

# ESE 2018

## Paper-1

Mechanical Engineering

► Questions & Solutions

- 1. Statement (I):** A greenhouse gas is any gas in the atmosphere which absorbs and re-emits heat and thereby keeps the planet's atmosphere warmer than it otherwise would be.

**Statement (II):** In the Earth's atmosphere, water vapor is one of the main greenhouse gases.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** Greenhouse gases absorb and emit radiation at specific wavelengths within the spectrum of thermal infrared radiation emitted by the Earth's surface, the atmosphere itself, and by clouds. Thus, it keeps the earth's atmosphere warmer. Water vapor (H<sub>2</sub>O), carbon dioxide (CO<sub>2</sub>), nitrous oxide (N<sub>2</sub>O), methane (CH<sub>4</sub>) and ozone (O<sub>3</sub>) are the primary greenhouse gases in the Earth's atmosphere. Thus, both the statements are correct. But statement II is not explaining the statement I.

- 2. Statement (I):** What is legal may not always be ethical.

**Statement (II):** Ethical standards and the law, share the same theme, i.e., what is permissible and impermissible.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** If someone has followed the law, it does not mean that she/he has become ethical as law itself can be unethical as law itself can be unethical e.g. anti-black law was prevailed in America in 18<sup>th</sup>, 19<sup>th</sup> century. Ethics is not following the law. In law, a man is guilty when he violates the rights of another. In ethics, he is guilty if he thinks of doing so. A good system of law does incorporate many ethical standards, but law can deviate from what is ethical.

- 3. Statement (I):** Increasingly, employers have generally tended to expect engineers to possess both hard skills and soft skills.

**Statement (II):** Soft skills mean the knowledge of software.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** • Hard skills are the technical skills we use each day to perform our job. Some examples would be our computer skills or procedural knowledge we apply in our job.  
• Soft skills are the subtle behaviors and communication styles that help make a work environment or interaction with another person easier to manage. Soft skill examples include communication skills, such as voice inflection and gestures. Hence to compete in the today's competitive scenario, knowledge of both the skills are expected.

**4. Statement (I):** Information and communication technologies can play a key role in the development and economic growth of rural India.

**Statement (II):** Successful ICT application in e-governance giving respective one-stop solutions for rural communities is an absolute need of the hour

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
C. Statement (I) is true; but Statement (II) is false  
D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** Information and Communication Technologies (ICTs) play a key role in development & Economic growth of the Developing countries of the World. Major part of developing

countries comprises of rural areas Combining ICT in Rural Development can not only speed up the development process but it can also fill the gaps between the educationally and technologically backward and forward sections of the society. The infusion of Information and Communication Technology (ICT) is playing a prominent role in strengthening such a demand. Several e-governance projects have attempted to improve the reach, enhance the base, minimize the processing costs, increasing transparency and reduce the cycle times. Introduction of simputers, e-chaupal are some of the initiatives by the government that has up to an extent been able to bring the rural population in contact with the information technology. Hence both the statements are correct and the second is following the first.

**5. Statement (I):** Mechanically, pearlite has properties intermediate between the soft ductile ferrite and the hard brittle cementite.

**Statement (II):** Alpha iron can be made magnetic above 768°C.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
C. Statement (I) is true; but Statement (II) is false  
D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** Pearlite is a mixture of 87.5% ferrite and 12.5% cementite as ferrite is soft and ductile so, pearlite is soft but less than ferrite cementite is hard and brittle so, based on its percentage in pearlite, pearlite is less hard brittle in comparison to cementite. 768 °C is Currie temperature below which iron is magnetic.

**6. Statement (I):** Long chain polymers are weaker than most ceramics and metals.  
**Statement (II):** The molecular chains in long chain polymers are bonded to each other with Van der Waals bonds.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** The molecular chains in long chain polymers are bonded to each other with weak Van der walls bonds and hence polymers are weaker than most ceramics and metals.

**7. Statement (I):** Metal carbides and carbon are used as refractories as they resist oxidation.

**Statement (II):** Metal carbides and carbon are not particularly suitable for high temperature applications.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the

- correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** Metal carbides and carbon are suitable for high temperature applications; hence statement II is wrong.

**8. Statement (I):** High strength, super-duralumin alloys are adopted in the manufacture of aero engines.

**Statement (II):** Precipitation heat treatment is adopted for duralumin products.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** High strength, super duralumin alloys are adopted in the manufacture of zero engines as they are light in weight. Also precipitation heat treatment is adopted for duralumin products.

Hence both statements are correct but statement II is not explanation of statement I.

**9. Statement (I):** Project management is essentially the process to plan its implementation and to pre-determine the period-wise need of resources including funds and personnel, given the choice of total duration and quality standards.

**Statement (II):** Of the four dimensions (not denying that there can be some more) of a project, viz., scope, cost, time and quality, only any two can be pre-assigned; others have to abide by these two prescriptions.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** It is not necessary that out of scope, cost, time and quality, only two can be pre-assigned e.g. Scope, time and quality can be pre-assigned, thereafter cost can be determined.

**10. Statement (I):** Preparation of bar charts is merely a scheduling operation while the preparation and analysis of a network is a planning function.

**Statement (II):** A bar chart, prima facie, does not show the interrelationships between activities.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the

- correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** Bar chart is simply used for scheduling of projects whereas project planning involves preparation and analysis of network diagram i.e. project scheduling. Biggest drawback of bar chart is that they do not show inter relationship between activities.

**11. Statement (I):** The size of a hydrogen balloon increases as it rises in the air.

**Statement (II):** The material of the balloon can be easily stretched.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** The size of hydrogen balloon increases as it rises in the air because the pressure of air keeps on decreasing.  
 The material of the balloon is easily stretched.

**12. Statement (I):** Normally carbon dioxide is not considered as an air pollutant.

**Statement (II):** Carbon dioxide is a constituent of atmospheric air.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** Carbon dioxide in normal circumstances is not considered as an air pollutants. Carbon dioxide is not harmful to ordinary things, to human beings, or to animals, or to plants. For example the air quality index (AQI) does not includes CO<sub>2</sub> as pollutant.

By volume, atmospheric air contains 78.09% nitrogen, 20.95% oxygen, 0.93% argon, 0.04% carbon dioxide, and small amounts of other gases. Thus, it is part of atmospheric air.

**13. Statement (I):** To practice terraced cultivation in hill slopes, it can be admissible to have the vertical face of the terraced boundary run perpendicular to the ground trace of the fault line, if any, in any, the underlying land.

**Statement (II):** Fault lines are susceptible to slips and should be guarded against in land use.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** Terrace farming and contour farming are ecofriendly technique of agriculture carried out in hilly areas. Where terrace and contours are kept perpendicular to the natural slope. Fault lines are ecological fragile zones prone to landslides.

**14. Statement (I):** Green energy refers to one which does not harm the ecosystem of planet Earth.

**Statement (II):** All renewable energy is green energy.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** Green energy like solar, wind, biomass, tidal are ecofriendly. However large hydro i.e. renewable causing deforestation and wild life loss which-is detrimental to environment.



**15. Statement (I):** Total Productive Maintenance (TPM) is productive maintenance involving total participation as a group activity.

**Statement (II):** Under the aegis of TPM, individual operators generally take care of minor maintenance aspects.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** TPM involves all the departments and all the employees of the organization from top to bottom. In TPM, operators working at the equipment are trained and given a sense of ownership and hence they generally take care of minor maintenance aspects.

**16. Statement (I):** The concept of Just-In-Time is operationalized when the exact number of units required are bought at each successive stage of production, at the appropriate time.

**Statement (II):** Just-In-Time concept has been expanded to mean a manufacturing philosophy of eliminating waste.

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT

the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** Just-In-Time is possible when the exact demand is known. Thus it minimizes the need for inventory and eliminates waste. Just-In-Time is also linked with lean manufacturing, thus minimizing the consumption of resources and eliminating waste.

**17. Statement (I):** Quality is essential for survival and growth of an organization in the present era of tough competition.

**Statement (II):** The concept of quality is confined only to construction and manufacturing organizations

- A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)  
 B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)  
 C. Statement (I) is true; but Statement (II) is false  
 D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** Quality is essential because of the tough competition in the era of globalization and information technology. The companies have to compete with both domestic companies. The concept of quality is not confined to construction and manufacturing sector only but it extends to all other sectors including service sectors.

**18. Statement (I):** Volcanic eruption is often accompanied by earthquakes.

**Statement (II):** Volcanoes erupt dust particles in the atmosphere.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. B**

**Sol.** Volcanoes are often found in areas of crustal weakness and the mass of the volcano itself adds to the regional strain. Most earthquakes occur in response to regional strain exerted in an area of weak faults that are caused by volcanic eruptions. Volcanoes do emit dust particles and magma in the atmosphere during eruption

**19. Statement (I):** Lifts and external staircases are provided with access from the lobby area of each floor in multistory blocks. The external staircase must be accessible through self-closing, 180°-swing unlocked doors (with provision for locking at appropriate conditions).

**Statement (II):** Such staircases should not be inadvertently subjected to spreading of smoke, but must yet provide unhindered exit from the lobby of each floor.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the

correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. A**

**Sol.** The external staircase provided in a multistory building is generally used for fire escape, hence it should be assessable through self-closing, 180° swing unlock doors. Also, it should not be subjected to spreading of smoke.

**20. Statement (I):** Atoms can neither be created nor destroyed.

**Statement (II):** Under similar conditions of temperature and pressure, equal volumes of gases do not contain an equal number of atoms.

A. Both Statement (I) and Statement (II) are individually true; and Statement (II) is the correct explanation of Statement (I)

B. Both Statement (I) and Statement (II) are individually true; but Statement (II) is NOT the correct explanation of Statement (I)

C. Statement (I) is true; but Statement (II) is false

D. Statement (I) is false; but Statement (II) is true

**Ans. C**

**Sol.** Atoms are the basic entity of any elements which can neither be created nor destroyed as conservation of mass comes into play. According to Avogadro's law equal volumes of



all gases, at the same temperature and pressure, have the same number of molecules.

**21.** What is 'Nepotism'?

- A. Undermining the morale of workers.
- B. Harassment of women workers.
- C. Being autocratic in decision-making.
- D. Hiring friends or relatives and showing favoritism in work.

- A. A
- B. B
- C. C
- D. D

**Ans. D**

**Sol.** It is the practice among those with power or influence of favoring relatives or friends, especially by giving those jobs or a good position in the organization.

**22.** What is meant by 'Conflict of Interest'?

- A. Being interested in many subjects.
- B. Hobbies interfering in education.
- C. Least interest in the job taken up or assigned.
- D. A conflict between the private interests and the official responsibilities of a person in a position of trust.

**Ans. D**

**Sol.** It is the conflict between private and public interest.

**23.** A Whistleblower is someone who

- A. Whistles classical music.
- B. Informs on any illegal, unethical or corrupt activity going on in the organization.
- C. Is adept in whistling.
- D. Boasts about himself/herself.

**Ans. B**

**Sol.** A whistleblower is a person who exposes any kind of information or activity that is deemed illegal, unethical, or not correct within an organization.

**24.** IPR protects the use the information and ideas that are of

- A. Ethical value
- B. Moral value
- C. Social value
- D. Commercial value

**Ans. D**

**Sol.** IPR (Intellectual property IP) refers to the creations of the mind, such as inventions; literary and artistic works; designs; and symbols, names and images used in commerce.

So, the answer is (d), Commercial Value.

**25.** HDI is a better index of development because

- A. GDP growth may not consider personal growth situations.
- B. It takes into consideration reduction of poverty.
- C. It covers income, health and education aspects of development.
- D. It covers promotion of growth.

**Ans. C**

**Sol.** HDI measures a country's overall achievement in its social and economic dimensions. It is a better index of development because it measures average achievement in three basic dimensions of human development: A long and healthy life, Knowledge  
A decent standard of living.

26. PQLI is based on
- Infant mortality, life expectancy and adult literacy rate.
  - Crime rate, clean environment and quality of housing.
  - Air pollution, water pollution and sanitation conditions.
  - Health, education and environment

**Ans. A**

**Sol. PQLI (Physical Quality of Life Index):** It is an attempt to measure the quality of life or well-being of a country.

The value is the average of three parameters:

- Basic literacy rate
- Infant mortality
- Life expectancy at age one

All equally weighted on a 0 to 100 scale.

$$PQLI = \frac{\text{Literacy Rate} + \text{Indexed Infant Mortality Rate} + \text{Indexed Life Expectancy}}{3}$$

27. Consider the following statements:
- Material science deals with the strength and stiffness behavior of components (buildings/machines/vehicle facilities) based on their response to imposed stresses (forces, moments, torque, etc.).
  - Material properties are dependent on their micro-structure and response to force fields and surface interaction.
- Which of the above statements is/are correct?
- 1 only
  - 2 only
  - Both 1 and 2
  - Neither 1 nor 2

**Ans. B**

**Sol.** Material science deals with properties and application of material manufacture and construction. Hence statement I is incorrect.

Material properties depends on their micro-structure and response to force fields and surface interaction. So statement II is incorrect.

28. In a radar system, the term 'Rat-Race' is used in connection with
- Modulator
  - Pulse characteristics
  - Receiver Bandwidth
  - Duplexer

**Ans. D**

**Sol.** A duplexer is an electronic device that allows bi-directional (duplex) communication over a single path.

In radar and radio communications systems, it isolates the receiver from the transmitter while permitting them to share a common antenna. Most radio repeater systems include a duplexer.

29. Consider the following statements regarding the code of ethics for Engineers:
- The safety, health and welfare of the public are of paramount importance
  - Perform services only in the area of their competence.
  - Issue public statements strictly in an objective and truthful manner.
  - Avoid deceptive acts.

Which of the above statements are correct?

- 1, 2 and 3 only
- 1, 2 and 4 only
- 3 and 4 only
- 1, 2, 3 and 4

**Ans. D**

**Sol.** Code of ethics for engineers:

- Hold paramount the safety, health and welfare of the public.

- Perform services only in areas of their competence.
- Issue public statements only in an objective and truthful manner.
- Act for each employer or client as faithful agents or trustees.
- Avoid deceptive acts.
- Conduct themselves honorably, responsibly, ethically, and lawfully so as to enhance the honor, reputation and usefulness of the profession.
- Shall approve only those engineering documents that are in conformity with applicable standards.

Serves his personal interest and not that of his professional interest.

i.e. A conflict of interest arises in the workplace when an employee has competing interests or loyalties that either are, or potentially can be at odds with each other. e.g. A person acts as an examinee as well as examiner.

**30.** Consider the following statements:

- 1) National Agricultural Portal, eNAM, is designed to create a unified national market for agricultural commodities.
  - 2) Farmers can showcase their produce online from the nearest market and the buyer can quote his price from anywhere.
- Which of the above statements is/are correct?

- A. 1 only                      B. 2 only  
C. Both 1 and 2              D. Neither 1 nor 2

**Ans. C**

**Sol.** National Agriculture Market is a pan India electronic trading portal which networks the existing Agriculture Produce Market

Committees (APMC) to create a unified national market for agricultural commodities.

- Farmers can showcase their produce online from their nearest market and traders can quote price from anywhere.
- It also ensures open price discovery and better returns to farmers.

**31.** A small production unit now works 6 days per week with  $3\frac{1}{3}$  hours of first shift every one of the 6 days and 3 hours of second shift for each of the first 5 days. Wage negotiations led to an agreement to work on 5 days a week with both shifts together clocking  $7\frac{1}{2}$  hours per day with an 8% increase in weekly wages. How much change in the hourly production would mean parity in the agreement for both management and employees?

- A. 0.8%                      B. 0.15%  
C. 1.82%                    D. 1.33%

**Ans. A**

**Sol.** In this first case, total number of hours per

$$\text{week } 6 \times \frac{10}{3} + 3 \times 5 = 35 \text{ hours}$$

$$\text{In the second case, total number of hours} = 7.5 \times 5 = 37.5 \text{ hours}$$

With increased wages, the effective hourly

$$\text{rate is } \frac{35 \times 1.08}{37.5} = \frac{37.8}{37.5} = 1.008$$

implying 0.8% as the increase in expected productivity.

**32.** What does CDMA stand for?

- A. Code Division Mobile Access  
B. Code Division Multiple Access  
C. Code Division Multiple Applications  
D. Code Division Mobile Applications

**Ans. B**

**Sol.** CDMA stands for Code Division Multiple Access.

It is a competing cell phone service technology to GSM.

**33.** Which of the following are the benefits of e-governance system?

- 1) Simplicity, efficiency and accountability.
- 2) Quality service to citizens.
- 3) Better access to information.
- 4) Expanded reach to governance.

- A. 1, 2 and 3 only      B. 1, 2 and 4 only  
C. 3 and 4 only      D. 1, 2, 3 and 4

**Ans. D**

**Sol.** Information and Communication Technology (ICT) facilitates easy disbursement of information and Right to Information (RTI), large on-line reach in service delivery, modernization and smartification of services, efficiency by improving speed, and accountability through scientific standards and information availability.

It has a mix of simplicity and complexity, for example it can simplify service delivery to people, however due to use of multiple technologies and need for frequent up-gradation of hardware and software, it may even add up some complexity.

**34.** Which of the following sets of free software tools are suitable for ICT-based education as well as an open source?

- A. Scilab, Osdag, PHP and Latex  
B. Java, LibreOffice, Audacity and Matlab  
C. Scilab, Arduino, LibreOffice and Latex  
D. Scilab, Octave, Netduino and Latex

**Ans. A**

**Sol.** Scilab: Scilab is free and open source software for numerical computation providing a powerful computing environment for engineering and scientific applications.  
Osdag: The development currently funded by the Ministry of Human Resource Development (MHRD), Govt. of India, through the FOSSEE project under the National Mission on Education (NME) through ICT.

PHP: PHP is a scripting language designed for web development.

Latex: It is used to prepare lectures notes etc.

**35.** The Hall Effect may be used to

- 1) Determine whether the semiconductor is p-type or n-type
- 2) Determine the carrier concentration.
- 3) Calculate the mobility.

Which of the above statements are correct?

- A. 1 and 2 only      B. 1 and 3 only  
C. 2 and 3 only      D. 1, 2 and 3

**Ans. D**

**Sol.** Hall Effect is used for the following applications:

- It is used to determine whether a semiconductor is n-type or p-type.
- It is used to calculate carrier concentration.
- It is used to calculate mobility
- It is used to calculate drift velocity
- It is used to calculate the conductivity of specimen.
- It is used to calculate magnetic field B.

**36.** The critical temperature above which ferromagnetic materials lose their magnetic property is called

- A. Kelvin point  
B. Curie point  
C. Recrystallization point  
D. Celsius point

**Ans. B**

**Sol.** The critical temperature at which ferromagnetic material becomes paramagnetic is known as Curie temperature. At this temperature it lose their magnetic property.

**37.** Malleable cast iron is produced  
 1) By quick cooling of cast iron.  
 2) By adding magnesium to molten cast iron.  
 3) From white cast iron by annealing.  
 Which of the above statements is/are correct?

- A. 1 only                      B. 2 only  
 C. 3 only                      D. 1, 2 and 3

**Ans. C**

**Sol.** When white cast iron is heated to a temperature high temperature of about 800 °–900° C for a prolonged period and in neutral atmosphere, then malleable cast iron formed.

Malleable cast iron is essentially white cast iron which has been modified by heat treatment.

**38.** The material used in the production of bearings is

- A. Cast iron                      B. Babbitt metal  
 C. Pig iron                      D. Steel

**Ans. B**

**Sol.** As Babbitt metals has embeddability properties it used for bearing material. It is soft alloy of tin, antimony, copper, and usually lead.

**39.** Which one of the following is termed as sacrificial protection of metal?

- A. Galvanization              B. Tinning  
 C. Organic coating            D. Inorganic coating

**Ans. A**

**Sol.** In galvanization, zinc is coated on the surface of iron to prevent it from corroding. Sacrificial protection is the process where zinc is kept near iron surface so that zinc corrodes instead of iron.

**40.** How much sulphur is required per 100 kg of final rubber product to completely crosslink butadiene rubber?

- A. 17 kg                      B. 27 kg  
 C. 37 kg                      D. 47 kg

**Ans. C**

**Sol.** Assuming only one sulphur atom is involved in each cross linking bond with butadiene, we know there is a one-to-one correspondence between the number of moles of sulphur and the number of moles of butadiene in the reaction. We are therefore able to assess the amount of sulphur required 100% cross linking.

The average molecular weight of butadiene per mole is

$$= 6 \text{ Hydrogen atoms} \times 1 \text{ g/mole} + 4 \text{ Carbon atoms} \times 12 \text{ g/mole} = 54 \text{ g/mole}$$

$$\text{Atomic weight of sulphur} = 32 \text{ g/mole}$$

$$\text{Fraction of sulphur used in butadiene rubber} = 32 / (54+32) = 0.372$$

For 100 kg of butadiene rubber, the required sulphur is 37.2 kg

**41.** What is the volume of an FCC unit cell in terms of its atomic radius R?

- A.  $\sqrt{3}R^3$                       B.  $16R^3\sqrt{2}$   
 C.  $16R^3\sqrt{3}$                       D.  $\sqrt{2}R^3$

**Ans. B**

**Sol.** Volume of unit cell =  $a^3$

$$R = \frac{\sqrt{2}a}{4} \Rightarrow a = \frac{4R}{\sqrt{2}}$$

In FCC unit cell,

$$\therefore \text{Volume} = a^3 = \left(\frac{4R}{\sqrt{2}}\right)^3 = 16\sqrt{2}R^3$$

**42.** On which of the following factors does hysteresis loss depend?

- 1) Magnetic field intensity
- 2) Frequency of the field
- 3) Volume of material
- 4) Neel temperature

- A. 1, 2 and 4 only      B. 1, 3 and 4 only  
C. 2, 3 and 4 only      D. 1, 2 and 3 only

**Ans. D**

**Sol.** Hysteresis loss =  $\eta B_{\max}^{1.6} fV$

Where, B=Magnetic field intensity

f=Frequency of the field

V=Volume of the material

**43.** The process of removing irregular portions of stones and facilitating their easy transportation is known as

- A. Quarrying              B. Reticulating  
C. Dressing                D. Pointing

**Ans. C**

**Sol.** The Dressing of stone is defined as "The process of giving a proper size, shape and finish to the roughly broken stones as obtained from the quarry."

This process is done manually or mechanically. A dressed stone is fit for use in particular situation in a building.

**44.** If  $L_j$  = the latest occurrence time for event  $j$ ,  
 $E_i$  = the earliest occurrence time for event  $i$ ,

$T_{ij}$  = the duration of activity  $\bar{i}j$ ,

what is the total float for activity  $\bar{i}j$ , ?

- A.  $L_j - E_i - T_{ij}$               B.  $L_j + E_i - T_{ij}$   
C.  $T_{ij} - E_i - L_j$               D.  $T_{ij} - L_j + E_i$

**Ans. A**

**Sol.** Total float is the maximum available time by which on activity can be delayed without affecting project completion time.

$$F_T = T_L - T_E^i - t_{ij}$$

$$= L_j - E_i - T_{ij}$$

**45.** If the EOQ is 360 units, order cost is Rs. 5 per order and carrying cost is Rs. 0.20 per unit, what is the usage?

- A. 2654 units              B. 2592 units  
C. 1872 units              D. 1574 units

**Ans. B**

**Sol.** EOQ=360

Ordering cost/order=Rs 5

Carrying cost/unit=Rs 0.20

$$EOQ = \sqrt{\frac{2DC_0}{C_c}}$$

$$360 = \sqrt{\frac{2D5}{0.2}}$$

$$D = 2592 \text{ units}$$

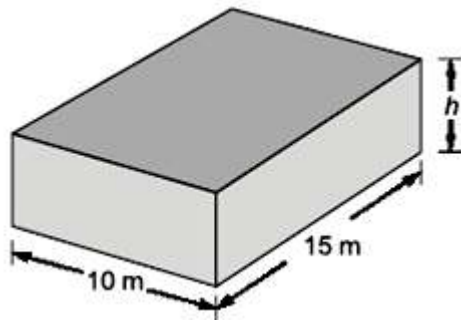
**46.** Consider the length of a room is 15 m and width is 10 m. If the sum of the areas of the floor and ceiling is equal to the sum of the areas of the four walls, then the volume of the room is

- A. 900 m<sup>3</sup>                      B. 1000 m<sup>3</sup>  
C. 1200 m<sup>3</sup>                      D. 1500 m<sup>3</sup>

**Ans. A**

**Sol.**





Given data:

Area of floor + Area of ceiling = Sum of area of four walls

$$\Rightarrow 10 \times 15 + 10 \times 15 = 15 \times h \times 2 + 10 \times h \times 2$$

$$300 = 50h$$

$$\Rightarrow h = 6 \text{ m}$$

$$\text{Volume of room} = 10 \text{ m} \times 15 \text{ m} \times 6 \text{ m}$$

$$= 900 \text{ m}^3$$

47. The objective function  $z = 3x_1 + 5x_2$  is to be maximized subjected to constraints.

$$x_1 + 2x_2 \leq 200$$

$$x_1 + x_2 \leq 150$$

$$x_1, x_2 \geq 0$$

The values of  $x_1$  and  $x_2$  in this context are, respectively

- A. 100 and 75                      B. 125 and 75  
C. 100 and 50                      D. 125 and 50

**Ans. C**

**Sol.** This question can be solved by finding point of intersection of the 2 linear equations representing the constraints

$$x_1 + 2x_2 \leq 200$$

$$\text{And } x_1 + x_2 \leq 150$$

$$\text{Which is } x_1 = 100 \text{ and } x_2 = 50$$

48. CPM method of network analysis is
- 1) Ideally suited for linearly extending works.
  - 2) Meant essentially for research and development activities.
  - 3) Activity-oriented.

4) Used for planning, scheduling and controlling purposes.

Which of the above statements are correct?

- A. 1 and 2 only                      B. 2 and 3 only  
C. 3 and 4 only                      D. 1 and 4 only

**Ans. C**

**Sol.** CPM is used for planning, scheduling and controlling of construction projects. PERT is used for research and development project. CPM can be used for any construction project which also involves linearly extending works.

49. ABC analysis in materials management is a method of classifying the inventories based on the

- A. Economic order quantity  
B. Value of annual usage of the items  
C. Volume of material consumption  
D. Quantity of material used

**Ans. B**

**Sol.** ABC analysis is based on annual usage value of the items.

A category items have highest annual usage, B category items have medium usage and C category items have least usage.

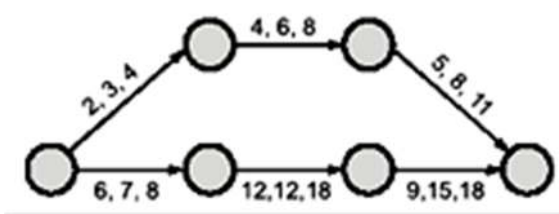
50. Crashing is

- A. Abandoning the project  
B. Completing the project with all possible haste  
C. Reduction of duration for a few of the activities  
D. Reducing the cost of the project with all needful modifications

**Ans. C**

**Sol.** Crashing is the process of obtaining minimum total cost of a project by reducing project duration along the critical path.

**51.** A simple project comprises of two start-to-end parallel paths, each with three activities in series, with no interpath dependencies. The a,m,b data (in days) for each activity are shown in the diagram. Assuming that three activities in series are enough for further computations, what will be the total project duration and its standard deviation?



- A.  $35\frac{1}{2}$  day and  $\frac{14}{3}$  days
- B.  $34\frac{1}{2}$  day and  $\frac{5}{2}$  days
- C.  $35\frac{1}{2}$  day and  $\frac{13}{6}$  days
- D.  $34\frac{1}{2}$  day and  $\frac{11}{6}$  days

**Ans. D**

**Sol.** Project duration along top path

$$= \frac{2+4 \times 3+4}{6} + \frac{4+4 \times 6+8}{6} + \frac{5+4 \times 8+11}{6}$$

$$= 3+6+8 = 17 \text{ day}$$

Project duration along bottom path

$$= \frac{6+4 \times 7+8}{6} + \frac{12+4 \times 12+18}{6} + \frac{9+4 \times 15+18}{6}$$

$$= 7+13+14.5 = 34.5 = 34\frac{1}{2}$$

Longest is  $34\frac{1}{2}$  hence this path is critical.

$$\sigma = \sqrt{\left(\frac{8-6}{6}\right)^2 + \left(\frac{18-12}{6}\right)^2 + \left(\frac{18-9}{6}\right)^2}$$

$$= \sqrt{\left(\frac{1}{3}\right)^2 + 1 + \left(\frac{3}{2}\right)^2} = \sqrt{\frac{1}{9} + 1 + \frac{9}{4}}$$

$$= \sqrt{\frac{4+36+9 \times 9}{36}} = \sqrt{\frac{121}{36}} = \frac{11}{6} \text{ days}$$

- 52.** An association of two organisms of different species for mutual benefit, and where the individuals may not be able to survive separately, is called
- A. Commensalism
  - B. Parasitic
  - C. Non-symbiotic
  - D. Symbiotic

**Ans. D**

**Sol.** Symbiosis describes close interactions between two or more different species. It is different from regular interactions between species, because in a symbiotic relationship, the two species in the relationship live together.

- 53.** Increased biological oxygen demand is an indication of
- 1) Low microbial contamination.
  - 2) Absence of microbial pollution.
  - 3) High level of microbial contamination.
- Which of the above statements is/are correct?
- A. 1 only
  - B. 2 only
  - C. 3 only
  - D. 1, 2 and 3

**Ans. C**

**Sol.** Biological oxygen demand is associated with amount of pollutants in water that required to grade the biodegradation of pollutants by microbes. Higher microbial action is indication of higher BOD.

**54.** Consider the following characteristics with respect to Alpha particles:

- 1) They have large specific ionization values.
- 2) They dissipate their energy rather slowly.
- 3) They can penetrate the outer layer of human skin.
- 4) Their emitters are heavy elements.

Which of the above statements are correct?

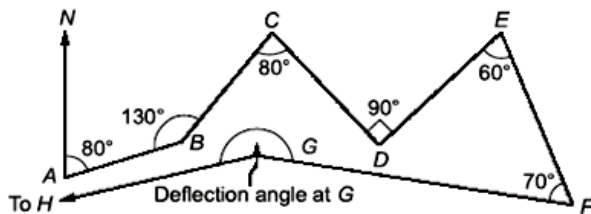
- A. 1 and 4 only                      B. 1 and 3 only  
 C. 2 and 4 only                      D. 2 and 3 only

**Ans. A**

**Sol.** Alpha particles are commonly emitted by all of the heavy radioactive nuclei occurring in the nature (uranium, thorium, radium). So, statement (4) is correct.

Alpha particles are heavily ionized matter and they quickly lose their kinetic energy. So, statement (2) is wrong but one is correct.

**55.** To isolate an enclosed area for conservation, an open traverse is run keeping close to (but outside of) the exterior boundary of the area through ground points A → B → C → D → E → F → G towards H (to be eventually located). AB is 80° to the East of the East of the North line at A. Deflection/Interior angles at B,C,D,E,F are indicated. What would be the magnitude of the deflection angle at G (as marked) so that GH may run parallel to BA? (Lengths are immaterial in this case.)



- A. 190°                                  B. 210°  
 C. 200°                                  D. 230°

**Ans. A**

**Sol.** H and A are joined to make the open traverse

a polygon of 8 sides ABCDEFGH  
 Sum of internal angles of polygon =

$$(2n - 4) \times 90 = (2 \times 8 - 4) \times 90 = 12 \times 90 = 1080^\circ$$

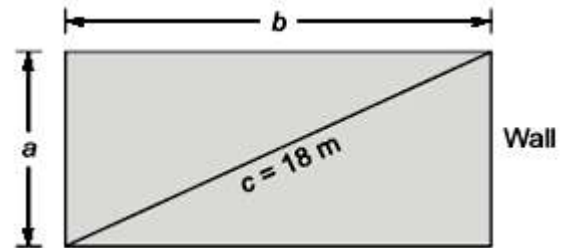
$$\begin{aligned} \angle A + \angle B + \angle C + \angle D + \angle E + \angle F + \angle G + \angle H &= 1080^\circ \\ 100^\circ + 230^\circ + 80^\circ + 270^\circ + 60^\circ + 70^\circ + \angle G + 80^\circ &= 1080^\circ \\ \angle G &= 190^\circ \end{aligned}$$

**56.** A wall, rectangular in shape, has a perimeter of 72 m. If the length of its diagonal is 18 m, what is the area of the wall?

- A. 224 m<sup>2</sup>                                  B. 486 m<sup>2</sup>  
 C. 572 m<sup>2</sup>                                  D. 606 m<sup>2</sup>

**Ans. B**

**Sol.**



Perimeter = 72 m

$$(a + b) \times 2 = 72 \text{ m}$$

$$a + b = 36 \text{ m}$$

Also, using Pythagoras Theorem,

$$a^2 + b^2 = c^2$$

$$a^2 + b^2 = 18^2$$

$$= 324$$

Now, Area =  $a \times b$

We know,

$$(a + b)^2 = a^2 + b^2 + 2ab$$

$$36^2 = 324 + 2 \times (\text{Area})$$

$$\text{Area} = 486 \text{ m}^2$$

**57.** Which one of the following is the major characteristic of deciduous trees?

- A. They do not lose their leaves.
- B. They shed their leaves annually.
- C. They synthesize their own food.
- D. They depend on other factors for their food.

**Ans. B**

**Sol.** The main characteristic of deciduous forests is that they shed their leaves annually (annually in autumn).

**58.** Consider the following statements regarding depletion of the ozone layer:

- 1) Excessive release of chlorine and bromine in the environment from man-made compounds, such as chlorofluorocarbons.
- 2) Occurrence of certain natural phenomena such as sunspots, and stratospheric winds.
- 3) Degradation of materials by ultra-violet radiation.
- 4) Major volcanic eruptions.

Which of the above can be categorized as causing ozone depletion?

- A. 1, 2 and 3 only
- B. 1, 3 and 4 only
- C. 1, 2 and 4 only
- D. 2, 3 and 4 only

**Ans. C**

**Sol.** • The chief ozone-depleting substances include chlorofluorocarbons (CFCs), carbon tetrachloride, hydrochlorofluoro carbons (HCFCs) and methyl chloroform.

- Natural phenomena like sunspots and stratospheric winds also deplete ozone layer but to a lesser degree.
- Large volcanic eruptions can potentially inject significant quantities of chlorine (via hydrochloric acid - HCl) directly in the stratosphere where the highest concentrations of ozone are found. However,

the vast majority of volcanic eruptions are too weak to reach the stratosphere, around 10 km above the surface. Thus, any HCl emitted in the eruption remains in the troposphere where it is quickly dissolved and washed out by rain.

**59.** Sanitary/municipal fills and waste heaps are unavoidably hazardous due to

- 1) Leachates
- 2) Emanating gases
- 3) Rodents and wandering animals
- 4) Automobile workshops that seem to have an affinity for such neighborhoods

Which of the above are correct?

- A. 1 and 4 only
- B. 1 and 2 only
- C. 2 and 3 only
- D. 3 and 4 only

**Ans. B**

**Sol.** Sanitary landfills or municipal fills though have provisions to reduce pollution. However, it is quite difficult to control leaching (i.e. downward movement of pollutants) and emanating gases like CH<sub>4</sub> (Methane), CO<sub>2</sub> etc.

**60.** Consider the following statements with regard to atmospheric humidity:

- 1) Absolute humidity is the amount of water vapor per unit volume.
- 2) Hygrometer is used to measure relative humidity.
- 3) Dew point is the temperature at which the relative humidity is 75%.

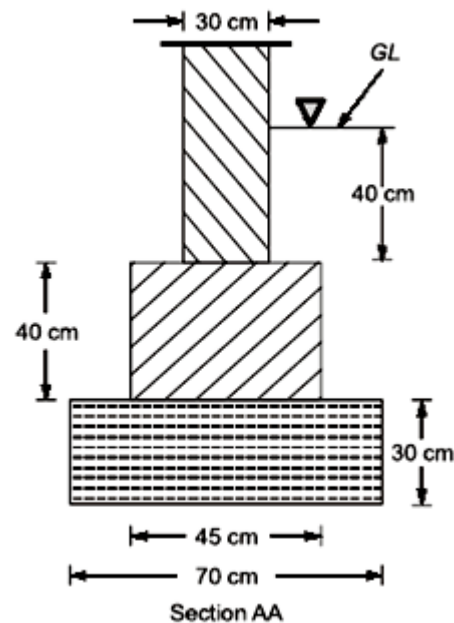
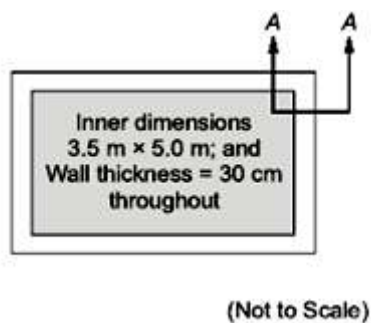
Which of the above statements are correct?

- A. 1 and 2 only
- B. 1 and 3 only
- C. 2 and 3 only
- D. 1, 2 and 3

**Ans. A**

- Sol.**
- Absolute humidity is the measure of water vapor (moisture) in the air, regardless of temperature. It is expressed as grams of moisture per cubic meter of air ( $\text{g}/\text{m}^3$ ).
  - Hygrometer is an instrument that measures relative humidity.
  - The dew point is the temperature at which a given sample of air will have a relative humidity of 100 percent; hence, the saturation temperature.

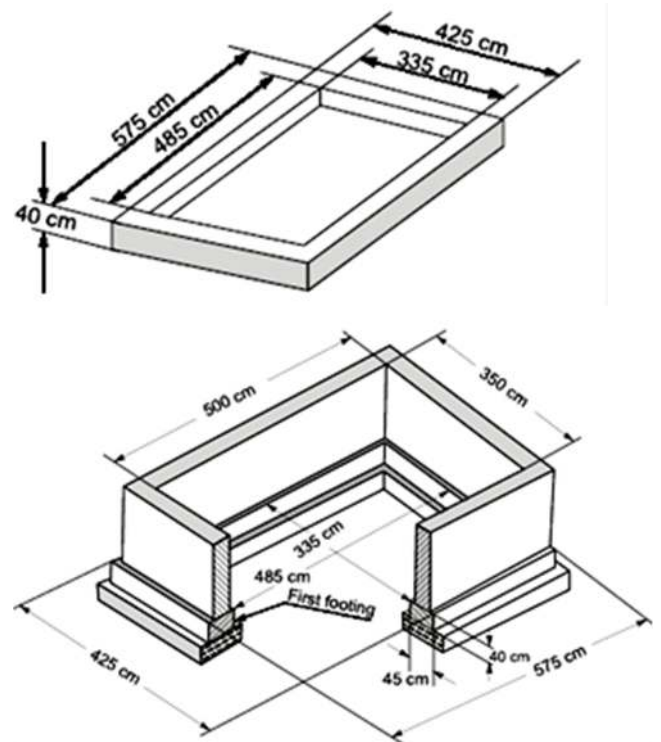
**61.** The plan view at just below window-sill level, but not showing door openings – is shown – of an outpost building of, say, the Forest Department. Section AA extending just a little above ground level GL and fully below ground level is shown. The wall and first footing are random-rubble masonry in cement mortar, and the lowest part of the foundation is of mass rubble in cement mortar. The total volume of the 40 cm deep footing for the whole building is, nearly



- A.  $3.8 \text{ m}^3$
- B.  $3.3 \text{ m}^3$
- C.  $2.8 \text{ m}^3$
- D.  $2.3 \text{ m}^3$

**Ans. B**

**Sol.** Dimension of 40 cm deep first footing are as shown below:



Total volume of first footing is

$$\begin{aligned}
 &= (575 \times 425 \times 40) - (485 \times 335 \times 40) \\
 &= 3276000 \text{ cm}^3 \\
 &= 3.276 \text{ m}^3
 \end{aligned}$$

On rounding off

$$\approx 3.3 \text{ m}^3$$

62. Let the sum of the squares of successive integers 0, 1, 2, ..., n-1, n be denoted by S. Let the sum of the cubes of the same integers be denoted by C. It is desirable that  $\frac{C}{S}$ , as n increases in steps of 'unity' from

'zero', is given by the series:

$$\frac{0}{1}, \frac{3}{3}, \frac{9}{5}, \frac{18}{7}, \frac{30}{9}, \dots \text{ (for } n = 0, 1, 2, 3, 4, \dots \text{)}.$$

What is this ratio be for n = 8?

- A.  $\frac{108}{17}$                       B.  $\frac{103}{17}$   
 C.  $\frac{103}{15}$                       D.  $\frac{100}{15}$

**Ans. A**

**Sol.** Putting the values of n, the 1<sup>st</sup> term corresponding to n=0 should be  $\frac{0}{0}$

Ignoring 1<sup>st</sup> term

$$\frac{C}{S} = \frac{\sum n^3}{\sum n^2} = \frac{\frac{\{n(n+1)\}^2}{2}}{\frac{n(n+1)(2n+1)}{6}}$$

Putting, n = 8 we get  $\frac{C}{S} = \frac{108}{17}$

63. Consider the following statements:

- 1) In work breakdown structure, top-down approach is adopted.
- 2) Duration along critical path is the shortest duration permissible.

3) PERT is probabilistic in its approach.

Which of the above statements are correct?

- A. 1 and 2 only              B. 1 and 3 only  
 C. 2 and 3 only              D. 1, 2 and 3

**Ans. D**

**Sol.** WBS follows top to down approach in which the project is divided into a number of activities and activities are further divided into sub-activities.

Critical path is the shortest duration permissible and longest duration needed. PERT is used for research and development type of projects hence it uses probabilistic approach.

64. Consider the following statements regarding Quality Circle:

- 1) It is a small group of people working in different areas of an organization with multiple expertise.
- 2) It consists of people who volunteer themselves.
- 3) It is a human resource development technique.
- 4) It is a problem-solving forum.

Which of the above statements are correct?

- A. 2, 3 and 4 only              B. 1, 2 and 3 only  
 C. 1, 3 and 4 only              D. 1, 2 and 4 only

**Ans. A**

**Sol.** Quality circle involves a voluntary group of people generally from the same work area. It leads to increase in problem solving abilities of the workers and enhances knowledge and participation of employees.



**65.** Consider the following statements regarding insolation:

- 1) It is the solar radiation that reaches the Earth's surface.
- 2) It is measured by the amount of solar energy received per square centimeter per minute.
- 3) It is the amount of solar energy absorbed by the stratosphere.

Which of the above statements are correct?

- A. 1, 2 and 3 only      B. 1 and 2 only  
C. 1 and 3 only      D. 2 and 3 only

**Ans. B**

**Sol.** Insolation is incoming solar radiation. It is incoming amount rather than absorbed amount i.e. measured in per unit area and per unit time.

**66.** Consider the following statements regarding a Grillage Foundation:

- 1) It is provided for heavily loaded isolated columns.
- 2) It is treated as a spread foundation.
- 3) It consists of two sets of perpendicularly placed steel columns.

Which of the above statements are correct?

- A. 1 and 2 only      B. 1 and 3 only  
C. 2 and 3 only      D. 1, 2 and 3

**Ans. A**

**Sol.** Grillage foundation is special type of isolated footing generally provided for heavily loaded steel stanchions and used in location of poor bearing capacity and the load of the column is distributed or spread to a very large area by means of two or more rolled steel sections (generally I section), each layer laid at right angle to each other. Both the layers of the

joists (not column) are then embedded in cement concrete.

**67.** Consider the following statements with reference to Six-Sigma:

- 1) It is a set of techniques and tools for process improvement.
- 2) It postulates that any process must not produce more than 3.4 defects per one million opportunities.
- 3) It is an initiative of Motorola.

Which of the above statements are correct?

- A. 1 and 2 only      B. 1 and 3 only  
C. 2 and 3 only      D. 1, 2 and 3

**Ans. D**

**Sol.** Six-Sigma is a set of techniques and tools which is used to process improvement. It uses techniques like DMAIC. Six-Sigma has a process performance of the level of 99.99966-/, then it produces 3.4 DPMO i.e., out of one million opportunities the process must not produce more than 3.4 defects. It was introduced by Bill Smith in 1986, while working at Motorola.

**68.** Which type of output device creates coloured images which look and feel like photographs?

- A. Electrostatic plotter  
B. Laser printer  
C. Dye sublimation printer  
D. Inkjet plotter

**Ans. C**

**Sol.** A dye-sublimation printer, also called a thermal dye transfer printer, uses heat to transfer colored dye to specially coated paper. Dye-sublimation printers can create images of photographic quality. Medical or security applications which require very high

image, use these printers. However, most home users prefer to purchase a photo printer instead of these dye-sublimation quality printers.

**69.** Consider the following statements regarding Ergonomic Design:

- 1) Reducing the stress on the spinal cord and providing for lesser fatigue-causing sitting arrangements.
- 2) Arrangements of keys on the computer keyboard towards optimizing finger stress level.
- 3) Catering to increasing demand to produce more pleasing objects.

Which of the above statements are correct?

- A. 1 and 2 only                      B. 1 and 3 only  
C. 2 and 3 only                      D. 1, 2 and 3

**Ans. A**

**Sol.** Ergonomics is the process of designing a workplace, products and systems so that they fit the people who use them. In another word it is the applied science of equipment design, intended to maximize productivity by reducing operator fatigue and discomfort. So, option (a) & (b) are correct. Option (c) is related to aesthetic design.

**70.** A weight of 240 N is dropped on to a close-coiled helical spring made up of 18 mm spring steel wire. The spring consists of 22 coils wound to a diameter of 180 mm. If the instantaneous compression is 120 mm, what is the height of drop of the weight, given  $G = 88 \times 10^3 \text{ N/mm}^2$ ?

- A. 450 mm                              B. 300 mm  
C. 250 mm                              D. 150 mm

**Ans. D**

**Sol.** Loss of P.E. = spring energy stored

$$Mg(H + \Delta) = \frac{1}{2} K \cdot \Delta^2$$

$$W(H + \Delta) = \frac{1}{2} K \Delta^2$$

$$W = 240 \text{ N}$$

$$D = 120 \text{ mm}$$

$$K = \frac{G \cdot d^4}{64R^3n}$$

$\Delta$  = Comp. in spring

d = diameter of wire = 18 mm

n = number of coils = 22

G = shear modulus =  $88 \times 10^3 \text{ N/mm}^2$

R = Radius of spring  $\frac{180}{2} = 90 \text{ mm}$

So the value of spring constant is,

$$K = \frac{88 \times 10^3 \times 18^4}{64 \times 90^3 \times 22} \text{ N/mm}$$

$$= 9 \text{ N/mm}$$

$$W(H + \Delta) = \frac{1}{2} K \cdot \Delta^2$$

$$240(H + 120) = \frac{1}{2} \times 9 \times 120^2$$

$$H + 120 = 270$$

$$H = 150 \text{ mm}$$

**71.** A rod of length  $L_r$  cross-section area  $A_1$  and modulus of elasticity  $E_1$ , has been placed inside a tube of length  $L_r$  of cross-section area  $A_2$  and modulus of elasticity  $E_2$ , and the two are firmly held by end plates. The portion of the load P applied on the end plates shared by rod and tube, respectively, are

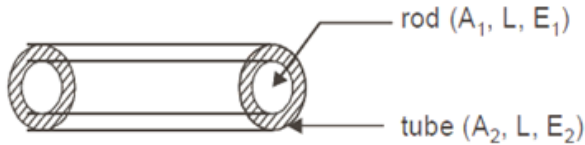
A.  $\frac{P A_1 E_1}{A_1 E_1 + A_2 E_2}$  and  $\frac{P A_2 E_2}{A_1 E_1 + A_2 E_2}$

B.  $\frac{P A_2 E_2}{A_1 E_1 + A_2 E_2}$  and  $\frac{P A_1 E_1}{A_1 E_1 + A_2 E_2}$

- C.  $\frac{P A_1 E_1}{A_1 E_1 + A_2 E_1}$  and  $\frac{P A_2 E_2}{A_1 E_2 + A_2 E_2}$
- D.  $\frac{P A_1 E_1}{A_1 + A_2}$  and  $\frac{P A_2 E_2}{A_1 + A_2}$

**Ans. A**

**Sol.**



Let Rod takes load  $P_1$  and Tube take load  $P_2$   
 $P_1 + P_2 = p$  ... (1)

Since rigid plates are not placed at both the ends hence deflection will be equal.

$$\Delta_{rod} = \Delta_{tube}$$

$$\frac{P_1 L}{A_1 E_1} = \frac{P_2 L}{A_2 E_2}$$

$$\frac{P_1}{P_2} = \frac{A_1 E_1}{A_2 E_2} \dots (2)$$

on solving (1) and (2)

$$P_1 + P_2 = P$$

$$P_2 \cdot \frac{A_1 E_1}{A_2 E_2} + P_2 = P$$

$$P_2 = \frac{P A_1 E_1}{A_1 E_1 + A_2 E_2}$$

$$\text{So, } P_1 = \frac{P \cdot A_2 E_2}{A_1 E_1 + A_2 E_2}$$

- 72.** For a vehicle travelling at 24 km/hr having a wheel radius of 0.305 m with overall gear ratio  $G = 19.915$ , and when torque transmitted is 203.6 N.m, the engine speed and power are, nearly
- A. 4155 rpm and 88.6 kW  
 B. 4500 rpm and 88.6 kW

- C. 4155 rpm and 95.4 kW  
 D. 4500 rpm and 95.4 kW

**Ans. A**

**Sol.** Engine rpm = Overall gear ratio  $\times$  Wheel rpm  
 = 19.915  $\times$  Wheel rpm  
 Wheel rpm

$$\text{Wheel rpm} = \frac{\text{Vehicle Velocity}}{\text{Circumference of wheel}} = \frac{24 \text{ km/hr}}{2 \times \pi \times 0.305 \text{ m}}$$

$$= \frac{24 \times \frac{1000}{60} \text{ m/min}}{2\pi \times 0.305 \text{ m}} = 208.7 \text{ rpm}$$

$$\text{Engine rpm} = 19.915 \times 208.7$$

$$= 4156.8 \text{ rpm}$$

$$\text{Engine power} = \text{Torque} \times \text{Angular displacement/sec}$$

$$= \frac{203.6 \text{ Nm} \times 4156.8 \times 2\pi \text{ rad}}{60 \text{ sec}}$$

$$= 88626 \text{ watt}$$

$$= 88.6 \text{ kW}$$

- 73.** A vehicle moving at a speed of 88 km/hr weighs 62293.5 N and its rolling resistance coefficient is 0.018. The rolling resistance of the vehicle is
- A. 1121.3 N                      B. 1000.4 N  
 C. 975.7 N                        D. 845.6 N

**Ans. A**

**Sol.** Rolling resistance =  $C \times W$

Where C is the rolling resistance coefficient.  
 W is the weight of the vehicle.

So,

$$\text{Rolling resistance} = 0.018 \times 62293.5 \text{ N}$$

$$= 1121.3 \text{ N}$$

- 74.** Consider the following provisions regarding safety on highways, where major improvement works may also be in progress:
- 1) Highly visible barricades to avoid falling of vehicles in deep interspaces ahead (including

drainages).

2) Wire-net provisions to ward off road slippages.

3) Signages for wild-animals crossing (like deer, elephant, etc.).

4) Signages on minor gradients.

Which of the above are relevant?

- A. 1, 2, 3 and 4      B. 1, 2 and 4 only  
 C. 1, 3 and 4 only      D. 1, 2 and 3 only

**Ans. D**

**Sol.** For highway safety minor gradient throughout the project is required to improve the drainage system. But signage on minor gradient is not required to improve the drainage system.

**75.** Which of the following concepts are relatable to income of members of the public while considering public welfare?

- 1) Sensitivity of demand  
 2) Elasticity of demand  
 3) Sensitivity of expenditure  
 4) Elasticity of expenditure

- A. 1 and 2 only      B. 2 and 3 only  
 C. 3 and 4 only      D. 1 and 4 only

**Ans. C**

**Sol.** Elasticity and sensitivity of demand are price related while elasticity and sensitivity of expenditure relates to income.

**76.** What is the maximum value of  $Z$ , if  $Z = 10x + 6y$  subject to the constraints

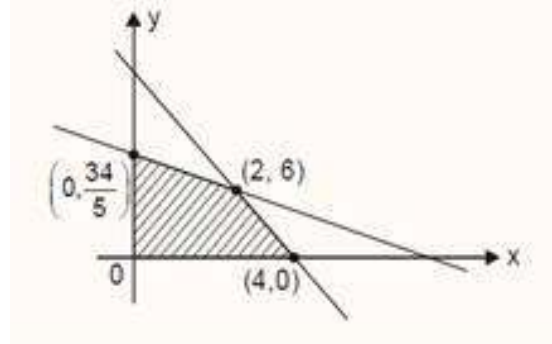
$$3x + y \leq 12, 2x + 5y \leq 34, x \geq 0, y \geq 0?$$

- A. 56      B. 52  
 C. 50      D. 40

**Ans. A**

**Sol.** This question can be solved by finding point of intersection of the 2 linear equations representing the constraints.

$$3x + y \leq 12 \text{ and } 2x + 5y \leq 34 \text{ which } x = 2 \text{ and } y = 6$$



Putting this value in the given objective function i.e.  $z = 10x + 6y$ , the maximum value of  $z$  is 56.

**77.** What is the residue of the function  $\frac{1 - e^{2z}}{z^4}$  at its pole?

- A.  $\frac{4}{3}$       B.  $-\frac{4}{3}$   
 C.  $-\frac{2}{3}$       D.  $\frac{2}{3}$

**Ans. B**

**Sol.** Expanding the function  $e^{2z}$ ,

$$\begin{aligned} \frac{1 - e^{2z}}{z^4} &= \frac{1 - \left[ 1 + 2Z + \frac{(2Z)^2}{2!} + \frac{(2Z)^3}{3!} + \frac{(2Z)^4}{4!} + \dots \right]}{z^4} \\ &= \frac{2}{z^3} - \frac{4}{2z^2} - \frac{8}{3!z} - \dots \\ \text{Residue at } Z = 0 &= \frac{-8}{3!} = \frac{-8}{6} = -\frac{4}{3} \end{aligned}$$

**78.** If  $u = \log\left(\frac{x^2 + y^2}{x + y}\right)$ , what is the value

$$\text{of } x \frac{eu}{\partial x} + y \frac{e\partial}{\partial y}?$$

- A. 0      B. 1  
 C.  $u$       D.  $eu$

**Ans. B**

$$u = \log\left(\frac{x^2 + y^2}{x + y}\right)$$

**Sol.** is non-homogeneous

$$F(u) = e^u = \frac{x^2 + y^2}{x + y}$$

is homogeneous

function of degree

$$n = x u_x + y u_y = n \frac{F(u)}{F^1(u)} = 1 \frac{e^4}{(e^4)} = 1$$

**79.** In the Laurent expansion

of  $f(z) = \frac{1}{(z-1)(z-2)}$  valid in the region  $1 < |z| < 2$ , the coefficient of  $\frac{1}{z^2}$  is

- A. 0                                      B.  $\frac{1}{2}$   
 C. 1                                        D. -1

**Ans. C**

**Sol.**

$$\begin{aligned} f(z) &= \frac{1}{(z-1)(z-2)} \\ &= \frac{-1}{z-1} + \frac{1}{z-2} \\ &= \frac{-1}{z\left(1-\frac{1}{z}\right)} + \frac{1}{-2\left(1-\frac{z}{2}\right)} \\ &= \frac{-1}{z}\left(-1\frac{1}{z}\right)^{-1} - \frac{1}{2}\left(1-\frac{z}{2}\right)^{-1} \\ &= \frac{-1}{z}\left(1 + \frac{1}{z} + \frac{1}{z^2} + \frac{1}{z^3} + \dots\right) - \frac{1}{2}\left(1 + \frac{z}{2} + \frac{z^2}{4} + \dots\right) \\ &= -\frac{1}{z} + \frac{1}{z^2} - \frac{1}{z^3} - \frac{1}{z^4} + \dots + \frac{1}{2} - \frac{z}{4} - \frac{z^2}{8} \end{aligned}$$

Coefficient of  $1/z^2 = +1$

**80.** What is the value of  $(1525)^{0.2}$  to 2 decimal places?

- A. 4.33                                      B. 4.36  
 C. 4.38                                      D. 4.30

**Ans. A**

**Sol.** Let  $x = (1525)^{0.2} = (1525)^{1/5}$

Taking log both sides,

$$\begin{aligned} \log x &= \frac{1}{5} \log 1525 \\ &= 0.6366 \end{aligned}$$

Taking antilog both sides,

$$\begin{aligned} x &= \text{anti log}(0.6366) \\ &= 4.331 \end{aligned}$$

**81.** Let  $f(x) = \begin{cases} -\pi, & \text{if } -\pi < x \leq 0 \\ \pi, & \text{if } 0 < x \leq \pi \end{cases}$  be a periodic function of period  $2\pi$ . The coefficient of  $\sin 5x$  in the Fourier series expansion of  $f(x)$  in the interval  $[-\pi, \pi]$  is

- A.  $\frac{4}{5}$     B.  $\frac{5}{4}$   
 C.  $\frac{4}{3}$     D.  $\frac{3}{4}$

**Ans. A**

**Sol.** To calculate the coefficient of  $\sin 5x$ , we have to calculate the  $b_n$  as the  $b$ -coefficient term contains the sine function. So,

$$\begin{aligned} b_5 &= \frac{1}{\pi} \int_{-\pi}^{\pi} f(x) \sin 5x dx \\ &= \frac{1}{\pi} \left[ \int_{-\pi}^0 -\pi \sin 5x dx + \int_0^{\pi} \pi \sin 5x dx \right] \\ &= \frac{1}{\pi} \left[ \left[ \frac{-\cos 5x}{5} \right]_{-\pi}^0 + \pi \left[ \frac{-\cos 5x}{5} \right]_0^{\pi} \right] \\ &= \frac{1}{\pi} \left[ -\pi \left( \frac{-2}{5} \right) + \pi \left( \frac{2}{5} \right) \right] = \frac{1}{\pi} \left[ \frac{4\pi}{5} \right] = \frac{4}{5} \end{aligned}$$

**82.** What is the cube root of 1468 to 3 decimal places?

- A. 11.340                                      B. 11.353  
 C. 11.365                                      D. 11.382

**Ans. C**

**Sol.** Let  $x^3 = 1468$

$$f(x) = x^3 - 1468 = 0$$

By Newton Raphson method

$$\begin{aligned} x_{n+1} &= x_n - \frac{f(x_n)}{f'(x_n)} \\ &= x_n - \frac{x_n^3 - 1468}{3x_n^2} \\ &= \frac{2x_n^3 + 1468}{3x_n^2} \end{aligned}$$

Start with  $x_0 = 11$

$$x_1 = \frac{2(11)^3 + 1468}{3(11)^2} = 11.377$$

$$x_2 = \frac{2(11.377)^3 + 1468}{3(11.377)^2} = \boxed{11.365}$$

**83.** Let the Eigen vector of the matrix  $\begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix}$  be

written in the form  $\begin{bmatrix} 1 \\ a \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ b \end{bmatrix}$ . What is the

value of (a+b)?

- A. 0
- B. 1/2
- C. 1
- D. 2

**Ans. B**

**Sol.** Let  $\begin{bmatrix} 1 \\ a \end{bmatrix}$  and  $\begin{bmatrix} 1 \\ b \end{bmatrix}$  be Eigen vectors for Eigen

value.

$\lambda=1,2$  re eigen values

Now,  $Ax = \lambda x$ , so

$$\begin{aligned} \begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ a \end{bmatrix} &= 1 \begin{bmatrix} 1 \\ a \end{bmatrix} \\ 1 + 2a &= 1 \\ 2a &= a \\ a &= 0 \end{aligned}$$

$$\begin{bmatrix} 1 & 2 \\ 0 & 2 \end{bmatrix} \begin{bmatrix} 1 \\ b \end{bmatrix} = 2 \begin{bmatrix} 1 \\ b \end{bmatrix}$$

$$1 + 2b = 2$$

$$2b = 2b$$

$$2b = 1$$

$$b = \frac{1}{2}$$

$$a + b = \frac{1}{2}$$

So the value of

**84.** What is the form of the function f(x) for the following data?

x	0	1	2	3
f(x)	3	6	11	18

- A.  $X^2 + 2X + 3$
- B.  $X^2 - 2X + 3$
- C.  $X^2 + 2X - 3$
- D.  $X^2 - 2X - 3$

**Ans. A**

**Sol.** The given points are (0, 3), (1, 6), (2, 11) and (3, 18)

Of all the given equations, only the option (A) satisfies the above points.

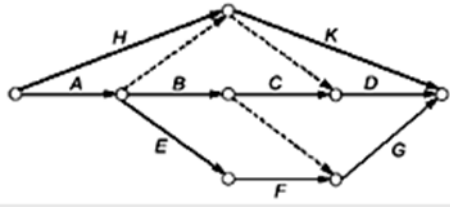
**85.** In a project there are 9 activities: A,B,C,D which are sequential; E,F,G which are sequential; H,K which are sequential. Also E,F,G run parallel to B,C,D and H,K run parallel to A,B,C,D besides these activity dependencies, it is also needful that B be completed before taking up G; A and H be completed before taking up D and K. How many dummies are to be drawn on the activity network?

- A. 5
- B. 4
- C. 3
- D. 2

**Ans. C**

**Sol.**





Number of Dummies needed = 3

86. In a particular test, the marks scored by 4 candidates A, B, C and D are as follows:

- Marks obtained by A and B add to 100;
- Marks obtained by C and D add up to those scored by A;
- B scores 4 times of D;
- D scores 10 marks less than C.

The marks obtained by C will be

- A. 30                                      B. 15  
C. 20                                      D. 25

Ans. D

Sol.

$$A + B = 100$$

$$C + D = A$$

$$B = 4D$$

$$D = C - 10 \text{ or } C = D + 10$$

$$A + 4D = 100$$

Also,

$$D + D + 10 = A$$

$$A = 2D + 10$$

Solving these 2 equations

given  $D = 15$  and  $C = 25$ .

87. The 12 digits on the face of a clock are to be represented employing contributions of only the number 9 as either 9 or  $\sqrt{9}$ . The other prescribed conditions are (i) the least number of uses alone are permitted; and (ii) when alternates are possible, use of 9 will be preferred over use of  $\sqrt{9}$ , which should be

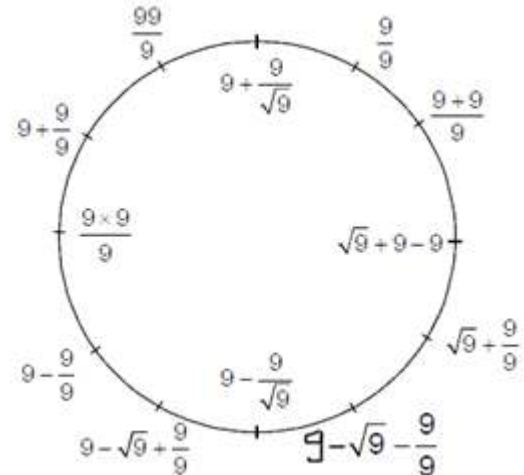
used minimally. How many times

would  $\sqrt{9}$  have to be used?

- A. 6                                      B. 5  
C. 4                                      D. 3

Ans. A

Sol.



$$\boxed{3} = \frac{9}{\sqrt{9}};$$

$$\boxed{4} = \sqrt{9} + \frac{9}{9};$$

$$\boxed{5} = 9 - \sqrt{9} - \frac{9}{9};$$

$$\boxed{6} = 9 - \sqrt{9};$$

$$\boxed{7} = 9 - \sqrt{9} + \frac{9}{9};$$

$$\boxed{12} = 9 - \sqrt{9};$$

88. Circle A is 4 cm in diameter; circle B is 5 cm in diameter. Circle C has its circumference equal to the sum of the circumferences of both A and B together. What will be the ratio of the area of circle C, with respect to the area of circle A and circle B respectively.

- A. 5.0625 and 1.84      B. 3.875 and 1.84  
C. 5.0625 and 3.24      D. 3.875 and 3.24

Ans. C

**Sol.** Diameter of the circle A = 4 cm

Circumference of circle A =  $4\pi$

$$A = \pi \left(\frac{4}{2}\right)^2$$

Area of the circle

Also,

Diameter of the circle B = 5 cm

Circumference of circle B =  $5\pi$

$$B = \pi \left(\frac{5}{2}\right)^2$$

Area of the circle

Now, circumference of circle C =

Circumference of circle A + Circumference of circle B =  $4\pi + 5\pi = 9\pi$

Diameter of circle C = 9 cm

$$C = \pi \left(\frac{9}{2}\right)^2 = \pi \left(\frac{81}{4}\right)$$

Area of circle

Ratio of area of circle C w.r.t. area of circle

$$A = \frac{4.5^2}{2^2} = 5.0625$$

Ratio of area of circle C w.r.t. area of circle

$$B = \frac{4.5^2}{2.5^2} = 3.24$$

**89.** The equation,  $x^3 - 8x^2 + 37x - 50 = 0$  is factored and it has  $(3 + 4i)$  as one of its roots. What is the real root of this equation?

A. 2

B. 4

C. 6.5

D. 13

**Ans. A**

**Sol.** Given equation is  $x^3 - 8x^2 + 37x - 50 = 0$

Let the roots of this equation be  $\alpha, \beta$  and  $\gamma$ .

With one root  $\alpha$  as  $3 + 4i$ , the other root is

its conjugate i.e.  $\beta = 3 - 4i$

$$\alpha + \beta + \gamma = -\frac{b}{a} = 8$$

$$(3 + 4i) + (3 - 4i) + \gamma = 8$$

$$\gamma = 2$$

So the third root is 2.

**90.** Given that 0.8 is one root of the equation,  $X^3 - 0.6X^2 - 1.8X + 1.344 = 0$ . The other roots of this equation will be

A. 1.1 and -1.4

B. -1.2 and 1.4

C. 1.2 and -1.4

D. -1.1 and 1.4

**Ans. C**

**Sol.** Given equation in  $X^3 - 0.6X^2 - 1.8X + 1.344 = 0$

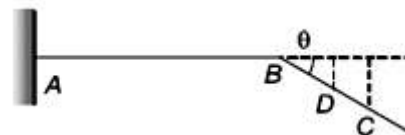
If a, b & c are the roots of the above equation.

Then,  $a+b+c = 0.6$ ,  $ab+bc+ac = -1.8$  &  $abc = -1.344$

So, the only option (C) is satisfying given equation so it is the right answer.

**91.** A cantilever beam ABC is shown to a highly exaggerated vertical scale.

Horizontally, AB is 2 m long and BC is 0.6 m long. Loads act only in the region AB, and there are no loads in the region BC. Under this load system, the deflection at B is 0.24 cm and the slope of the beam at B is  $\theta$ , where  $\sin\theta = 0.038$ . What is the deflection at D, which is midway between B and C?



A. 0.2406 cm

B. 0.2514 cm

C. 0.2530 cm

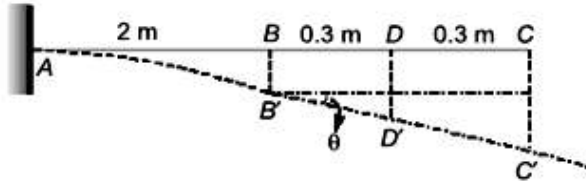
D. 0.2452 cm

**Ans. B**

**Sol.** Here the value of BC should be 0.6 cm instead of 0.6 m

1<sup>st</sup> let's take BC in meter

$$L_{BD} = 0.3 \text{ m} = 30 \text{ cm}$$



$$BB' = \Delta_B = 0.24 \text{ cm}$$

$$DD' = \Delta_D = \Delta_B + \tan \theta \times L_{DB}$$

$$\Delta_D = \Delta_B + \sin \theta \times L_{DB}$$

(For small angle  $\tan \theta \approx \sin \theta$ )

$$= 0.24 + 0.038 \times 30 \text{ cm}$$

$$= 0.24 + 1.14$$

$$\Delta_D = 1.38 \text{ cm}$$

Hence none of the option is correct.

If  $L_{BD}$  is taken in centimeters then,

$$\Delta_D = \Delta_B + 0.038 \times 0.3$$

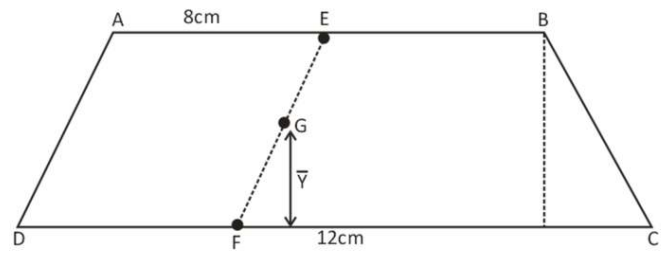
$$= \Delta_B + 0.0114 = 0.24 \text{ cm} + 0.0114 \text{ m}$$

$$= 0.2514$$

- 92.** Consider a trapezoidal lamina ABCD, with AB parallel to DC, 6 cm apart; AB is 8 cm; CD is 12 cm; CD extends outwards by 1 cm from the foot of the perpendicular from B on DC. The center of gravity of the lamina will be
- Along AC at a height of 3 cm from DC
  - Along at a height of 3 cm from DC
  - Along BD the line joining the mid-point of AB to the mid-point of at a height of 2.8 cm from DC.
  - At the intersection point of AC and DB

**Ans. C**

**Sol.** Centroid of an unsymmetrical trapezium lies on the line joining mid-point of the parallel side and at a height of  $\bar{y}$



$$\bar{y} = \frac{h}{3} \left[ \frac{2b + a}{a + b} \right] \text{ from the face of length } a$$

From given figure, E is midpoint of AB and F is mid point of DC

$$\bar{y} = \frac{6}{3} \left[ \frac{2 \times 8 + 12}{8 + 12} \right] = 2.8 \text{ cm from } CD$$

- 93.** The sum of squares of successive integers 8 to 16, both inclusive, will be
- 1126
  - 1174
  - 1292
  - 1356

**Ans. D**

**Sol.** Using the formula for sum of the square of n

natural numbers,  $\sum n^2 = \frac{n(n+1)(2n+1)}{6}$ , we have

$$\sum_1^{16} n^2 - \sum_1^7 n^2 = \frac{16(16+1)(32+1)}{6} - \frac{7(7+1)(14+1)}{6} = 1496 - 140 = 1356$$

- 94.** What is Crowdfunding?
- Money collected for public welfare projects by levying an entry fee to exhibitions, shows, etc.
  - Money collected by charitable organizations by placing a donation box at prominent locations.
  - Money raised by innovators and inventors by launching their products and services

through the Internet.

D. Money raised by individuals by passing the hat around to onlookers at a street performance.

**Ans. C**

**Sol.** Crowdfunding is the practice of funding a project or venture by raising small amounts of capital from a large number of individuals to finance a new business venture or programme.

- 95.** The meaning of 'Carbon Footprint' is described by the amount of
- Carbon dioxide released into the atmosphere as a result of the activities of a particular individual, organization or community
  - Greenhouse gases emitted by industries contributing to global warming
  - Carbon emissions released by the burning of jet fuel
  - Increase in the carbon content of the atmosphere due to the felling of trees.

**Ans. A**

**Sol.** Carbon footprint is the total amount of greenhouse gases produced to directly and indirectly support human activities, usually expressed in equivalent tons of carbon dioxide (CO<sub>2</sub>).

- 96.** Consider the following statements:  
Non-performing assets (NPAs) decline in value when
- 1) Demand revives in the economy.
  - 2) Capacity utilization increases.
  - 3) Capacity utilization, through substantive, is yet sub-optimal.
  - 4) Capacity utilization decreases consequent upon merger of units.
- Which of the above statements are correct?

- 1, 3 and 4 only
- 1, 2 and 4 only
- 1, 2 and 3 only
- 1, 2, 3 and 4

**Ans. C**

**Sol.** Non-performing assets (NPAs) decline in value when the,

- Demand revives in the economy: Increase in demand helps the industry to use up more capacity that increases its profits and capital. It can lower the NPAs with ease. Thus the value of NPAs is reduced
- Capacity utilization increases: Increase in capacity utilization improves the efficiency of the companies. Increase in efficiency will result in more production. More production means more profits which lowers NPAs.
- Suboptimal capacity utilization means less than the full capacity utilization of industry. Although it lessens the production of the industry, yet it keep running the industry so, it helps in reducing the NPAs

**97.** Consider the following statements:

- 1) IPDS strengthens the distribution network in urban areas while DDUGJY does the same in rural areas.
- 2) DELP focuses to substitute LED bulbs for incandescent bulbs.

Which of the above statements is/are correct?

- 1 only
- 2 only
- Both 1 and 2
- Neither 1 nor 2

**Ans. C**

**Sol.** \*Integrated Power Development Scheme" (IPDS) has the objectives of:  
1. Strengthening of sub-transmission and distribution network in the urban areas;  
2. Metering of distribution transformers /feeders / consumers in the urban areas.  
Deen Dayal Upadhyaya Gram Jyoti Yojana (DDUGJY): is a Government of India scheme

designed to provide continuous power supply to rural India.

Domestic Efficient Lighting Programme (DELP): The scheme was announced as "Domestic Efficient Lighting Programme (DELP)" on 5 January 2015, urging the people to use LED bulbs in place of incandescent bulbs, tube lights and CFL bulbs as they are more efficient, long lasting and economical in their life cycle duration.

- 98.** The Olympic Flame symbolizes
- Unity among various nations of the world
  - Speed, perfection and strength
  - The development of sportsmanship
  - Continuity between ancient and modern games

**Ans. D**

**Sol.** Olympic flame is a symbol of the Olympic Games and its origins lie in ancient Greece to celebrate the ancient Olympics. It represents link between the ancient and modern games and underlines the profound connection between these two events. It was 1<sup>st</sup> introduced at the Games of the IX Olympiad 1928 in Amsterdam and it has been part of the modern Olympic game ever since.

- 99.** Technology Promotion, Development and Utilization Programme implemented by Department of Scientific and Industrial Research has which of the following components?
- 1) Industrial R&D Promotion Programme
  - 2) Flagship Programme
  - 3) Information Technology and e-Governance
- A. 1 and 2 only                      B. 1 and 3 only  
C. 2 and 3 only                      D. 1, 2 and 3

**Ans. A**

**Sol.** • The Bill replaces Industrial R&D Promotion Programme

- Technology Development and Innovation Programme (Flagship)
- Technology Management Programme
- International Technology Transfer Programme
- Consultancy Promotion Programme
- Industrial R&D and Technology Information Facilitation Programme

**100.** Government of India had introduced the Consumer Protection Bill, 2015, in the Lok Sabha. The Bill gives the right to consumers to

- 1) Seek redressal against unfair or restrictive trade practices.
- 2) File a complaint for overcharging or deceptive charging.

Which of the above is/are included in the Bill?

- A. 1 only                                      B. 2 only  
C. Both 1 and 2                              D. Neither 1 nor 2

**Ans. C**

**Sol.** • The Bill replaces the Consumer Protection Act, 1986. The Bill enforces consumer rights, and provides a mechanism for redressal of complaints regarding defects in goods and deficiency in services.

- The bill proposes to establish an investigating, prosecuting, reviewing and recommending body-the Central Consumer Protection Authority.
- It also provides right to consumer to file a complaint for overcharging.

\*\*\*\*



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