

- પ્ર-1. નીચેના ત્રણ પૈકી કોઈપણ એક વિષય પર આશરે 250 થી 300 શબ્દોમાં નિબંધ લખો. (20)
- (ક) વૈશ્વિક પરિપ્રેક્ષ્યમાં ભારતીય અધ્યાત્મનો પ્રભાવ  
(ખ) પડોશી દેશોની રાજકીય સ્થિતિ અને ભારતીય અર્થતંત્ર પર અસર  
(ગ) ટેલીકોમ્યુનિકેશન:ગ્રેહામ બેલથી 5G
- પ્ર-2. નીચેના બે પૈકી કોઈપણ એક નો આશરે 100 શબ્દોમાં વિચાર-વિસ્તાર કરો. (10)
- (ક) જીવ હજીએ ઝલ્મલામાં છે, ફાટી ગઈ છે જાત, કબીરા.— ચંદ્રેશ મકવાણા  
(ખ) હાથ પોતાનોય બીજો જાણવા પામે નહિ,  
કીડિયારું એમ પૂર્યું હોય તે બેસે અહીં.— સ્નેહી પમાર
- પ્ર-3. નીચેના ગદ્યખંડનો આશરે 1/3 ભાગમાં તમારા શબ્દોમાં સંક્ષેપ કરો. (10)

ગ્રંથાલય એટલે શિવાલય, કલ્યાણકારી શિવને પ્રલય સર્જનારા કહ્યા છે. પ્રલય એટલે નાશ. એ તો શાબ્દિક અર્થ છે. વિશિષ્ટ અર્થ છે- પ્રલય પેદા કરનારા અર્થાત્ પ્રલય લય પેદા કરનારા. જીવનમાં જે ખોરવાયું હોય તેમાં સંવાદિતા થકી પુનઃલય સંગીત પેદા કરી સમતુલિત કરનારા. અજ્ઞાનતા કે જેમાં કામ, ક્રોધ, મદ અને લોભનો સમાવેશ થાય છે તે અતિરેકનો નાશ કરનારા. શિવ જેમાં વસે છે તે શિવાલય. આવું જ રૂપ ગ્રંથાલયનું છે, વાચન, ચિંતન અને મનનની ત્રણ પાંખડીઓ વાળા બીલીપત્રો તો આપણી પાસે હાજરાહજૂર છે. તે ખરીદવા પૈસાની જરૂર નથી. તાદાત્મ્ય અને શ્રદ્ધાથી બે બે હાથોને બદલે આંખોથી અભિવાદન કરીએ એટલે બીલીપત્રો ચઢ્યાં જ સમજો. ગ્રંથાલય સુધી ચાલવું એ રખડપટ્ટી નહિ પણ પદયાત્રા! ને ત્યાં પહોંચવું એટલે સંગમતીર્થ. ગ્રંથપાલ તો તેનો પૂજારી, સેવા તે કરે ને પસંદગીનો પ્રસાદ ધરે.

પાંડુરંગ દાદાએ ‘કેનોપનિષદ’માં નોંધ્યું છે તે મુજબ સુમેરિયન, બાબિલિયન, ઈજિપ્શિયન, ગ્રીક અને આર્યની સંસ્કૃતિનો તલસ્પર્શી અભ્યાસ દ્વારા તાગ મેળવીશું તો બહુધા સંસ્કૃતિઓની આધારશિલાઓમાં એક તત્ત્વ સમાન જણાશે ને તેનાથી પ્રદેશિકતાવાદ અને રાષ્ટ્રવાદ પણ આપોઆપ ખરી જશે. આ રીતે આ ગ્રંથાલયોમાં રહેલા સામાજિક ઉત્કર્ષના વ્યક્તિત્વ વિકાસનાં અનેકવિધ પુસ્તકો માનવતાના કલ્યાણાર્થે સત્ય, અહિંસાને ન્યાયના સમાન તત્ત્વને ગૂંથી લેનારા છે. સમયના પટ પર એક જ કેન્દ્ર પર (ગ્રંથાલયમાં) વ્યતીત કાળના અને વર્તમાન કાળના વૈજ્ઞાનિકો, અર્થશાસ્ત્રીઓ, માનસ શાસ્ત્રીઓ, સંતો, સેવકો, ભક્તો ને તત્ત્વ ચિંતકોનો સંગમ થાય છે. જેમ સમુદ્રમાં ગંગા, કાવેરી, યમુના, બ્રહ્મપુત્રા વગેરે ભળી જાય છે તેમ વિશિષ્ટ વ્યક્તિત્વ અને સંસ્કૃતિ ધરાવતા વિવિધ સર્જકોની વિચાર સરણીનું સંગમ સ્થાન એ ગ્રંથાલય છે. અલગ અલગ પંથ, સંપ્રદાય ને રૂચિ ધરાવતા વાચકોનો પણ ત્યાં સંગમ થતો હોય સાચા અર્થમાં આ તીર્થ છે ને સંગમ તીર્થનો માર્ગદર્શક ગ્રંથપાલ છે.

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- પ્ર-4. નીચે આપેલા ગદ્યખંડને આધારે તેની નીચે પૂછેલા પ્રશ્નોના જવાબ લખો. (10)
- ત્રણ પ્રકારનાં બિંદુ વિશ્વમાં પવિત્ર છે: ઝાકળબિંદુ, અશ્રુબિંદુ અને પ્રસ્વેદબિંદુ. સવારે ભોંય પર ખરી પડેલાં પારિજાતનાં પુષ્પોની પાંખડીઓ સાથે વળગેલાં ઝાકળબિંદુ સુવાસને ભીનાશની દીક્ષા આપતાં હોય છે. એ ઝાકળભીનાં પારિજાત વીણી લઈને પ્રિયજનની હથેળીમાં મૂકતી વખતે કોઈ શબ્દો બોલવાની જરૂર રહેતી નથી. આમ કરવાથી ‘અનુભૂતિનું કુંવારાપણું’ ક્ષીણ થાય છે. જીભ દ્વારા થતું પ્રત્યાયન પ્રદૂષિત હોઈ શકે, પરંતુ આંખ દ્વારા જે કહેવાય તેમાં અસત્યની ભેળસેળ હોતી નથી. અશ્રુબિંદુ અને ઝાકળબિંદુ સ્વભાવે નિર્મળ હોય છે.

માનસિક આરોગ્ય માટે પ્રેમથી ચડિયાતું જીવન-રસાયણ જડવું દુર્લભ છે. ‘મળેલા જીવ’ વચ્ચે રચાતાં અશ્રુજળનાં મેઘ ધનુષ્ય સ્વજનોની નજરે પડતાં નથી. અશ્રુજળ ટપકી પડે એ ઘટના વાદળ વરસી પડે તેના જેવી પવિત્ર છે. સ્ત્રીઓ ઝટ રડી શકે છે તેથી તેમનું માનસિક આરોગ્ય બહુ મોટી વિટંબણા વિના જોખમાતું નથી. સ્ત્રીઓનીદુઃખ વેઠવાની ક્ષમતા પ્રમાણમાં વધારે છે, કારણકે એમનાં અશ્રુજળ સાવ સહજપણે વહી શકે છે. પરિણામે એમનું બ્લડપ્રેશર પણ ઝટ ખોરવાતું નથી.

દિવસમાં એક વાર શરીરે પરસેવો વળે તેવું કરવું એ તંદુરસ્તી માટેના વીમાનું પ્રિમિયમ છે. શરીરની ચામડી દ્વારા પરસેવા સાથે રોગ બહાર નીકળતો હોય છે. ઉનાળામાં તો આળસુ માણસને પણ પરસેવો વળે છે. શિયાળામાં પરસેવો વળે તે માટે ઝડપભેર ચાલવું પડતું હોય છે. આપકમાઈનો પરસેવો આપણા આરોગ્યની ગેરંટી અને વોરંટી છે. ખરી ભૂખ લાગે ત્યારે ભાણે બેઠેલો માણસ પોતાના શરીરમાં કેવળ કેલેરી જ નહિ, આયુષ્ય પણ પધરાવતો હોય છે. મેડિકલ સ્ટોર એક એવી જગ્યા છે, જ્યાં માણસે થોડાક સંકોચ સાથે કોઈ જોઈ ન જાય એવી રીતે જવું જોઈએ. ગુજરાતની ગૃહિણી સરેરાશ પાંચ કિલો વજન ઘટાડવાનો સંકલ્પ કરે તો એમનાં ઘૂંટણને કાયમી રાહત થાય. પરસેવો જ ન પડે તેવી જીવનશૈલી રોગની આમંત્રણ પત્રિકા જાણવી. પ્રસ્વેદ બિંદુ પવિત્ર છે, શ્રમજીવીને પરસેવો નથી હોતો, એનો પરસેવો પવિત્ર છે. ઝાકળબિંદુ જીવનની જ્ઞાનયુક્ત સ્વચ્છતાનું પ્રતીક છે, અશ્રુબિંદુ મનુષ્યમાં રહેલી ભાવયુક્ત ભક્તિનું પ્રતીક છે અને પ્રસ્વેદબિંદુ એ મનુષ્યની કર્મનિષ્ઠાનું તીર્થસલિલ છે.

ગુણવંત શાહ: એકલતાના એવરેસ્ટ પર પાન નં: 261

પ્રશ્નો:

1. લેખક શાને ‘અનુભૂતિનું કુંવારાપણું’ કહે છે?
2. માનસિક આરોગ્ય વિશે લેખક શું માને છે?
3. ‘આપ કમાઈનો પરસેવો એટલે આપણા આરોગ્યની ગેરંટી અને વોરંટી’ શાથી?
4. ઝાકળબિંદુ, અશ્રુબિંદુ અને પ્રસ્વેદબિંદુ શાના સૂચક છે?
5. આ ગદ્યખંડને યોગ્ય શીર્ષક આપો.

- પ્ર-5. માતૃભાષાના શિક્ષણ વિશે વાલીઓની ઉદાસીનતા અંગે ‘ક, ખ, ગ’ વર્તમાનપત્રમાં 200 શબ્દોમાં ચર્ચાપત્ર લખો. (10)
- પ્ર-6. તમે એક પ્રતિષ્ઠિત ગુજરાતી સાપ્તાહિક માટે કોમન વેલ્થ ગેઈમ્સ-2022માં અહેવાલ માટેગયા છો, તેસંદર્ભે આશરે 200 શબ્દોમાં અહેવાલ લખો. (10)
- પ્ર-7. નીચે આપેલા ચિત્ર પરથી આશરે 150 શબ્દોમાં તમારા નિરીક્ષણો લખો. (10)



પ્ર-8. નીચે આપેલા ગદ્યખંડનો અંગ્રેજીમાંથી ગુજરાતી ભાષામાં અનુવાદ કરો. (10)

Once we have accepted that love is a stimulus, we come up against the third obstacle: fear of the defeats we will meet on the path. We who fight for our own dream suffer far more when it doesn't work out, because we cannot fall back on the old excuse, "oh, well, I didn't really want it anyway." We do not want it and know that we have staked everything on it and that the path of personal calling is no easier than any other path, except that our whole heart is in this journey. Then we warriors of light must be prepared to have patience in difficult times and to know that the Universe is conspiring in our favour, even though we may not understand how. I ask myself: are defeats necessary? Well, necessary or not, they happen.

When we first begin fighting for our dream, we have no experience and make many mistakes. The secret of life, though, is to fall seven times and get up eight times. So, why is it important to live our personal calling if we are only going to suffer more than other people?

પ્ર-9. નીચે આપેલા પ્રશ્નોના સૂચવ્યા મુજબ જવાબ લખો. (10)

1. નીચે આપેલા રૂઢિપ્રયોગનો અર્થ આપી તેનો વાક્ય પ્રયોગ કરો.  
કોથળીમાંથી સાપ નીકળવો
2. નીચે આપેલી કહેવતનો અર્થ આપો.  
તડકે-તડકે મેહ વરસે ને ઉંદરડી ઉચાળા ભરે
3. નીચે આપેલા સામાસિક શબ્દનો વિગ્રહ કરી ઓળખાવો.  
પ્રધાનમંત્રી
4. નીચે આપેલી પંક્તિનો છંદ ઓળખાવો.  
પવન ઝડપે પાણી ડોલ્યાં, નદી મલકી પડી.
5. નીચે આપેલા અલંકારને ઓળખાવો.  
મીર જાફર નામનો નવાબ હતો.
6. નીચે આપેલા શબ્દ સમૂહ માટે એક શબ્દ આપો.  
સારાનરસાનો ભેદ પામવો કે તેની શક્તિ
7. નીચે આપેલા શબ્દોની સાચી જોડણી લખો.  
તસ્વિર
8. નીચે આપેલા વાક્યને લેખનરૂઢિ અને ભાષા શુદ્ધિની દૃષ્ટિએ સુધારીને ફરીથી લખો.  
ચુંટણી સભામાં લગભગ હજારેક માણસ હશે.
9. નીચે આપેલા શબ્દોનો સંધિ વિગ્રહ કરો.  
તન્વંગી
10. નીચે આપેલા વાક્યમાં ઉદ્દેશ્ય અને વિધેયખંડો ઓળખાવો.  
મારી નાની બહેનનું નામ તો અમૃતા.

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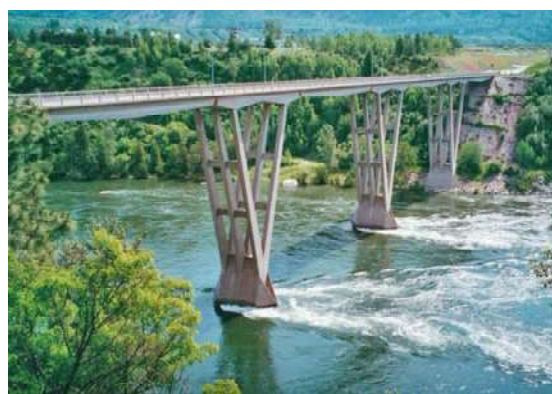
PAPER - 2

Subject : English

Time : 2 Hours

Total Marks : 100

- Q. 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 having originality of thought and expression. It must be well argued piece of writing coherently and sequentially with observance of grammar rules. (20)
- I. Discuss *Health Humanities* as the study of the intersection between health and humanistic disciplines.
- II. Evolution of Industry 4.0 to Industry 5.0 concept.
- III. New India @ 75: Bringing the flag home collectively as the Nation celebrates *Azadi Ka Amrit Mahotsav* symbolic of personal connection to the Tiranga and an embodiment of our commitment to Nation-building.
- IV. Suggest the ways to empower communities and guide them to set their own goals and equip them so that progress made is sustained, and continued long after.
- V. “Exercise is labour without weariness”
- Q. 2** Imagine that you are an engineer on special duty at *Bharatmala* Project launched for INR 14,000 crore. The project will be “India Garland” and it will garland the entire country. This 5000-km road project by the central government is planned to be finished within 5 years. Your senior officer has sought your suggestion for completing the project in best way within the deadline. Write a letter to your senior officer giving your opinion in about 150 words. (10)
- Q. 3** *Gujarat Gyan Guru Quiz* is organized with the vision to provide an intensified impetus towards enthusiasm in students. It is an activity that combines education, fun and competition. Under the guidance of NSS( National Service Scheme) program officer and academic coordinator of your institution, as the general secretary you have organized an awareness drive for the students to participate in the quiz. Write a report about the awareness drive event in 200 words. (10)
- Q. 4** Observe the picture carefully, and summarize your ideas meaningfully by selecting and reporting description in about 150 words. (10)



**Q. 5** Ministry of Youth Affairs and Sports, Government of Gujarat is Organizing Mega event on *World Bicycle Day* to popularize the usage of cycling to solve the dual issues of global warming and unhealthy lifestyle. In about 150 words draft an inaugural speech of this event to be delivered by the Honourable Governor of Gujarat. (10)

**Q. 6** Write a précis of the following passage in about one third of its original length. (10)

Shekar Goud is the first and the only triple amputee in the world scale Mount Elbrus, the highest peak in Russia, Mount Kilimanjaro, the highest mountain in Africa and Mount Kosciuszko, mainland Australia's highest mountain. When Shekar was eighteen, his right arm and left leg were amputated. He also lost his toes and much of the skin of the right foot in an electrical accident. The sympathy and the consolation that he received from others only made him more determined to overcome his difficult circumstances.

While people expressed uncertainty regarding his future, Sekhar's strong will, grit and perseverance helped him focus on positive aspects of life. Sekhar encountered psychological stress and anxiety after his trauma, but after his hospitalization, he resolved to overcome his life altering circumstances. He began by focusing on the positives as he was determined to achieve the purpose of his life. Since then, there has been no looking back for Sekhar. He has participated in numerous Marathons and duathlons. His first Marathon was the Airtel 10k run in 2014. He has cycled 4100 km in just 58 days from South India to North India. Sekhar has also trekked for 84 km to reach the base camp of Mount Everest. Sekhar loves cycling and cycles for around 100 km or so whenever he finds the time. He runs around 15 km daily to train his body for upcoming trek. However, unlike at the beginning of his mountaineering career, Sekhar has been struggling for funds to undertake various treks. His triumph over his circumstances inspires us to realise our dreams without giving up, even during tough times. (269 words)

**Q. 7** Read the following passage carefully and answer the questions that follow. (10)

The old lady was glad to be back at the block of flats where she lived. Her shopping had tired her and her basket had grown heavier with every step of the way home. In the lift her thoughts were on lunch and a good rest; but when she got out at her own floor, both were forgotten in her sudden discovery that her front door was open. She was thinking that she must reprimand her daily maid the next morning for such a monstrous piece of negligence, when she remembered that she had gone shopping after the maid had left and she knew that she had turned both keys in their locks. She walked slowly into the hall and at once noticed that all the room doors were open, yet following her regular practice she had shut them before going out. Looking into the drawing room, she saw a scene of confusion over by her writing desk. It was as clear as the daylight then that burglars had forced an entry during her absence. Her first impulse was to go around all the rooms looking for thieves, but then she decided at her age it might be more prudent to have someone with her, so she went to fetch the porter from his basement. By this time her legs were beginning to tremble, so she sat down and accepted a cup of very strong tea, while he telephoned to the police. Then her composure regained, she was ready to set off with the porter's assistance to search for any intruders who might still be lurking in her flat.

They went through the rooms, being careful to touch nothing as they did not want to hinder the police in their search for fingerprints. The chaos was inconceivable. She had lived in the flat for thirty years and was a veritable magpie at hoarding; and it seemed as though everything she possessed had been tossed out and turned over and over. At least sorting out the things she could have discarded years ago was being made easier for her. Then the police inspector began to look for fingerprints, while the constable checked that the front door locks had not been forced, thereby proving that

the burglars had either used the skeleton keys or entered over the balcony. There was no trace of fingerprints, but the inspector found a dirty red bundle that contained jewellery which the old lady said was not hers. So their entry into this flat was apparently not the burglars' first job that day and they must have been disturbed. The inspector then asked the old lady to try to check what was missing by the next day and advised her not to stay alone in the flat for a few nights. The old lady thought he was a fussy creature, but since the porter agreed with him, she rang up her daughter and asked for help in what she described little spot of bother.

Questions :

1. What is the meaning of 'the ransacked flat'?
2. What was the old lady's first impulse and what did she do at moment of this impulse?
3. What happened in the basement and who telephoned the police?
4. What did the old lady do when she had regained her composure?
5. Why was the chaos inconceivable? What assumption were made when the inspector found a dirty red bundle ?
6. Did the police find any trace of fingerprints ?According to the old lady who was a fussy creature and why?
7. On which point the porter agreed with the inspector? Why was the old lady advised not to stay alone for few nights in the flat?
8. What does 'magpie' mean in context of this passage? Give meaning of 'little spot of bother'.
9. There is a mention of old lady's one relative in the passage, who is that relative?
10. Who is a 'porter' and what is his job in context of this passage?

Q. 8. Do as directed : (10 × 1 = 10 Marks)

(10)

Choose the correct answer from the given option and darken [ ● ] the circle and also write the correct answer in the bracket ( CAPITAL LETTER ) as per the sample given below :

Sample Answer: ( C )      A ○      B ○      C ●      D ○      E ○

1. Jyotsna said that the rain had been falling the day before. Seema said that the man could come. Rakesh said that the man had come at six. Praveen said that he had seen that man long time ago. (Change the narration)
  - (A) Jyotsna said, " Rain has been falling day before." Seema said, "The man could come". Rakesh said, " The man might come." Praveen said, "I saw this man years ago."
  - (B) Jyotsna said, " Rain has been falling yesterday." Seema said, "The man could come". Rakesh said, " The man may be coming." Praveen said, "I have seen this man long ago."
  - (C) Jyotsna said, " Rain was falling yesterday." Seema said, "The man can come." Rakesh said, " The man is coming." Praveen said, "I saw this man long ago."
  - (D) Jyotsna said, " Rain had been falling since yesterday." Seema said, "The man could be coming". Rakesh said, " The man may be coming." Praveen said, "I have seen this man long ago."
  - (E) Jyotsna said, " Rain has been falling yesterday." Seema said, "The man can come". Rakesh said, " The man may be coming." Praveen said, "I have seen this man long ago."

2. Her and him led the singing. You will soon hear from we boys. Every Ship has it's own officers. (Correct the errors in the use of pronouns in the given sentences)
- (A) Me and him led the singing. You will soon hear from us boys. Every ship has its own officers.
- (B) Me and he led the singing. You will soon hear from we boys. Every ship has its self officers.
- (C) Myself and he led the singing. You will soon hear from we boys. Every ship has ones officers.
- (D) Me and he led the singing. You will soon hear from we boys. Every ship has it officers.
- (E) Me and he led the singing. You will soon hear from ourselves boys. Every ship has its' officers.
3. Welcomed by all, Sachin felt great. Having finished our work, we went to play. The defeated team resolved to play again. (Underline the participles and indicate whether it is present participle, past participle or perfect participle)
- (A) Welcomed by all, Sachin felt great. (past participle)  
Having finished our work, we went to play. (perfect participle)  
The defeated team resolved to play again. (past participle)
- (B) Welcomed by all, Sachin felt great. (past participle)  
Having finished our work, we went to play. (perfect participle)  
The defeated team resolved to play again. (past participle)
- (C) Welcomed by all, Sachin felt great. (past participle)  
Having finished our work, we went to play. (perfect participle)  
The defeated team resolved to play again. (past participle)
- (D) Welcomed by all, Sachin felt great. (past participle)  
Having finished our work, we went to play. (perfect participle)  
The defeated team resolved to play again. (past participle)
- (E) Welcomed by all, Sachin felt great. (past participle)  
Having finished our work, we went to play. (perfect participle)  
The defeated team resolved to play again. (past participle)
4. Identify the option with correct labelling of parts of speech.
- (A) Why did you do it ? I know the reason why he did it ?  
(Adverb) (Adverb)  
This is not the time to go into why and whereof of the matter.  
(Noun)
- (B) Why did you do it ? I know the reason why he did it ?  
(interjection) (Noun)  
This is not the time to go into why and whereof of the matter.  
(Noun)
- (C) Why did you do it ? I know the reason why he did it ?  
(pronoun) (Adjective)  
This is not the time to go into why and whereof of the matter.  
(Noun)
- (D) Why did you do it ? I know the reason whyhe did it ?  
(Adjective) (Pronoun)  
This is not the time to go into why and whereof of the matter.  
(Noun)
- (E) Why did you do it ? I know the reason why he did it ?  
(Adverb) (Noun)  
This is not the time to go into why and whereof of the matter.  
(Verb)



5. Prices are *up*. Let us go *up* the hill. The next *up* train leaves within an hour. They had their *ups* and downs. (Observe four uses of *up* and choose the option with right identification in the bracket)
- (A) Prices are *up*. (Adjective) Let us go *up* the hill. (Preposition) The next *up* train leaves within an hour. (Adverb) They had their *ups* and downs. (Noun)
- (B) Prices are *up*. (Verb) Let us go *up* the hill. (Adverb)  
The next *up* train leaves within an hour. (Adjective)  
They had their *ups* and downs. (Noun).
- (C) Prices are *up*. (Adverb) Let us go *up* the hill. (Preposition)  
The next *up* train leaves within an hour. (Adjective)  
They had their *ups* and downs. (Noun)
- (D) Prices are *up*. (Verb) Let us go *up* the hill. (Preposition)  
The next *up* train leaves within an hour. (Adverb)  
They had their *ups* and downs. (Pronoun)
- (E) Prices are *up*. (Preposition) Let us go *up* the hill. (Preposition) The next *up* train leaves within an hour. (Adverb) They had their *ups* and downs. (Noun)
6. The cow had been spoiling new plants in the garden. The plants are watered by the gardener. A new plant will be being installed by the Company. (Change the voice)
- (A) The new plants in the garden had been being spoilt by the cow. The gardener waters the plants. The Company will be installing a new plant.
- (B) The new plants in the garden had been spoilt by the cow. The gardener is watering the plants. The Company will be installed by a new plant.
- (C) The new plant in the garden had being spoiled by the cow. The gardener watered the plants. The Company is being installing a new plant.
- (D) The new plants in the garden had been spoiled by the cow. The gardener had being watering the plants. The Company has been installing a new plant.
- (E) The newer plants in the garden had been spoiling. The gardener had being watering the plants. The Company has been installing a new plant.
7. An outing had been organized by the team. The students have been being taken by the school for a study tour. (Change the voice)
- (A) The team has organized an outing. The school had been taking the students for a study tour.
- (B) The team has been organizing an outing. The school has being taking the students for a study tour.
- (C) The team had organized an outing. The school has been taking the students for a study tour.
- (D) The team has had organized an outing. The school has had been taking the students for a study tour.
- (E) The team organized an outing. The school is being taking the students for a study tour.



8. He is a man of \_\_\_\_\_ manners. His manners are \_\_\_\_\_. He is in \_\_\_\_\_ service. We don't like his \_\_\_\_\_ conduct.

(Fill in the banks correctly to convey the right meaning)

- (A) gentel, gentel, emperial, emperious
- (B) genteel, gentel, imperious, imperious
- (C) gentel, gentel, imperial, imperial
- (D) gentle, genteel, imperial, imperious
- (E) gentleful, gentel, imperious, imperial

9. Identify the option with right use of idioms.

- (A) Whatever may come out, I must finish this project work by this evening. Many people hang in the main city square all day.
- (B) The meeting brooked up late at night. I shall call on your office tomorrow.
- (C) Though defeated, he would not give in. It was given out that the king was dead.
- (D) He got beyond scot free. Some robbers fell in the lonely traveller.
- (E) The ceremony comes on Sunday next. I cannot fell into your view.

10. Identify the incorrect pair

- (A) Chronophobia – Fear of time
- (B) Logophobia – Fear of words
- (C) Gamophobia – Fear of games
- (D) Bathophobia – Fear of depths
- (E) Hodophobia – Fear of travelling

Q. 9. Translate the following Passage from Gujarati into English

(10)

પ્રથમ એણે અમદાવાદમાં સદ્ગુરુની ઘણી શોધ કીધી, પણ ત્યાંથી કોઈ નહિ મળવાથી કાશી, પ્રયાગ જવાનો નિશ્ચય કરી તે એ નગર છોડી નીકળ્યો. માર્ગમાં તે જેપુર ગયો કહેવાય છે. ત્યાંના ગોસાંઈના બાળકને શરણે જઈ રહ્યો. અખા પાસે પુષ્કળ દ્રવ્ય હોવાથી મહારાજે તેનો ઘણો સારો સત્કાર કર્યો. ત્યાં સારાં સારાં મિષ્ટાન્નો, દોર, ખુવા, મલાઈ વગેરે પદાર્થો તેને રોજના જમવાના મળતા હતા, પણ ઉપદેશની તો વાત જ મળે નહિ, એટલે એણે મહારાજને નમસ્કાર કીધા અને વોટદક્ષણા આપી વિદાય થયો. અખો એ પછી ગોકુળમથુરામાં પણ ગયેલો જણાય છે.

કોઈ સ્થળે સદ્ગુરુ નહિ મળવાથી તે અંતે કાશી ગયો... કાશીમાં ઘણો વખત રહેવા પછી એ પાછો અમદાવાદ આવીને રહ્યો જણાય છે. અમદાવાદ આવતાં માર્ગમાંથી એ પાછો જેપુર ગયો હતો, ને ત્યાં ગોકુલનાથજી નામના ગોસાંઈજીના બાળકના મંદિરમાં જઈ તેની પરીક્ષા કરવાની ઈચ્છા કરી. આ વખતનો એનો વેષ તદ્દન બદલાઈ ગયો હતો. જ્ઞાનનું તેજ એના મોંઢા પર પ્રકાશી નીકળેલું હતું, ને તેથી એણે માયિક આડંબરનો સંપૂર્ણ ત્યાગ કીધો હતો. મંદિરના દરવાને આવા વિલક્ષણ વેષધારીને મંદિરમાં પ્રવેશ કરાવવાને માટે ના પાડી, ત્યારે એણે કહ્યું કે, 'હું તો અખો શેઠ છું.' દરવાને કહ્યું કે 'અખો શેઠ તો બડો પૈસાદાર હતો, ને તું તો ફકીર છે તે અખો શેઠ ક્યાંથી થઈ પડ્યો?' આ પ્રમાણે દરવાજા પર ગડબડ થતી હતી તે સાંભળીને મેડી પરથી બારીમાં મહારાજે ડોકિયું કર્યું ને અખાને બરાબર પિછાણ્યો, તે છતાં તેનો તિરસ્કાર કીધો. ત્યારે અખાને ઘણું દુઃખ લાગ્યું હતું. તેણે કહ્યું કે 'આ અસાર સંસારમાં જો કોઈ સાર વસ્તુ આ અધર્મીઓને માટે હોય તો તે માત્ર દ્રવ્ય'

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SECTION - A

- Instructions :
1. Question No. 1 to 12
  2. Attempt all 12 questions. All Questions are compulsory.
  3. Each question carries 5 marks
  4. Answer should be given approximately in 40 to 50 words.
- 

- Q.-1 What do you understand by path function and point function? Explain with examples
- Q.-2 Explain the equivalence of Kelvin-Planck and Clausius statements.
- Q.-3 What do you understand by dry and wet compression? Which is preferred and why?
- Q.-4 Discuss how the volumetric efficiency of a compressor varies with the clearance and the pressure ratio.
- Q.-5 With a neat sketch, explain how the limitation of a Helical gear can be overcome in Herringbone gear.
- Q.-6 Explain any one inversion of Double Slider crank chain.
- Q.-7 Determine the total pressure on a circular plate of diameter 1.5 m which is placed vertically in water in such a way that the centre of the plate is 3 m below the free surface of water. Find the position of centre of pressure also.
- Q.-8 Water is flowing through a pipe having diameter 300 mm and 200 mm at the bottom and upper end respectively. The intensity of pressure at the bottom end is 24.525 N/cm<sup>2</sup> and the pressure at the upper end is 9.81 N/cm<sup>2</sup>. Determine the difference in datum head if the rate of flow through pipe is 40 lit/s.
- Q.-9 What is meant by abnormal combustion? Explain the phenomena of knock in SI engines.
- Q.-10 What is non-destructive testing (NDT)? Explain the application of NDT in any two fields.
- Q.-11 What is "Energy audit"? Explain the types of energy audit in brief.
- Q.-12 Explain in brief energy efficiency versus energy conservation. Write stepwise procedure to calculate boiler efficiency.
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SECTION - B

- Instructions :
1. Question No. 13 to 20
  2. Attempt all 8 questions. All Questions are compulsory.
  3. Each question carries 10 marks
  4. Answer should be given approximately in 80 to 90 words.
- 

- Q.- 13. Show that the efficiency of a reversible engine operating between two given constant temperatures is the maximum.
- Q.- 14. An air standard dual cycle has a compression ratio of 16 and compression begins at 1 bar, 50°C. The maximum pressure is 70 bar. The heat transferred to air at constant pressure is equal to that at constant volume. Estimate (a) the pressure and temperatures at the cardinal points of the cycle, (b) the cycle efficiency, and (c) the m.e.p of the cycle,  $c_v = 0.718\text{kJ/kgK}$ ,  $c_p = 1.005\text{kJ/kgK}$ .
-

- Q.- 15. A friction clutch is used to rotate a machine from a shaft rotating at a uniform speed of 250 rpm. The disc type clutch has both of its sides effective, the coefficient of friction being 0.3. The outer and the inner diameters of the friction plate are 200 mm and 120 mm respectively. Assuming uniform wear of the clutch, the intensity of the pressure is not to be more than 100 kN/m<sup>2</sup>. If the moment of inertia of the rotating parts of the machine is 60.5 kg-m<sup>2</sup>, determine the time to attain full speed by the machine and the energy lost slipping of the clutch.
- What will be the intensity of the pressure, if the condition of the uniform pressure of the clutch is considered? Also determine the ratio of power transmitted with uniform wear to that with uniform pressure
- Q.- 16. What is cavitation and what are its causes? How will you prevent the cavitation in hydraulic machines?
- Q.- 17. Briefly explain a typical electronic engine management system.
- Q.- 18. In an Otto cycle air at 17°C and 1 bar is compressed adiabatically until the pressure is 15 bar. Heat is added at constant volume until the pressure rises to 40 bar. Calculate the air-standard efficiency, the compression ratio, and the mean effective pressure for the cycle. Assume  $C_v = 0.717$  kJ/kg K and  $R = 8.314$  kJ/kmol K.
- Q.- 19. State the difference between properties: hardness, yield strength, ultimate tensile strength, fracture strength, creep strength, fatigue strength and impact toughness.
- Q.- 20. A cogeneration plant installation was to reduce the net yearly energy bill by Rs. 24 lakhs. Now the capital cost for the new cogeneration installation is Rs. 90 lakhs, and the net cost of maintaining and operating are Rs. 6 lakhs. Find the expected payback duration for the project.

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#### SECTION - C

- Instructions :
1. Question No. 21 to 24
  2. Attempt all 4 questions. All Questions are compulsory.
  3. Each question carries 15 marks
  4. Answer should be given approximately in 130 to 140 words.
- 

- Q.- 21. A reversible heat engine operates between two reservoirs at temperatures of 600°C and 40°C. The engine drives a reversible refrigerator which operates between reservoirs at temperatures of 40°C and -20°C. The heat transfer to the heat engine is 2000 kJ and the network output of the combined engine refrigerator plant is 360 kJ. Evaluate the heat transfer to the refrigerant and the net heat transfer to the reservoir at 40°C.
- Q.- 22. In a symmetrical tangent cam operating a roller follower, the least radius of the cam is 30 mm and roller radius is 17.5 mm. The angle of ascent is 75° and the total lift is 17.5 mm. The speed of the cam shaft is 600 rpm. Calculate (i) the principal dimensions of the cam (ii) the accelerations of the follower at the beginning of the lift, where straight flank merges into the circular nose and at apex of the circular nose. Assume that there is no dwell between ascent and descent.
- Q.- 23. The three-jet Pelton turbine is required to generate 10,000 kW under a net head of 400 m. The blade angle at outlet is 15° and the reduction in the relative velocity while passing over the blade is 5%. If the overall efficiency of the wheel is 80%,  $C_v = 0.98$  and speed ratio = 0.46, then find: (a) the diameter of the jet, (b) total flow in m<sup>3</sup>/s and (c) the force exerted by a jet on the buckets. If the jet ratio is not to be less than 10, find the speed of the wheel for a frequency of 50 hertz/sec and the corresponding wheel diameter.
- Q.- 24. Explain various case hardening processes with their characteristics.

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SECTION - A

- Instructions :
1. Question No. 1 to 12
  2. Attempt all 12 questions. All Questions are compulsory.
  3. Each question carries 5 marks
  4. Answer should be given approximately in 40 to 50 words.
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- Q. 1. Water is heated in a counterflow double pipe heat exchanger from 35°C to 85°C by an oil with a specific heat of 1.5 kJ/kgK and a mass flow rate of 50 kg/min. The oil is cooled from 215°C to 180°C, and the overall coefficient of heat transfer is 400 W/m<sup>2</sup> K. Determine the rate of heat transfer and surface area of heat exchanger.
- Q. 2. Explain why the conductivity of metals decreases and the conductivity of insulating materials increases with increase in temperature.
- Q. 3. What are the desirable properties of ideal refrigerant. Name the different refrigerants generally used.
- Q. 4. A piece of material is subjected to tensile stress of 70 N/mm<sup>2</sup> and 50 N/mm<sup>2</sup> at right angles to each other. Find fully the stresses on a plane the normal of which makes an angle of 35° with the 70 N/mm<sup>2</sup> stress.
- Q. 5. Write the assumptions used in simple theory of bending.
- Q. 6. Write the basic assumptions for the perfect truss.
- Q. 7. An elevator has a downward acceleration of 1 m/s<sup>2</sup>. What force will be transmitted to the floor of the elevator by a man weighing 500 N travelling in the lift? Find the force if the elevator had an upward acceleration of 1 m/s<sup>2</sup>.
- Q. 8. Write the expression for static, limiting wear load and dynamic load for spur gears.
- Q. 9. Consider a peak rectifier fed by a 60-Hz sinusoid having a peak value  $V_p = 100$  V. Let the load resistance  $R = 10$  k. Find the value of the capacitance  $C$  that will result in a peak-to-peak ripple of 2 V. Also, calculate the fraction of the cycle during which the diode is conducting and the average and peak values of the diode current.
- Q. 10. A shunt regulator utilizes a zener diode whose voltage is 5.1 V at a current of 50 mA and whose incremental resistance is 7Ω. The diode is fed from a supply of 15-V nominal voltage through a 200 Ω resistor. What is the output voltage at no load? Find the line regulation and the load regulation.
- Q. 11. What is Industry 4.0? What is the difference between Industry 4.0 and the Internet of Things?
- Q. 12. What is nanotechnology? What is the major impact of nano technology on society?

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SECTION - B

- Instructions :
1. Question No. 13 to 20
  2. Attempt all 8 questions. All Questions are compulsory.
  3. Each question carries 10 marks
  4. Answer should be given approximately in 80 to 90 words.
- 

- Q. 13. A steel pipe of 10 cm bore and 12 cm outside diameter carries hot water at 80°C. If the thermal conductivity of the pipe is 54 W/mK, the surrounding temperature 15°C, and the inner and outer heat transfer coefficients 1kW/m<sup>2</sup>K and 9W/m<sup>2</sup>K respectively, calculate the heat loss per metre length of pipe and the surface temperatures. Also calculate the heat loss and the surface temperatures when the pipe is covered with an insulation of thermal conductivity of 0.048 W/mK, 4 cm thick with the outer surface heat transfer coefficient reduced to 7 W/m<sup>2</sup>K.
- Q. 14. Define the following: Specific humidity, Absolute humidity, Relative humidity, and Dew point temperature.
- Q. 15. A solid shaft of 250 mm diameter has the same cross-sectional area as the hollow shaft of the same material with inside diameter of 200 mm. (a) Find the ration of power transmitted by the two shafts for the same angular velocity, and (b) compare the angles of twist in equal lengths of these shafts, when stressed to the same intensity.
- Q. 16. Two men M<sub>1</sub> and M<sub>2</sub> of mass 50 kg and 75 kg, dive off the end of a boat of mass M = 250 kg so that their relative velocity with respect to the boat is 4m/s. If the boat is initially at rest, find its final velocity if (a) two men dive simultaneously (b) the man of mass 75 kg dive first followed by the man of mass 50 kg (c) the man of mass 50 kg dive first followed by the man of mass 75 kg.
- Q. 17. Following data is given for a 360° hydrodynamic bearing: Radial load = 10kN, Journal speed = 1440 rpm, unit bearing pressure = 1000 kpa, clearance ratio (r/c) = 800, viscosity of lubricant = 30 mPas. Assuming that the total heat generated in bearing is carried by the total oil flow in the bearing. Calculate (i) the dimensions of the bearing, (ii) coefficient of friction, (iii) power lost in friction (iv) total flow of oil, (v) temperature rise.
- Q. 18. Consider a p-n junction in equilibrium at room temperature (T = 300 K) for which the doping concentrations are N<sub>A</sub>=10<sup>18</sup>/cm<sup>3</sup> and N<sub>D</sub>=10<sup>16</sup>/cm<sup>3</sup> and the cross-sectional area A=10<sup>-4</sup>cm<sup>2</sup>. Calculate p<sub>p</sub>, n<sub>p0</sub>, n<sub>n</sub>, p<sub>n0</sub>, V<sub>0</sub>, W, x<sub>n</sub>, x<sub>p</sub>, and Q<sub>J</sub>. Use n<sub>i</sub> = 1.5×10<sup>10</sup>/cm<sup>3</sup>.
- Q. 19. Consider the circuit shown in Figure 1. A string of three diodes is used to provide a constant voltage of about 2.1 V. We want to calculate the percentage change in this regulated voltage caused by (a) a ±10% change in the power-supply voltage, and (b) connection of a 1 kΩ load resistance.

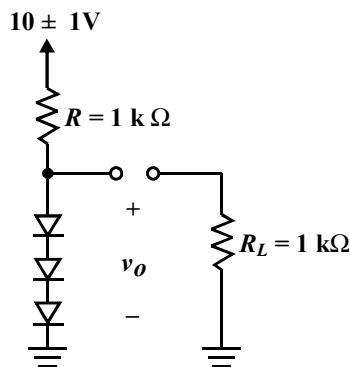


Figure1

- Q. 20. Define composite material. What are the three primary advantages of composite materials? Name few applications of composites.

SECTION - C

- Instructions :**
1. Question No. 21 to 24
  2. Attempt all 4 questions. All Questions are compulsory.
  3. The marks of the question are shown on the right side.
  4. Answer should be given approximately in 130 to 140 words.

- Q. 21.** The temperature limits of an ammonia refrigerating system are 25°C and -10°C. If the gas is dry at the end of compression, calculate the coefficient of performance of the cycle assuming no undercooling of the liquid ammonia. (15)
- Use the following table for properties of ammonia:

Temperature ( °C )	Liquid heat ( kJ/kg )	Latent heat ( kJ/kg )	Liquid entropy ( kJ/kg K )
25	298.9	1166.94	1.1242
-10	135.37	1297.68	0.5443

- Q. 22 (A)** A steel bolt 650 mm<sup>2</sup> cross sectional area passes centrally through a copper tube of 1200 mm<sup>2</sup> cross sectional area. The tube is 500 mm long and is closed by rigid washers, which are fastened by the threads on the steel bolt. The nut is now tightened by ¼ of a turn. Find the stress in the bolt and the tube if the pitch of the thread is 3 mm. (7)
- Take  $E_s = 2.05 \times 10^5 \text{ N/mm}^2$  and  $E_c = 1.1 \times 10^5 \text{ N/mm}^2$ .
- (B)** A cylindrical shell 2 m long and 90 cm internal diameter and 12 mm metal thickness is subjected to an internal pressure of 1.6 N/mm<sup>2</sup>. (8)
- Determine (a) maximum intensity of the shear stress, and (b) changes in the dimensions of the shell.
- Take  $E = 2 \times 10^5 \text{ N/mm}^2$  and  $1/m = 0.3$ .
- Q. 23 (A)** A uniform spherical ball of mass  $m$  and radius  $r$  is projected along a rough horizontal plane with an initial velocity of  $v_0$  and zero angular acceleration. (10)
- The coefficient of friction between the ball and the plane is  $\mu$ . Determine the time after which the ball will start rolling without slipping. Also, find the linear and angular velocities of ball at the time.
- (B)** The resultant of two concurrent forces is 2500 N and angle between the forces is 90°. (5)
- The resultant makes an angle of 46° with one of the forces. Find the magnitude of each force.
- Q. 24.** Analyse the circuit given in Figure 2 to determine the voltages at all nodes and the currents through all branches. (15)

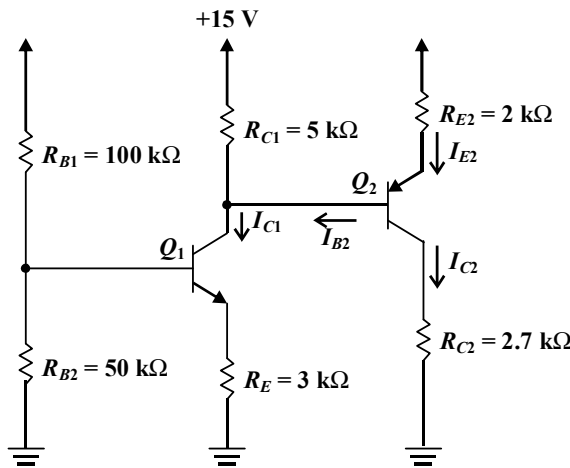


Figure 2

SECTION - A

- Instructions :
1. Question No. 1 to 12
  2. Attempt all 12 questions. All Questions are compulsory.
  3. Each question carries 5 marks
  4. Answer should be given approximately in 40 to 50 words.

- Q. 1. Solve the differential equation:  $(1+x)^2 \frac{d^2y}{dx^2} + (1+x) \frac{dy}{dx} + y = 2\sin[\log(1+x)]$
- Q. 2. Evaluate  $\int_C \tan z \, dz$  where C is the circle  $|Z|=2$
- Q. 3. Which die casting machines usually have a higher production rate, cold chamber or hot chamber, and why?
- Q. 4. Define and distinguish the two terms 'heat transfer factor' and 'melting factor' in relation to welding.
- Q. 5. How does aggregate planning differ from the master production scheduling?
- Q. 6. What are the common methods for assessing surface roughness?
- Q. 7. Explain why a unilateral tolerance system is generally preferred over bilateral system.
- Q. 8. Explain distributed numerical control (DNC).
- Q. 9. What are the three basic elements of an automated systems?
- Q. 10. What is the necessity of nuclear waste disposal?
- Q. 11. Five different jobs can be done on five different machines. The set-up and take-down time costs are assumed to be prohibitively high for changeovers. The matrix below gives the cost in rupees of producing job i on machine j different jobs. How should the jobs be assigned to the various machines so that the total cost is minimized?

	M <sub>1</sub>	M <sub>2</sub>	M <sub>3</sub>	M <sub>4</sub>	M <sub>5</sub>
J <sub>1</sub>	11	17	8	16	20
J <sub>2</sub>	9	7	12	6	15
J <sub>3</sub>	13	16	15	12	16
J <sub>4</sub>	21	24	17	28	26
J <sub>5</sub>	14	10	12	11	13

- Q. 12. A firm manufactures headache pills in two sizes A and B. Size A contains 2 grains of aspirin, 5 grains of bicarbonate and 1 grain of codeine. Size B contains 1 grain of aspirin, 8 grains of bicarbonate and 6 grains of codeine. It is found by users that it requires at least 12 grains of aspirin, 74 grains of bicarbonate and 24 grains of codeine for providing immediate relief. Formulate the problem as standard L.P.P. It is required to determine the minimum number of pills a patient should take to get immediate relief.



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**SECTION - B**

- Instructions :**
1. Question No. 13 to 20
  2. Attempt all 8 questions. All Questions are compulsory.
  3. Each question carries 10 marks
  4. Answer should be given approximately in 80 to 90 words.
- 

Q. 13. Evaluate  $\int_0^\infty \int_0^\infty e^{-(x^2+y^2)} dx dy$  by changing to polar coordinates and hence show that

$$\int_0^\infty e^{-x^2} dx = \frac{\sqrt{\pi}}{2}$$

Q. 14. If  $w = A + iB$  represent the complex potential for an electrical field and  $B = x^2 - y^2 + \frac{x}{x^2 + y^2}$ ,

determine the function A.

Q. 15. A 300 mm wide strip 25 mm thick is fed through a rolling mill with two powered rolls of radius 250 mm. The work thickness is to be reduced to 22 mm in one pass at a roll speed of 50 rev/min. The work material has a flow curve defined by  $K = 275$  MPa and  $n = 0.15$ , and the coefficient of friction between the rolls and the work is assumed to be 0.12. Determine if the friction is sufficient to permit the rolling operation to be accomplished. If so, calculate the roll force, torque and the horsepower.

Q. 16. Write about various design considerations in Jigs.

Q. 17. What is an LVDT? Explain its working principle. Discuss the characteristic curve of an LVDT with a sketch.

Q. 18. What is transformation? How many types of transformation are there to change geometry.

Q. 19. Explain the closed cycle gas turbine plant with sketch.

Q. 20. An established company has decided to add a new product to its line. It will buy the product from the manufacturing concern, package it and sell it to a number of distributors that have been selected on a geographical basis. Market research has already indicated the volume expected and size of sales force required. The steps in the following table are to be planned.

Activity	Preceding activity	Duration (days)
A	-	6
B	A	4
C	B	7
D	A	2
E	D	4
F	E	10
G	-	2
H	G	10
I	J, H	6
J	-	13
K	A	9
L	C, K	3
M	I, L	5

- a. Draw AOA network for this project. [5]
- b. Find the critical path and project completion time. [5]

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**SECTION - C**

- Instructions :**
1. Question No. 21 to 24
  2. Attempt all 4 questions. All Questions are compulsory.
  3. The marks of the question are shown on the right side.
  4. Answer should be given approximately in 130 to 140 words.
- 

**Q. 21.** Verify the Green Theorem for  $f(x, y) = e^{-x} \sin y$  &  $g(x, y) = e^{-x} \cos y$  and C is the square with vertices  $(0,0)$   $(\pi/2,0)$   $(\pi/2,\pi/2)$   $(0,\pi/2)$ . (15)

**Q. 22 (A)** Explain the factors that should be considered during the selection of an appropriate unconventional machining process for a given job. (7)

**(B)** Explain with sketch the principle of working of plasma arc machining process. (8)

**Q. 23 (A)** Write a short note on Hermite curve. (5)

**(B)** Explain the structure of CNC like spindle, drives, actuation system, feedback device and axis standards. (10)

**Q. 24.** Solve the following problem using Simplex method. (15)

**Maximize**  $Z = 5x_1 - 2x_2 + 3x_3,$

**Subject to**  $2x_1 + 2x_2 - x_3 \geq 2,$

$3x_1 - 4x_2 \leq 3,$

$x_2 + 3x_3 \leq 5,$

$x_1, x_2, x_3 \geq 0,$