart test and odour to water.

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97. The unit in which both sedimentation and digestion take place simultaneously is the :

    (1) Detritus tank   (2) Imhoff tank

    (3) Skimming tank   (4) Clarifier

98. The sag in the dissolved oxygen curve results because of DO is a function of :

    (1) Both addition and depletion of oxygen from the stream.

    (2) The rate of addition of oxygen to the solution.

    (3) The rate of addition of oxygen is linear, but not that of depletion.

    (4) The rate of organic substances introduced in the process.

99. Alum as a coagulant is found to be effective between pH range of _____.

    (1) 8.0 to 10.0   (2) 8.5 to 10.5   (3) 6.5 to 8.5   (4) 7.0 to 9.0

100. In an oxidation pond, the sewage is made non-putrescible primarily by :

    (1) Algae bacteria symbiosis only.

    (2) Bacterial oxidation only.

    (3) Chemical oxidation only.

    (4) Algae photosynthesis and algae bacteria symbiosis.

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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 परीक्षाकक्षाबाहेर घेऊन जाण्यास परवानगी आहे. **मात्र परीक्षाकक्षाबाहेर 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 प्रश्नक्रमांकासमोरील संबंधित वर्तुळ पूर्णपणे छायांकित करून दाखवावा. **ह्याकरिता फक्त काळ्या शाईचे बॉलपेन वापरावे, पेन्सिल वा शाईचे पेन वापरू नये.**

कच्च्या कामासाठी जागा/SPACE FOR ROUGH WORK

महाराष्ट्र लोकसेवा आयोगामार्फत " **महाराष्ट्र स्थापत्य अभियांत्रिकी सेवा (मुख्य) परीक्षा-2019 (स्थापत्य अभियांत्रिकी पेपर क्र. 2)**" या स्पर्धा परीक्षेच्या प्रश्नपत्रिकेची प्रथम उत्तरतालिका उमेदवारांच्या माहितीसाठी संकेतस्थळावर प्रसिध्द करण्यात आली होती. त्यासंदर्भात उमेदवारांनी अधिप्रमाणित (Authentic) स्पष्टीकरण / संदर्भ देऊन पाठविलेली लेखी निवेदने, तसेच तज्ज्ञांचे अभिप्राय विचारात घेऊन, आयोगाने उत्तरतालिका सुधारित केली आहे. या उत्तरतालिकेतील उत्तरे अंतिम समजण्यात येतील. यासंदर्भात आलेली निवेदने विचारात घेतली जाणार नाहीत व त्याबाबत कोणताही पत्रव्यवहार केला जाणार नाही, याची कृपया नोंद घ्यावी.

उत्तरतालिका - KEY

प्रश्न क्रमांक	संच A	संच B	संच C	संच D	प्रश्न क्रमांक	संच A	संच B	संच C	संच D
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3	3	4	#	4	28	4	1	2	2
4	1	1	3	1	29	1	3	4	1
5	4	1	1	4	30	3	2	3	4
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21	2	#	3	2	46	3	2	1	2
22	2	1	#	2	47	3	1	3	3
23	1	2	2	4	48	2	3	1	3
24	2	2	4	#	49	3	3	1	3
25	#	2	2	1	50	3	3	3	2

ने दर्शविलेले प्रश्न रद्द करण्यात आलेले आहेत.

प्रश्न क्रमांक	उत्तर				प्रश्न क्रमांक	उत्तरे			
	संच A	संच B	संच C	संच D		संच A	संच B	संच C	संच D
51	4	3	2	1	76	4	3	1	1
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56	1	3	2	2	81	1	4	3	2
57	#	1	#	3	82	2	2	1	2
58	3	#	1	#	83	4	4	3	4
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67	4	2	1	2	92	2	2	2	3
68	1	2	2	3	93	4	2	3	1
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71	1	2	4	2	96	3	4	3	4
72	2	4	1	4	97	2	4	3	4
73	4	3	3	2	98	1	1	2	2
74	2	2	4	3	99	3	1	4	3
75	3	3	2	4	100	4	3	4	3

11th June, 2020

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