વિષયકોડ – **ESM 1** (વર્ણનાત્મક)

ગુજરાતી (મુખ્ય પરીક્ષા)

પ્રશ્નપત્ર

પ્રશ્ન : ૦૧ :

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 20

નીચે આપેલ ત્રણ વિકલ્પોમાંથી કોઈ એક મુદ્દા પર ઓછામાં ઓછા ૨૫૦ અને વધુમાં વધુ ૩૦૦ શબ્દોમાં, યોગ્ય ઉદાહરણોનો આધાર લઈને નિબંધ લખો. (૨૦ ગુણ)

૧.૧ તાંત્રિક વિદ્યાશાખાઓના સ્નાતકોનું બિનતાંત્રિક કાર્યક્ષેત્રોમાં સ્થાનાંતરણ– કારણો અને પરિણામો

૧.૨ શહેરી કચરાના નિકાલની પર્યાવરણ જાણવળીના સંદર્ભે શું વ્યવસ્થા થઈ શકે?

૧.૩ ભારતીય સ્થાપત્ય અને બાંધકામ કલાનો વિકાસ – પ્રાચીનથી અર્વાચીન સમયના સંદર્ભે

પ્રશ્ન : ૦૨ :

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

નીચેનાં બે વિકલ્પોમાંથી કોઈ પણ એક પંક્તિનો આશરે ૧૦૦ શબ્દોમાં વિચારવિસ્તાર કરો.

૨.૧ "આપવામાં જ આપણને મળે છે; ક્ષમા કરવામાં જ આપણે ક્ષમા પામીએ છીએ." – સંત ફ્રાન્સિસ

૨.૨ "જિંદગીના રસની પીવામાં કરો જલદી, 'મરીઝ'
એક તો ઓછી મદિરા છે, ને ગળતું જામ છે." - મરીઝ

પ્રશ્ન : ૦૩ :

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

નીચે આપેલ ગદ્યખંડનો (૧૮૦ શબ્દો), મૂળ વિચાર જળવાઈ રહે એ રીતે લગભગ ૧/૩ ભાગમાં (૬૦ શબ્દોમાં) સંક્ષેપ કરો. *

જીવનમાં સાહિત્યકલાને ઘણું ઊંચું સ્થાન છે. અને તેમ છતાં સાહિત્યસેવન, કાવ્યાનુભવ, એ જીવનનું એક જ ધ્યેય નથી, તેમ જ તે સૌથી ઉન્નત ધ્યેય પણ નથી. જીવનનું ઉન્નત ધ્યેય પોતે ઉન્નતિ, વિશાલતા, જાગૃતિ, નિર્ભયતા સિધ્ધ કરવી એ છે. અમુક કાવ્યના પરિમિત અનુભવમાં પૂર્ણતા મન સમક્ષ વ્યક્ત થાય એટલાથી કૃતાર્થ થઈ શકાતું નથી. એ પૂર્ણતા સમસ્ત જીવનમાં સિધ્ધ કરવી જોઈએ. અને તે તરફ જવાનો માર્ગ વાસ્તવિક જીવન સોંસરો પડેલો છે. વાસ્તવિક જીવનના ઉપસ્થિત પ્રસંગોએ નિર્ભયતા, વિશાલતા સેવતાં સેવતાં જ એ સિધ્ધિઓ પ્રાપ્ત થઈ શકે છે. એવા પ્રસંગો જતા કરીએ, એવા પ્રસંગોએ ખસી જઈએ, તો એ પ્રસંગનું કામ કોઈ કાવ્ય કરી શકશે નહીં. બહાદુરી કરવાને પ્રસંગે ફરજમાંથી ખસી જઈએ તો એ પ્રસંગનું ફળ વીરરસકાવ્ય-વાચનથી કે વીરરસના નૃત્યથી નથી મળવાનું. ફળ નથી મળવાનું એટલે વ્યાવહારિક ફળ નથી મળવાનું એ તો દેખીતું જ છે. પણ બહાદુરના કૃત્યથી આત્માની જે ઉન્નતિ થવાની હતી તે વીરરસકાવ્ય-વાચનથી નથી થવાની. ઊલટું, બહાદુરનો પ્રાપ્ત પ્રસંગ જવા દીધો, ચેતનની સ્ફૂર્તિની એક તક ગુમાવી, એથી ચેતન એટલું ઓસર્યું, અને પછી એ ક્રિયાને ફરી અટકાવીએ નહીં તો એ ઓસરતું જ જવાનું. એ ચેતન પછી કાવ્ય દ્વારા પણ વીરરસનો અનુભવ કરવાને એટલું નાલાયક બનવાનું.

'સાહિત્ય અને જીવન' – રામનારાયણ પાઠક

(સાહિત્યવિમર્શ પુસ્તક – ૧૯૩૯)

પ્રશ્ન : ૦૪ :

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

નીચે આપેલ ગદ્યખંડની સઘન વાચના કરી પ્રશ્નોના ઉત્તરો આપો. (૨ ગુણ × ૫ પ્રશ્નો) *

વિદ્યાર્થી વિદ્યાનો અર્થી હોય તો શિસ્તના ને એવા પ્રશ્નો પછી રહેશે નહીં. પણ આજે રાજકારણી નેતાઓ પોતે જે ધ્યેય રજૂ કરે છે એની આગળ આ શાળા-કૉલેજનાં ભણતર કોડીના હિસાબમાં નથી. આજે એ ધ્યેય પાછળ લાગી જઈએ; વિદ્યા એવી શી ચીજ છે – કાલે પછી મેળવી લઈશું, એવી વાતો તેઓ બેધડક રીતે કરે છે. ભૂતકાળમાં કે અત્યારે કોઈ પણ સાધારણ રીતે સ્વસ્થ ગણી શકાય એવો સમાજ બતાવશો, જેમાં વિદ્યાર્થીઓને વિદ્યા સિવાય બીજી કોઈ વસ્તુને પ્રદાન લેખવા કહેવામાં આવતું હોય? આજે આપણા દેશમાં વિદ્યા તરફ એક જાતની ધીટતાભરી નફરત જોવા મળે છે. પછી શિસ્ત માટે લાખો-કરોડોની યોજનાઓ વેતરવા આપણે બેસીએ છીએ. શિસ્ત એ આંતરનિયમન હોય તો જ એની કશી કિંમત છે. એ આંતરનિયમનને સંચારિત કરવાનો – સક્રિય બનાવવાનો સર્વોત્તમ માર્ગ તે વિદ્યાર્થી અને શિક્ષકનો પરસ્પર સંપર્ક છે.

આજનો વિદ્યાર્થી પોતાની પાછળ જેટલું ખર્ચ કરે છે તેમાંનો કેટલો ભાગ શારીરિક પોષણ પાછળ ખર્ચાય છે, અને જે ખર્ચાય છે તેનું વળતર પૂરેપૂરું મળે છે કે કેમ, તે વિચારવા જેવું છે. એકંદર એના આખા જીવનમાં આનંદ જેવું કેટલું છે? આજે વિદ્યાર્થીની નિરાનંદસ્વામી સમી સૂરત જોઈને છાતી બેસી જાય છે. કાં તો આનંદ પાછળ હવાતિયાં મારતો ક્યારેક એ જોવા મળે છે – જે પણ ભારે ચિંતાનો વિષય છે. સમૂહ-રમતોનો પ્રચાર હજી ઘણો વધવો જોઈએ. તે ઉપરાંત, પ્લેટોએ કેળવણીમાં વ્યાયામ અને સંગીતની હિમાયત કરી છે તેનું સ્મરણ કરીને ગંભીરપણે, હું સમૂહનૃત્ય અને સમૂહસંગીતની સૂચના કરવાની હિંમત કરું છું. સમાજજીવનમાંથી ઉત્સવો લુપ્તપ્રાય થયા છે. આપણાં લોકનૃત્યો અને લોકસંગીત પ્રજાસત્તાક-દિને દિલ્હીમાં રજૂ કરવાની દેખાવની વસ્તુઓ જ નથી. રોજિંદા જીવનમાં એનું મહત્ત્વનું સ્થાન છે. દા.ત. કાઠિયાવાડની ગરબી જે જુવાન સમૂહમાં ગાઈ-ખેલી શકે છે તેના લોહીના લયમાં આપોઆપ ભારેની શિસ્ત ધબકવાની.

આજનો વિદ્યાર્થી – ઉમાશંકર જોશી

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૪.૧ આજના વિદ્યાર્થીના કયાં વલણની લેખક ટીકા કરે છે?

૪.૨ "આજે આપણા દેશમાં વિદ્યા તરફ એક જાતની ધીટતાભરી નફરત જોવા મળે છે." – લેખક આવું શા માટે કહે છે?

૪.૩ લેખકના મતે વિદ્યાર્થીમાં શિસ્ત કેવી રીતે લાવી શકાય?

૪.૪ લેખક આજના વિદ્યાર્થીની સ્થિતિથી ઉદાસ કેમ જણાય છે?

૪.૫ લેખક વિદ્યાર્થીઓની કેળવણી માટે કયા ઉપાયો સૂચવે છે?

પ્રશ્ન : ૦૫ : (આશરે ૨૦૦ શબ્દો) (૧૦ ગુણ)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

EWS (Economically Weaker Sections / આર્થિક રીતે નબળા વર્ગો) માટે આરક્ષણની નીતિ થકી સમાજને થનાર લાભ અંગે નિવેદન કરતું ચર્ચાપત્ર તૈયાર કરી અ બ ક વર્તમાનપત્રના તંત્રીશ્રીને મોકલો.

પ્રશ્ન : ૦૬ : (આશરે ૨૦૦ શબ્દો) (૧૦ ગુણ)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

The South Asian Association for Regional Cooperation (SAARC/સાર્ક)ની પ્રજાના સર્વાંગી વિકાસ માટે જાન્યુઆરી ૨૦૧૯, ઢાકામાં યોજાએલ મંત્રણામાં તમે ભારતીય પ્રતિનિધિ હતા. મંત્રણામાં વિવિધ દેશો દ્વારા રજૂ કરવામાં આવેલાં મુદ્દાઓને આવરી લેતો અહેવાલ લખો.

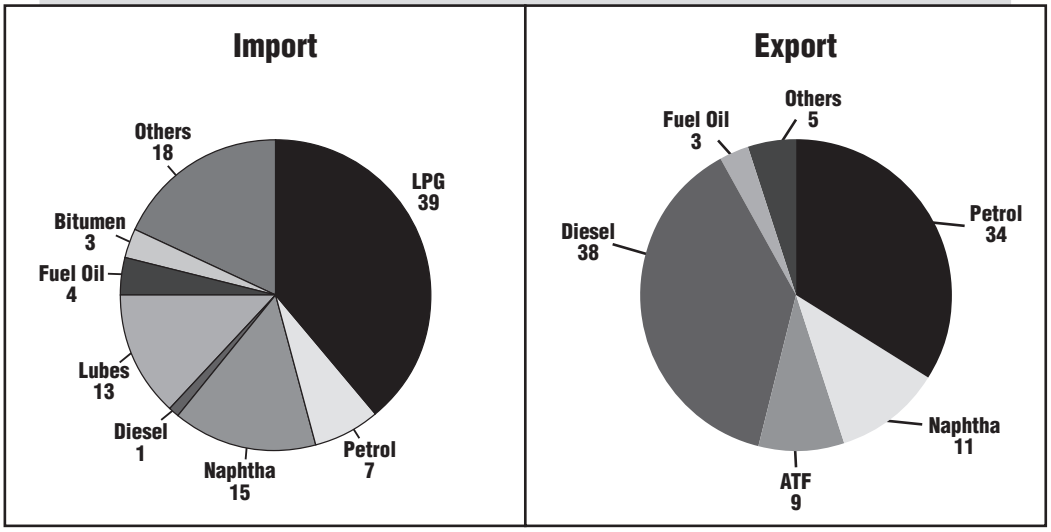
પ્રશ્ન : ૦૭ : (આશરે ૧૫૦ શબ્દો) (૧૦ ગુણ)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

ઇન્ડિયન પેટ્રોલિયમ એન્ડ નેચરલ ગેસ સ્ટેટિસ્ટિક્સ (2015-16)ના ભારત સરકાર દ્વારા પ્રસિધ્ધ કરવામાં આવેલ રીપોર્ટ મુજબ નીચે આપેલા આલેખોમાં પેટ્રોલિયમ પેદાશોના આયાત અને નિકાસ અંગે ટકાવારીમાં જાણકારી આપવામાં આવી છે. આ આલેખોને ધ્યાનમાં રાખીને વર્ષ 2015-16ના પેટ્રોલિયમ પેદાશોના આયાત અને નિકાસ વચ્ચેની તુલનાત્મક સમજને સ્પષ્ટ કરતી નોંધ તૈયાર કરી તમારાં તારણો આપો.

Figure VI.4: Value of import and export of petroleum products (in %) during 2015-16



પ્રશ્ન : ૦૮ :

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

આપેલ અંગ્રેજી ગદ્યખંડનો ગુજરાતીમાં ભાવાત્મક અનુવાદ કરો. (૧૦ ગુણ)

I'm sorry, but I don't want to be an emperor. That's not my business. I don't want to rule or conquer anyone. I should like to help everyone - if possible - Jew, Gentile - black man - white. We all want to help one another. Human beings are like that. We want to live by each other's happiness - not by each other's misery. We don't want to hate and despise one another. In this world there is room for everyone. And the good earth is rich and can provide for everyone. The way of life can be free and beautiful, but we have lost the way.

Greed has poisoned men's souls, has barricaded the world with hate, has goose-stepped us into misery and bloodshed. We have developed speed, but we have shut ourselves in. Machinery that gives abundance has left

us in want. Our knowledge has made us cynical. Our cleverness, hard and unkind. We think too much and feel too little. More than machinery we need humanity. More than cleverness we need kindness and gentleness. Without these qualities, life will be violent and all will be lost….

The aeroplane and the radio have brought us closer together. The very nature of these inventions cries out for the goodness in men - cries out for universal brotherhood - for the unity of us all. Even now my voice is reaching millions throughout the world - millions of despairing men, women, and little children - victims of a system that makes men torture and imprison innocent people.

***Excerpt from The Final Speech from The Great Dictator – Charlie Chaplin.**

પ્રશ્ન : ૦૯ :

સૂચના પ્રમાણે ગુજરાતી વ્યાકરણને લગતા પ્રશ્નોના ઉત્તરો આપો. (૧×૧૦=૧૦ ગુણ)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

૦૯.૧ : રૂઢિપ્રયોગનો અર્થ આપી તેમનો વાક્યમાં પ્રયોગ કરો.

૦૯.૧.૧ ફનાફાતિયાં કરવું

૦૯.૨ : કહેવતનો અર્થ સમજાવો.

૦૯.૨.૧ ઝાઝી કીડી સાપને તાણે

૦૯.૩ : સમાસનો વિગ્રહ કરી તેની ઓળખ આપો.

૦૯.૩.૧ ચોરબોર

૦૯.૪ : પંક્તિનો છંદ ઓળખાવો.

૦૯.૪.૧ પ્રિયે તુજ લટે ધરું ધવલ સ્વચ્છ આ મોગરો

૦૯.૫ : અલંકાર ઓળખાવો.

૦૯.૫.૧ પવન પાંદડાં જોડે ગમ્મત કરે છે.

૦૯.૬ : શબ્દસમૂહ માટે એક શબ્દ આપો.

૦૯.૬.૧ સમાધિમાં સ્થિર રહેનાર

૦૯.૭ : શબ્દની જોડણી સુધારો.

૦૯.૭.૧ ચામાચિડીયુ

૦૯.૮ : વાક્યમાં જોડણીની ભૂલો સુધારો.

૦૯.૮.૧ ભારતની વિધવિધ સૈલીઓનો શમ્વય કરી એનો શકય એવો વિકાસ અહીં વીચારવામાં આવે છે.

૦૯.૯ : શબ્દની સંધિ જોડો અને છોડો.

૦૯.૯.૧ સંધિ છોડો | નિઃશબ્દ

૦૯.૯.૨ સંધિ જોડો | સત્ + મતિ

૦૯.૧૦ : વાક્યરચના અંગે આપેલ સૂચના મુજબ ઉત્તર આપો.

૦૯.૧૦.૧ પ્રેરક વાક્ય બનાવો | હું પાઠ બોલું છું.

ENGLISH (MAIN EXAMINATION)

Note: Attempt all questions. Your answers must be within the word limit. You are expected to show your awareness of the subject, originality of thought and expression in grammatically correct language.

1. **Write an essay on any ONE of the following in 250 to 300 words. It must exhibit your grasp and critical understanding of the subject in the best possible individual style. It must be a well argued piece of writing expressed and sequentially.**

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 20

I. Should Universities be a battlefield of politics or temples of Education?

II. India and Civil Engineering Marvels - Ancient to Modern

III. Gender Equality is essential to curb crimes against women

IV. Artificial Intelligence and its challenges

V. Judicial Reforms: the Need of the Hour

2. **Imagine you are a Software Engineer working in Defence Research and Development Organisation (DRDO) and your Chief Engineer has asked you to explore the methods of controlling the incidents of cyber attacks on scientific organisations. Write a letter in about 150 words to the Chief Engineer, DRDO, Delhi suggesting necessary measures.**

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

3. **As a member of a group of Engineers you have recently visited the states of Punjab and Haryana to study the possibilities of converting the stubble into condensed bricks instead of burning it. Write a report on the study in about 200 words.**

મેળવેલ ગુણ / OBTAINED MARKS

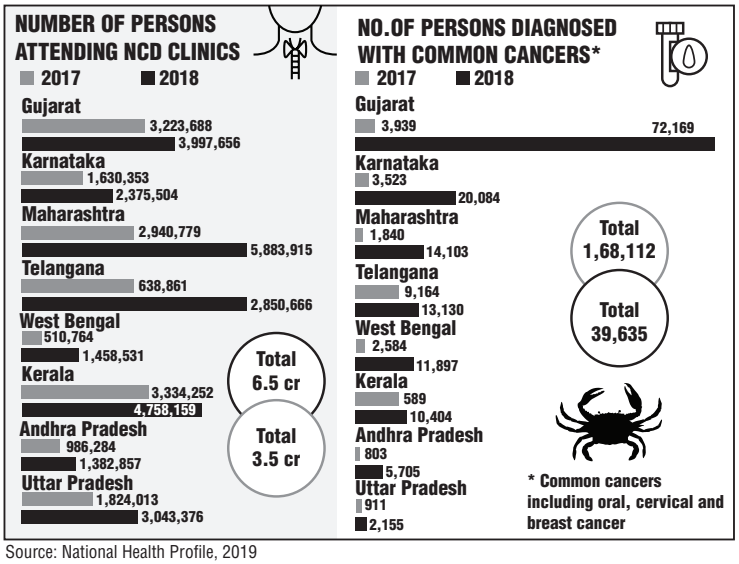
કુલ ગુણ / TOTAL MARKS: 10

4. **Carefully study the following bar diagram published in The Times of India, Delhi, November 03, 2019 and write a report in about 150 words.**

Gujarat recorded most cases of common cancer in 2018

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10



Source: National Health Profile, 2019

5. **The Government of Gujarat is to launch various developmental programmes on the 145th birth anniversary of Sardar Vallabhbhai Patel on 31st October, 2020. Draft a speech to be delivered by the Chief Minister of the state on this occasion in about 150 words.**

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

6. **Write a précis of the following passage in about one-third of its original length.**

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

Every drop of water in the ocean, even in the deepest parts, responds to the forces that creates tides. No other force that affects the sea is so strong. Compared with tides, the waves created by the wind are surface movements felt than no more than a line a hundred fathoms below the surface. The currents also seldom involve more than the upper several hundred fathoms despite their impressive sweep.

The tides are a response of the waters of the ocean to the pull of the Moon and the more distant Sun. In theory, there is a gravitational attraction between the water and even the outermost star of the universe. In reality, however, the pull of remote stars is so slight as to be obliterated by the control of the Moon and, to a lesser extent, the Sun.

Just as the Moon rises later each day by fifty minutes on the average, so, in most places, the time of high tide is correspondingly later each day. And as the Moon waxes and wanes in its monthly cycle, so the height of the tide varies. The tidal movements are strongest when the Moon is a silver in the sky, and when it is full. These are the highest flood tides and the lowest ebb tides of the lunar month and are called the spring tides. At these times the Sun, Moon and Earth are nearly in line and pull of the heavenly bodies is added together to bring the water high on the beaches, to send its surf upward against the sea cliffs, and to draw a high tide into the harbours. Twice each month, when the Sun, Moon and Earth lie at the apexes of a triangular configuration, and the pull of the Sun and Moon are opposed, the moderate tidal movements called neap tides occur.

7. Read the following passage carefully and answer the questions that follow:

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

Man has been defying the elements since he appeared on Earth. Driven by the necessity of survival, by his love of adventure, and by an insatiable curiosity where the unknown is concerned, he has braved the oceans, the mountains, the deserts, the skies, and finally space.

For several centuries man has lifted himself into the air with balloons, but it was not until this, the twentieth century that Orville Wright, in 1903, made man's first powered flight. His average speed for the trip was 31 miles per hour.

Both the speed and the altitude of man's flights have increased since that time - slowly at first and then by great leaps. The speed of sound (about 735 miles an hour) was exceeded in 1947. Present day aircraft fly regularly at twice that speed. The X-15 has flown more than 4100 miles per hour. Now, in space, man has achieved altitudes measured in hundreds of miles and speeds measured in thousands of miles per hour.

As far as the rigid requirements of space travel are concerned, man is not the most efficient mechanism. He requires an environment very closely resembling that in which he lives on Earth. In order to survive, he needs adequate oxygen, barometric pressure, temperature control, and the elimination of toxic agents. He is a relatively heavy object and the equipment required to protect him in the space flight of even short duration weighs hundreds of pounds.

In space, man must cope with isolation and confinement, even radiations which menaces his life. His efficiency and reliability are variable. As a power source he is slow and frequently inaccurate. He requires rest, food, and relaxation, and unlike machines, he is not expendable.

Notwithstanding all this there has never been any doubt that man would challenge the danger of space as he has challenged every other unknown. For, in spite of shortcomings, man brings to space exploration certain attributes which no one has ever succeeded in building into a machine. He brings intelligence, judgement, determination, courage, and creativity. He can use all these attributes in the case of unforeseen. By simply adding man and his capabilities to a machine its chances of success in a space mission are enormously increased.

I. Why has man defying nature?

II. What prompted man to make an attempt to travel in space?

III. What are the requirements of space travel?

IV. Is man an efficient mechanism to travel in space? Give reasons.

V. Which qualities of man are likely to bring him success in space exploration?

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 10

8. **Do as directed:**

Choose the correct answer from the given options and darken the circle ( ) as well as write the correct answer in the bracket (CAPITAL LETTER) as per sample given below.

Ans.: (C) A ( ) B ( ) C ( ) D ( ) E ( ) 1 X 10 = 10 marks

I. It is possible that I (be) mistaken. (Put the verb in auxiliary + perfect infinitive form)

- **A. May / might have been**
- **B. May / might be**
- **C. May / might have being**
- **D. May / might having been**
- **E. None of the above**

II. We added up the money and found that it was correct. (Change the voice)

- **A. The money has been added up and found to be correct.**
- **B. The money which was added up has been found to be correct.**
- **C. The money was added up and found to be correct.**
- **D. The money added up by us is found to be correct.**
- **E. The money being added up by us has been found to be correct.**

III. The official said, "This passport photo isn't like you at all. You must have another one taken." (Change the narration)

- **A. The official said that the passport photo wasn't like her and that she must have another one taken.**
- **B. The official told that the passport photo isn't like her and that she must have another one taken.**
- **C. The official told that the passport photo wasn't like she and that she should have another one taken.**
- **D. The official said that the passport photo wasn't like her and that she should have another photo taken.**
- **E. The official said that the passport photo wasn't like her so she must have another photo taken.**

IV. He must not attempt to escape, on pain of death. (Transform the simple sentence into compound sentence)

- **A. He must not attempt to escape, so that he will be put to death.**
- **B. He must not attempt to escape, so that he will feel pain of death.**
- **C. He must not attempt to escape, and he will be put to death.**
- **D. He must not attempt to escape, on fear of death.**
- **E. He must not attempt to escape, or he will be put to death.**

V. You are making _____ mistake after another. (Supply appropriate determiner)

- **A. a**
- **B. an**
- **C. no**
- **D. one**
- **E. some**

VI. Buying presents _____ children is sometimes very difficult. So, ____ the end I bought a kite for Ramesh.

- **A. to, at**
- **B. for, in**

C. for, at
D. to, in
E. None of the above

VII. Match the following phrasal verbs and nouns which describe gestures.

i.	Stick out	a. Your arms
ii.	Flag down	b. A friend
iii.	Burst off	c. Your tongue
iv.	Wave off	d. A taxi
v.	Throw up	e. Tears

A. i-a, 2-b, iii-c, iv-e, v-d
B. i-c, 2-b, iii-e, iv-a, v-d
C. i-c, 2-d, iii-e, iv-b, v-a
D. i-d, 2-e, iii-b, iv-a, v-c
E. i-d, 2-b, iii-e, iv-c, v-a

VIII. She was a plain _____ at school who reinvented herself when went to drama school. (Complete the idiom with a name)
A. Adam
B. Bob
C. Tom
D. Jack
E. Jane

IX. Select the correct administrative term for 'permanent office that receives complaints and acts on behalf of citizens to secure information, request services, or pursue grievances'.
A. Public Administration
B. Regulatory Commission
C. Task Force
D. Ombudsman
E. Governing Council

X. Which of the following is NOT a synonym of 'blasphemous'?
A. reverent
B. sacrilegious
C. profane
D. unholy
E. None of the above

9. Translate the following passage from Gujarati to English.

"સત્યના પ્રયોગો" માં ગાંધીજીએ તેઓ જ્યારે હાઈસ્કૂલમાં ભણતા હતા ત્યારે જે મિત્રો થયેલા તેના અનુસંધાને મિત્રતા વિષે લખેલ છે કે, " જેને સુધારવા છે તેની મિત્રતા હોય નહિ. મિત્રતા સરખા ગુણવાળા વચ્ચે શોભે ને નભે, મિત્રો એક બીજા ઉપરની અસર પાડ્યા વિના ન જ રહે. એવી મિત્રતામાં સુધારાને અવકાશ બહુ ઓછો હોય છે. મારા અભિપ્રાય મુજબ અંગત મિત્રતા અનિષ્ટ છે, કેમ કે મનુષ્ય દોષને ઝટ ગ્રહણ કરે છે. ગુણ ગ્રહણ કરવાને સારુ પ્રયાસની આવશ્યકતા છે."

ઉપરોક્ત વાત ગાંધીજીએ પોતે રાજકોટ અભ્યાસ કરવા માટે આવ્યા ત્યારે, તેઓ એક મિત્રના પરિચયમાં આવ્યા જેણે કહ્યું કે માંસાહાર કરવાથી શક્તિવાન બનાય છે. અંગ્રેજો માંસાહાર કરે છે અને આપણાં ઉપર રાજ કરે છે. અનેક હિંદુ વિધ્યાર્થીઓ અને શિક્ષકો પણ માંસાહાર કરે છે. ગાંધીજી પોતાને માંયકાંગલા ગણતા હોય પોતે બળવાન બને તેમ વિચારી માંસાહાર કરવા સ્વીકારેલું. માંસાહાર કર્યા બાદ માતા-પિતાને છેતર્યાનું ઊંડુ દુઃખ થયું. તેઓને થયું કે જુઠું બોલવું માંસ ન ખાવા કરતાં યે ખરાબ ગણાય. પરિણામે માંસાહર છૂટ્યો.

મેળવેલ ગુણ / OBTAINED MARKS
કુલ ગુણ / TOTAL MARKS: 10

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 60

SECTION – A
12 QUESTIONS (5 MARKS EACH)

1. **What is Lightweight aggregate? Explain its significance. Enlist Natural and Artificial Lightweight aggregates.**

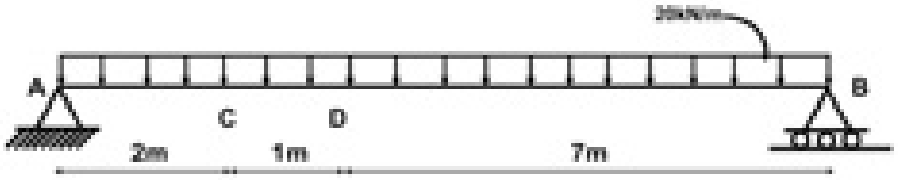
2. **Enlist the aspects to be considered in defining the effects of admixtures in concrete.**

3. **Name the various moduli of elasticity of Plain Cement Concrete. State the factors affecting the modulus of elasticity of concrete.**

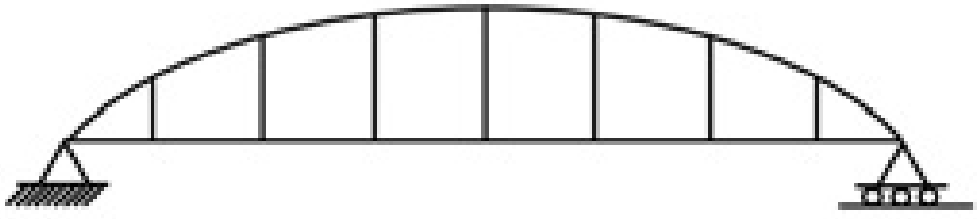
4. **What do you understand by Shear Centre?**

5. **Discuss Mohr circle of stress and its importance.**

6. **A simply supported beam AB, shown below, has a span of 10 m and supports a transverse load of 20 kN/m. Draw the free body diagram of portions AC, CD and DB.**



7. **Determine the degree of Static Indeterminacy of the bow string girder shown below. Assume all joints to be rigid.**



8. **A Tie bar of 50 mm × 8 mm is to carry a load of 80 kN. A specimen of the same quality of steel of cross sectional area 250 mm^2 was tested in the laboratory. The maximum load carried by the specimen was 125 kN. Find the Factor of Safety in design.**

9. **Axial compressive force in a member of a Truss is 45 kN and the distance between its joints is 1.35 m. Find the adequacy of ISA 60 × 60 × 6. For this member F_y = 250 / mm^2, A = 684 mm^2, r = 11.5 mm. Allowable axial stresses can be considered as 68 N / mm^2 for a slenderness ratio 115 and 64 N / mm^2 for a slenderness ratio 120.**

10. State the losses which take place during pre-stressing of concrete. How the losses due to friction can be reduced?

11. A circular RCC tank has an internal diameter of 10 m, maximum height of water as 4 m, thickness of wall as 0.17 m. The walls of the Tank are restrained at the base. Determine the values of maximum hoop tension and its location and maximum cantilever Bending Moment by Carpenter's Method. Take values of Carpenter's F and K as 0.014 and 0.39 for H/T = 20 and H/D = 0.4 and 0.01 and 0.35 for H/T = 30 and H/D = 0.4 respectively.

12. Define Damping in a Dynamic System. On what factors it depends?

SECTION – B
8 QUESTIONS (10 MARKS EACH)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 80

13. Estimate the quantities of Cement, Fine Aggregate and Coarse Aggregate per cubic meter of concrete if the Void Ratio in cement is 60%, Fine Aggregate is 40% and coarse aggregate is 45%. The material properties are as follows: Mix is 1:1.5:3 with w/c ratio of 0.5, one bag of cement contains 50 kg of cement and its density is 1440 kg/m^3. The density of Fine aggregate is 1650 kg/m^3 and coarse aggregate is 1580 kg/m^3 respectively. One bag of cement is equal to 34.7 litres.

14. What are Plywoods? Enlist their advantages. Distinguish between Impreg Timber and Compreg Timber.

15. Describe the preparation of Lime Mortar. Discuss Surkhi Mortar and Fire Resistant Mortar.

16. A beam has an I section with Top Flange 75 mm × 20 mm, web 100 mm × 20 mm and Bottom Flange 150 mm × 40 mm. If tensile stress is not to exceed 30 N/mm^2 and compressive stress 80 N/mm^2, what is the maximum uniformly distributed load the beam can carry over a simply supported span of 6 m?

17. Three springs A, B and C are connected in series as shown in Fig below. The stiffness of the springs is 20, 10 and 5 N/mm respectively. Develop the Flexibility Matrix for the system of springs with reference to coordinates 1, 2 and 3 as shown in the figure.

.

18. Calculate the strength of a 20 mm diameter bolt of grade 4.6 for Lap joint. The main plates to be joined are 12 mm thick. Assume steel of the grade Fe 410 and threads of the Bolt fall in the shear planes. The Net tensile stress area of 20 mm diameter bolt can be taken as 245 mm^2. Also the diameter of hole and distance to rolled edge (e) are defined as 22 mm and 33 mm respectively.

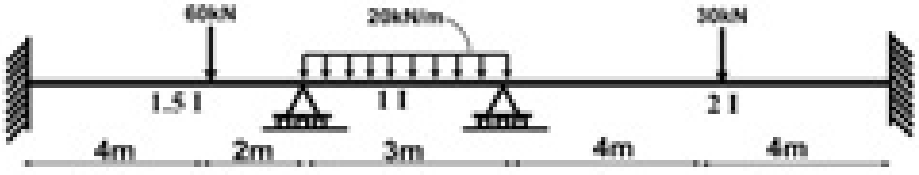
19. Design a slab base for a column ISHB 350 @ 710.2 N/m subjected to a factored axial compressive load of 1500 kN considering that load is transferred to the Base Plate by direct bearing of column Flanges. The base rests on concrete Pedestal of grade M20. Use Fe 410 grade of steel. Properties of ISHB 350 can be assumed as t_f = 11.6 mm, t_w = 10.1 mm, depth = 350 mm and b_f = 250 mm.

20. A rectangular RC beam is 200 mm wide and 500 mm deep. It is reinforced with 4 bars of 25 mm diameter in compression with an effective cover of 50 mm. Determine the area of tension reinforcement needed to make the beam section full effective. What then would be Moment of Resistance? Use M20 concrete and Fe 250 steel.:

મેળવેલ ગુણ / OBTAINED MARKS	
કુલ ગુણ / TOTAL MARKS: 60	

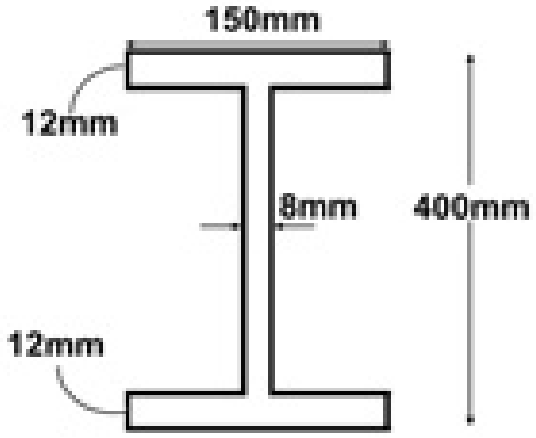
SECTION – C
4 QUESTIONS (15 MARKS EACH)

21. Analyze the continuous beam shown below by Kani's Method:

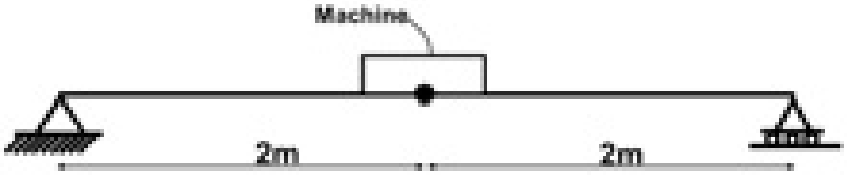


22. Design a Reinforced Concrete Slab for a room of clean dimensions 4 m × 5 m. The slab is supported all around on walls of width 300 mm. The slab has to carry a live load of 4 kN/m^2 and Floor Finish of 1 kN/m^2. Use M20 concrete and Fe 415 steel. Assume corners are held down.

23. **Calculate the Plastic Moment 'M_p', the Plastic Modulus 'Z_p' and the shape factor 'F' for the I Section beam shown in the figure below:**



24. **A machine of weight 70 kN mounted centrally of a simply supported beam, as shown below, produces a harmonic force of magnitude F = 150 kN at a frequency ω = 60 rad/s. Neglect the weight of the beam and assume 15% of critical damping. Determine the amplitude of the motion of machine and the force transmitted to support. Given $E = 2 \times 10^5$ N/mm^2 and $I = 25 \times 10^6$ mm^4.**



મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 60

SECTION – A
12 QUESTIONS (5 MARKS EACH)

1. Enlist the general principles to be observed while providing Damp-proof course in a building.

2. What are the various factors which affect the choice of a flooring material?

3. Water flows between 2 plates separated by 12 mm. The velocity profile of water is given by $u = (1-999.9y^2)$. Here 'u' is in m/s and 'y' is in meters measured from the mid-distance between the plates. If the area of each plate is 4 m^2, find the shear force on each plate. (Take viscosity of water as 0.1 Pascal-Second.)

4. Water is pumped from a lake to a storage tank above 24 m at the rate of 72 litres per second by consuming 18.8 kilowatt of electric power. Ignoring frictional losses in pipes and any change in the kinetic energy, find the overall efficiency of the pump-motor unit.

5. There are 6 rain gauge stations A, B, C, D, E and F which were spread across an area of 10 km^2. The Thiessen polygon network details are given in the table below.

Rain Gauge	Area (%)	Rainfall (mm)
A	24	27
B	21	04
C	26	11
D	08	03
E	11	05
F	10	11

Calculate the Equivalent Uniform Depth of the rainfall.

6. A loam soil has a field capacity of 30% and its permanent wilting point is 12%. The dry unit weight of soil is 1.25 gm / cc. If the effective depth of root zone is 60 cm and daily consumptive use of water for a given crop is 12.5 mm, determine after how many days of interval water has to be supplied.

7. Define the following Irrigation system efficiencies:
   (i) Irrigation efficiency
   (ii) Water application efficiency
   (iii) Water storage efficiency
   (iv) Water distribution efficiency
   (v) Water consumptive use efficiency. :

8. What are the main functions of a draft tube in a reaction turbine?

9. What do you mean by 'Surface Overflow Rate' (SOR)? A rectangular sedimentation tank is to treat 2 MLD of raw water. The flow velocity of the water is 9 cm / min, detention time is 2.5 hours and the effective depth of water in the tank is 2 m. Find the SOR.

10. Briefly explain with proper equations the biological denitrification process in the removal of nitrogenous components from wastewater.

11. What are the provisions made for preventing pollution from the landfill operations?

12. The noise level measured at particular location in a factory with a noisy machine operating nearby is 92 dB(A). When the machine is turned off, the noise level measured at the same location is 88 dB(A). What is the noise due to the machine alone?

SECTION – B
8 QUESTIONS (10 MARKS EACH)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 80

13. Discuss briefly how orientation of the building plays an important role in its overall performance.

14. Briefly describe 'Cavity Wall' and 'Shear Wall' and enlist their advantages / functions.

15. 1,296 Million Litres per Day of water is passing through a rectangular channel of width 4.5 m with a velocity of 5.8 m/s. State whether there is a possibility of a hydraulic jump. If yes, then compute the height of the hydraulic jump.

16. A centrifugal pump delivers water against a net head of 14.5 metres and a design speed of 1000 r.p.m. The vanes are curved back to an angle of 30° with the periphery. The impeller diameter is of 30 cm and outlet width of 5 cm. Determine the discharge of the pump if the manometric efficiency is 95%.

17. Using Lacey's theory, design a regime channel for a discharge of 30 m^3/sec with a silt factor of 0.9 and taking side slopes as 1 H : 2 V.

18. A water treatment plant treats 10 Million Litres of water per Day. The chemical analysis of the water coming out from the rapid sand gravity filter reveals that it contains the following impurities:

$CaCO_3$ = 350 mg/lit	$CaSO_4$ = 240 mg/lit
NaCl = 35 mg/lit	$MgSO_4$ = 200 mg/lit
$MgCl_2$ = 150 mg/lit	SiO_2 = 15 mg/lit
$Mg(HCO_3)_2$ = 112 mg/lit	Fe_2O_3 = 55 mg/lit

To soften the water, a water softening unit is installed after the filteration unit. It is planned to use slaked lime and soda to soften the

water. The purity of slaked lime is 85% and that of soda is 100%. The treatment has to be done so as to meet the Water Quality Standards 10500 – 2012. Slaked lime costs Rs 4,000/- per quintal while soda costs Rs 21,000/- per quintal. Calculate the cost of treatment.

19. Determine the dimensions of a high rate trickling filter for the following data:

(i) Sewage flow : 10 MLD

(ii) Recirculation ratio : 1.5

(iii) BOD of the raw sewage : 270 mg/lit

(iv) BOD removal in the primary sedimentation tank : 30%

(v) Desired BOD of the final effluent : 20 mg/lit

20. Enlist any 05 air pollutants and mention their limiting concentrations (for daily and annual) for Residential areas as per National Ambient Air Quality Standards 2009. Why there is no mathematical convergence

SECTION – C
4 QUESTIONS (15 MARKS EACH)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 60

21. 1188 Million Litres of water has to pass through a trapezoidal channel in a single day. The channel is designed to be the most efficient one and has the side slope of 1:1 along with the bed gradient of 1 in 1000. If unlined, the value of Chezy's constant C is 44 while that for the lined one is 60. The cost per m^3 of excavation is 4 times the cost per m^2 of lining. Find whether the lined canal would be cheaper or the unlined one and what would be the dimensions of the most economical canal.

22. The amounts of water flowing from the catchment area at the proposed dam site are as follows:

Month	Inflow ($\times 10^5$ m^3)
January	4.5
February	5.2
March	11.03
April	27.04
May	22.02
June	29.06
July	26.07
August	8.11
September	9.1
October	5.1
November	4.1
December	3.1

Determine:

(i) The minimum capacity of the reservoir if the water is to be used to feed the turbines of the hydropower plant at an uniform rate and no water is to be spilled over.

(ii) The initial storage of water required to maintain the uniform flow of water to the hydropower plant.

23. A Type-I settling (discrete particle settling) column test was performed for estimating the removal efficiency of the primary settling tank. Following data was acquired from the test.

Time (min)	0	60	100	150	240	420
Conc (mg / l)	250	219	188	141	108	65

Use the above data to estimate the removal efficiency of the tank. Assume tank depth equals 1.8 m and the surface overflow rate is 15 m^3/day/m^2.

24. The sewage discharge of a town is 150 Million Litres per Day. If the sewage has to be discharged into a river whose minimum flow is 10m^3/sec, determine the degree of treatment which has to be given to the sewage if the minimum dissolved oxygen to be maintained in the river is 4.5 mg / lit. Following are the data for the river water and sewage:

Temperature of sewage = 20°C

Temperature of river water = 20°C

Deoxygenation coefficient (k_D) = 0.1

Reoxygenation coefficient (k_R) = 0.5

5 days BOD of sewage = 300 mg/lit

5 days BOD of river water = 2 mg/lit

Dissolved oxygen in sewage = zero

Saturation Dissolved Oxygen at 20°C = 9.2 mg/lit

Dissolved oxygen at saturation in river = 80%

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 60

SECTION – A

12 QUESTIONS (5 MARKS EACH)

1. **Define Total Float. How it is determined? What is its importance in network planning?**

2. **Explain the following terms (i) Latest allowable occurrence time (ii) Earliest expected time (iii) Slack. What does a negative slack indicate?**

3. **A soil has the following characteristics:**
   1. **Percentage of soil passing 0.075 mm sieve = 55**
   2. **Percentage of coarse fraction passing 4.75 mm sieve = 60**
   3. **Liquid limit = 68 %**
   4. **Plastic Limit = 22 %**

   Classify the given soil according to the Indian Standards with justifications.

4. **An unconfined compression test was conducted on an undisturbed sample of clay. The sample had a diameter of 37.5 mm and was 80 mm long. The load at failure measured by the proving ring was 28 N and the axial deformation of the sample at failure was 13 mm. Determine the unconfined compression strength and the undrained shear strength of the clay.**

5. **An unsupported excavation is to be made in a clay layer. If the density of clay is 18 KN/m^3, cohesion is 30 KN/m^2 and the angle of Internal friction is 10^0, then calculate the following:**
   (a) **Depth of tension cracks**
   (b) **Maximum possible unsupported depth**

6. **Define Remote sensing and state the two laws which form the basis of data acquisition through remote sensing.**

7. **Discuss briefly Extrusive and Intrusive Rocks.**

8. **Enlist the various methods of tunnelling in soft soil and describe them briefly.**

9. **Discuss the main objectives and general guidelines for providing ventilation system in a tunnelling operation.**

10. **Enlist the various parameters / themes on the basis of which the bridges can be classified.**

11. **Write a short note on 'Cut-offs as river training works'.**

12. **Enlist the salient features of the various building demolition techniques.**

SECTION – B
8 QUESTIONS (10 MARKS EACH)

મેળવેલ ગુણ / OBTAINED MARKS

કુલ ગુણ / TOTAL MARKS: 80

13. **A vane shear of 7.5 cm diameter and 11.0 cm length was used to measure the shear strength of soft clay. If torque of 600 kg cm was required to shear the soil, then calculate the shear strength. The vane was then rotated rapidly to cause remoulding of the soil. The torque required in the remoulded state was 200 kg cm. Determine the sensitivity of the soil.**

14. **Compute the safe bearing capacity of a square footing 1.5 m x 1.5 m, located at a depth of 1 m below the ground level in a soil of average density of 20 KN/m^3, angle of internal friction 20^0, N_c = 17.7, N_q = 7.4 and N_r = 5.0. Assume Factor of safety of 3.0 and that the water table is very deep. Also compute the reduction in safe bearing capacity of the footing if the water table rises to the ground level.**

15. **A 30 cm diameter pile of length 12 m was subjected to a pile load test and following results were obtained:**

Load (tons)	0	50	100	150	200	250
Settlement during loading (cm)	0	0.85	1.65	2.55	3.8	6.0
Settlement during unloading (cm)	4.0	4.6	5.2	5.5	5.8	6.0

Determine the allowable load.

16. **Enlist the salient features of (i) Reconnaissance Survey (ii) Preliminary Survey (iii) Topographic Survey (iv) City Survey (v) Underground Survey**

17. **Find the gradient from P to Q using the data given in the table below:**

Instrument at	Staff at	Line	Bearing	Vertical Angle	Crosshair reading
A	P	AP	84°36’	3°30’	1.35, 2.10, 2.85
B	Q	AQ	142°24’	2°45’	1.955, 2.875, 3.765

The staff was held normal to the line of sight in both cases. The Multiplying Constant of the instrument was 100 and the additive constant was 0.3.

18. **Spot speed studies were conducted at a certain stretch of a highway and consolidated data collected are given below:**

Speed (km/h)	No of Vehicles observed
0-10	15
10-20	30
20-30	60
30-40	115
40-50	340
50-60	470
60-70	250
70-80	135
80-90	70
90-100	10
100-110	5

Determine the following:

(i) The upper and lower values of speed limits for regulation of mixed traffic flow

(ii) The design speed for checking the geometric design elements of the highway

19. **Calculate the minimum sight distance required to avoid a head-on collision of two cars approaching from the opposite directions at 90 kmph and 60 kmph. Assume a reaction time of 2.5 seconds, coefficient of friction of 0.7 and a brake efficiency of 50 percent in either case.**

20. **Discuss briefly the various Non-Destructive Test methods used for corrosion assessment of concrete bridges.**

SECTION – C
4 QUESTIONS (15 MARKS EACH

21. **For submitting the bid for work consisting of activities and different time limits given in table below, work out the following:**

Activity	Time (in weeks)		
	Best time (optimistic)	Most likely time (probable)	Worst time (pessimistic)
1-2	1	3	5
1-3	3	6	15
2-3	2	5	14
2-4	5	7	9
3-4	2	4	12
2-5	6	9	18

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4-5	1	2	3
3-8	3	12	15
4-6	4	6	8
5-7	1	2.5	7
6-8	3	4	5
6-7	0	0	0
7-9	1	8	9
9-10	1	3	5
8-10	0	0	0
8-11	1	9	11
10-11	3	4.5	9
9-11	4	9	20

(i) Critical path and standard deviation for the whole network.

(ii) Z factor for completing the project in 38 weeks.

(iii) Completion time duration for which company should bid considering 93% probability (Take Z factor at 93% = 1.50).

(iv) Total float, Free float and Interfering float for activities 3-8, 4-6, 6-8 and 6-7.

22. **A building has to be supported on a raft foundation of dimensions 14 m × 21 m. The subsoil is clay which has an average unconfined comprehensive strength of 15 kN/m^2 and density of 19 kN/m^3. The pressure of the soil due to weight of the building and the loads that it will carry is estimated to be 150 kN/m^2 at the base of the raft. At what depth should the bottom of the raft be placed to provide a factor of safety of 3 against shear failure?**

23. **Two straight roads intersect at a deflection angle of 60°30' at a chainage of 3030 m. The maximum speed of the vehicles is 120 kmph. The centrifugal ratio is 1/4 and the rate of change of radial acceleration is to be 0.3 m / s^3. Design the transition and circular curves and find the chainages of points at the beginning and end of the curves. If the transition curve is a cubic parabola, find the offsets from the tangent to set up points on the curve.**

24. **Determine the warping stresses at interior, edge and corner regions in a 25 cm thick concrete pavement with transverse joints at 11 m interval and longitudinal joints at 3.6 m intervals. The modulus of subgrade reaction (K) is 6.9 kg/cm^2. Assume temperature differential for day conditions to be 0.6°C per cm slab thickness. Assume radius of loaded area as 15 cm for computing warping stress at the corner.**

Additional data are given below:

$e = 10 \times 10^{-6}$ / °C, $E = 3 \times 10^5$ kg / cm^2, $\mu = 0.15$, $C_x = 0.80$ and $C_y = 0.45$