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RPSC Main Exam 2019 : Test Series

Assistant Engineer

Social Aspects of Engineering

Compulsory Subject : Paper-II

Test No. 2 | Date of Exam. : 30-06-2019 (9 AM to 12 Noon)

Part-A

1. Gross Domestic Product (GDP) is the total money value of final goods and services produced in the economic territories of a country in a given year.
2. The Trade Facilitation Agreement (TFA) was one among the 10 agreements of the deal the WTO members (including India) had agreed upon in December 2013 Bali Ministerial meeting. The TFA seeks to speed up global trade by reforming customs procedures and cutting red tape.
3. Goods and Services Tax (GST) is a single indirect tax on the supply of goods and services, right from the manufacturer to the consumer.
4. The Bill Of Quantities (BOQ) shows the net quantity to be executed in each item of work. Items are classified into earthwork, anti termite treatment, waterproofing, brickwork, concreting, etc.
5. EPC stands for engineering, procurement and construction. It is common form of contracting arrangement within construction industry.
6.
 1. Bhupen Hazarika
 2. Pranab Mukherjee
 3. Nanaji Deshmukh
7. Desert Greening is the process of man-made reclamation of deserts for ecological reasons (biodiversity), farming and forestry, but also for reclamation of natural water systems and other ecological systems that support life.

8. A Wind Energy Conversion System (WECS) is an equipment which generates mechanical energy powered by wind energy that can be directly converted into electrical energy.
9. Anicut is a small water harvesting masonry dam constructed across a stream to hold sufficient water and submerge the upstream area during the rainy season.
10. Supervision is defined as guiding the activities of people who perform the work. It includes planning, organizing, directing, and controlling the work and the activities of subordinates or employees.
11. **BOLT:** Build, Own, Lease and Transfer.
12. The concept of unity of command is a principle of management theory. It means that an employee is responsible to only one supervisor and so on such that no subordinate in an organisation should report to more than one boss.
13. Soil pollution is the contamination of the soil that prevents natural growth and balance in the land which is used for cultivation, habitation or wildlife reserve.
14. Under NAMP, four air pollutants viz. Sulphur Dioxide (SO₂), Oxides of Nitrogen (NOX) and Suspended Particulate Matter (SPM) and Respirable Suspended Particulate Matter (RSPM/PM 10), have been identified for regular monitoring at all the locations.
15. Oil Zapper is used to curb oil pollution. It refers to mixture of five microbacterial strains which are capable to degrade crude oil and oil sludge very fast.
16. Biomagnification refers to the tendency of pollutants to concentrate as they move from one trophic level to the next. It is basically the increase in concentration of a pollutant from one link in a food chain to another.
17. Unnat Jyoti by Affordable LEDs for All (UJALA)
18. A Trade Union is the continuous association of wage earners for the purpose of maintaining or improving the conditions of their working lives.
19. Lockout is the step taken by the employer to put pressure on workers. Employer close down the workplace until the workers agree to continue the work on the terms and conditions as given by the employer.
20. The Digital India is a flagship programme of the Government of India with a vision to transform India into a digitally empowered society and knowledge economy.

Part-B

21. In-situ water harvesting and moisture conservation is very useful in drought mitigation and in enhancing land productivity, which are field based, cost effective, location-specific soil and water conservation technology. Under this technique, Contour furrowing is practiced on mild slopes. Also, a large numbers of mini-storages are created across the slope which alleviate drought.
22. Maternity Benefit (Amendment) Act, 2017 has increased the duration of paid maternity leave available for women employees to 26 weeks from 12 weeks. However, for those women who are expecting after having 2 children, the duration of the leave remains unaltered at 12 weeks. The paid maternity leave can be availed 8 weeks before the expected date of delivery.
23. AGMARK is a certification mark employed in agricultural products in India, assuring that they conform to a set of standards approved by the Directorate of Marketing and Inspection, in agency of the Government of India. The AGMARK seal ensures about quality and purity of the food products. The quality of the product is determined with reference to the size, variety, weight, fat content and other factors are taken in to account.
24. Photochemical Smog is composed mainly of Ozone (O_3), Peroxyacetyl Nitrate (PAN) and NO_x . Photochemical smog is capable of inflicting irreversible damage on the lungs and heart. High levels of smog can also trigger asthma attacks because the smog causes increased sensitivity to allergens, which are triggers for asthma. The effect of smog on animals are also similar to its effect on humans, it decreases lung capacity and lung elasticity.
25. Problems associated with Indira Gandhi Canal in Rajasthan:
 1. In the region of Indira Gandhi Canal, there have been problems with waterlogging caused by excessive irrigation, seepage from canals and poor drainage. These factors produced a rise in the water table, increased salinity and finally submergence of the land.
 2. The excessive irrigation and intensification of agriculture over the years has caused environment degradation and creation of new wastelands.
 3. Vector borne diseases are spreading in the canal command area.
26. Line of Balance (LOB):
 - Line of balance is a planning technique for repetitive work. In this technique, the required resources for each stage or operation are found out so that, the subsequent stages of the activities are not interfered with and the target output can be achieved. The technique can be applied in repetitive works involving construction projects such as mass housing developments, high rise buildings, tunnels etc.
 - The technique of LOB can be used for assembling, selecting, interpreting and presenting in graphical form, the essential factors involved in construction from initial stage to the completion of construction against a background of time. This technique is highly effective in determining areas of weakness and focusing on items requiring immediate attention.

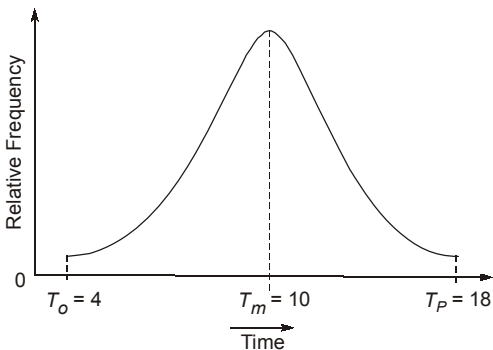
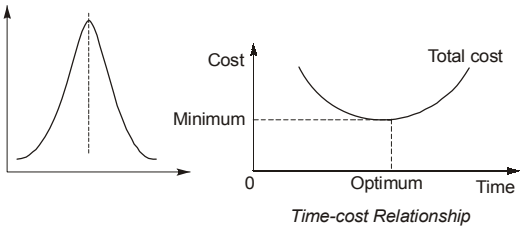
27. ABC analysis is based on the principle of 'vital few and trivial many'. ABC analysis segregates the material items that are consumed in a production process/project into three groups, viz., A-items, B-items and C-items.

A-items: We could observe that about 70% to 75% of the total money spent is spent on a few items of materials that account for only about 5% to 10% of the total items of material consumed. Such materials that form part of only 5% to 10% of the total items of material consumed, but that account for a major chunk of the money spent are called A-items.

B-items: These are those items that normally form part of about 10% to 15% of the total number of items and account for about 10% to 15% of the total expenditure on the materials. The B-items do not require a rigid control as required for A-items.

C-items: These are those items that normally form about 70% to 80% of the total number of items but account for only about 5% to 10% of the total money spent.

28. Comparison between PERT and CPM:

PERT	CPM
<ol style="list-style-type: none"> 1. It is event oriented. 2. It has probabilistic approach. The probability distribution is of the type of β distribution 3. Three types of times are estimated on the basis of which an expected time t_e is derived. 4. Cost is directly proportional to time. Hence efforts are made to minimize the time so as to result in the minimum cost. 5. It is suitable for newer type of projects which have not been performed in the past and no exact assessment of time and cost is available. 	<ol style="list-style-type: none"> 1. It is an activity oriented network. 2. It has deterministic approach. Probability value approaches to one here. 3. Only one time is calculated i.e. activity duration 't'. 4. Time and cost are related by the following curve given. From this curve optimum time is derived which results in the minimum cost. 5. It is suitable for repetitive type of work where time and cost can be evaluated with fair degree of accuracy. 

29. **Digital Divide:** The word digital divide is caused broadly because of four aspects i.e.
- **Awareness:** Only rolling out schemes are not enough. People must also be made aware of how to use the technology and what are the various benefits that they can avail by using these technologies.
 - **Availability:** The remote availability of hardware/software.
 - **Accessibility:** Related to the ability to use the ICT.
 - **Affordability:** Most of ICT applications need ICT tool like mobiles and internet which are not affordable by all.
30. The key challenges in adopting Artificial Intelligence in India are:
- Absence of collaborative approach to adoption and application of AI.
 - Lack of broad-based expertise in research and application of AI.
 - Lack of Trained professionals
 - Ensuring data security, protection, privacy, and ethical use via enabling both regulatory and technological frameworks.
 - High resource cost and low awareness for adoption of AI.
 - Absence of enabling data ecosystems such as access to intelligent data, data collection, archiving and encouraging data availability with adequate safeguards, possibly via data marketplaces / exchanges.
31. • **Health Management Information System (HMIS):** Computerization project for registration of indoor and outdoor patients, enquiry and Central cash collection service.
- **Health Information system for Government (HEALING):** It is an integrated health information system which enables the department in effective and efficient delivery of health care services.
- **Swasthya Mitra:** In order to facilitate patient services in empanelled hospitals, both government and private, a Swasthya Mitra will be placed by the hospital.
32. The various factors responsible for the selection of particular technologies are:
- Rehabilitation
 - Technological factors like dependence on fuel, power and its maintenance.
 - Environmental factor like the quality and quantity of waste it produces.
 - Institutional factors.
 - Community and management factor.
 - Financial factor

Part-C

33. A watershed is the land area extending from the topographic high points where water collects, such as ridges, down to the topographic low point where the area drains into creek, river, bay, ocean, or other waterbody.

A watershed plan is a strategy and a work plan for achieving water resources goals that provides assessment and management information for a geographically defined watershed. It includes the analysis, actions, participants, and resources related to development and implementation of the plan.

The watershed developmental strategy is two pronged- technical and social, both integrated for sustainable development of natural resources.

- Social strategy is for creating awareness and capacity building of community for self-motivation and long term commitment to the project for its sustainability. Social Strategy Participatory Approach for empowerment of Community: People's participation is the key to sustainable watershed development programmes. Demand Driven Project Proposals of the community and Flexibility in choice of Technology.
- Technical strategy is for planning designing and implementation of activities for development of natural resources. Technical Strategy Ridge to Valley Approach In-situ moisture conservation Reduce Runoff Velocity Rain Water harvesting with the approach of Water Budgeting Alternate land use i.e. Horticulture, Agro forestry, Pasture development and forestry plantation based on land capability classification.

Expected outcomes from Watershed development:

- Increased levels of production and productivity
- Increase in cultivable area
- Cropping pattern has changed
- Increase in irrigated area and irrigation intensity
- Considerable increase in water table in wells (1-10 m)
- Dead wells rejuvenated
- Increase in number of wells and water bodies
- Increase in availability of water
- Runoff arrested
- Soil erosion has been checked
- Increase in employment opportunities
- Farmers have become more interactive and participative

34. **Role of agriculture in the economic development of a country:**

The agriculture sector is the backbone of an economy which provides the basic ingredients to mankind and raw material for industrialisation. Industrial and agricultural developments are not alternatives but are complementary and are mutually supporting with respect to both inputs and outputs.

Interdependence between agriculture and industry becomes strengthened through various linkages generated in these two sectors. The three most important linkages are: production linkages, demand linkages, and saving-investment linkages.

Agriculture draws some raw materials, like chemical fertilisers, pesticides, electric power, agricultural machinery and implements, etc., from the industry. Agriculture is also dependent on industry for the supply of materials for building up social and economic overheads in the agricultural sector.

Further, many raw materials and inputs used in industrial production, e.g., cotton, jute, sugarcane, tobacco, etc., is supplied by the agricultural sector.

Agriculture based industries in Rajasthan: Agro-based industries are those industries which depend on agriculture production materials. These include industries related to textiles, sugar, paper and edible oil.

The Rajasthan is India's largest producer of rapeseed and mustard oil seeds, seed spices (coriander, cumin and fenugreek), coarse cereals and bajara in India. The State is major producer of soyabean, food grains, gram, groundnut and pulses.

With the development of Indira Gandhi Canal and Chambal areas, the output of wheat has increased and still it is expected to be more in the state which paved the way for wheat milling. Some more large scale roller flour mills can be established in Ganganagar, Jaipur, Udaipur, Kota, Sawaimadhapur and at some other suitable locations.

Kota, Sawai Madhopur, Ganagnagar, Bikaner, Pali, Bhilwara and Ajmer districts are suitable locations for cotton mills because of availability of raw materials.

Among the existing agro-based industries, the scope for expansion of the sugar industry appear to be the maximum.

35. Climate Change is a long-term change in the statistical distribution of weather patterns over periods of time that range from decades to millions of years. It may be a change in the average weather conditions or a change in the distribution of weather events, for example, greater or fewer extreme weather events. Climate Change may be limited to a specific region, or may occur across the whole Earth.

The major effects of climate change are:

- Increasing number of extreme weather such as floods in Kerala which caused life and property loss.
- It also lead to reduce agricultural productivity which may cause threat to nutritional and food security.
- Increase sea level due to glacier melting will lead to sinking of coastal areas.
- It is also posing threat to biodiversity which provide various ecological and economic service

Thus there is urgent need to tackle this problem various measure which can be taken in the direction of climate adaptation and mitigation.

Mitigation measure:

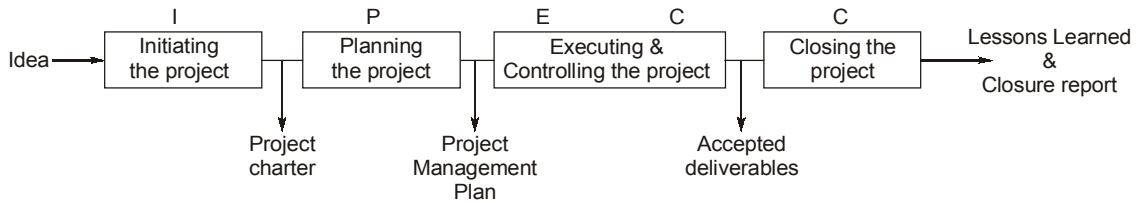
- Adoption of non-polluting sources of energy like solar, wind energy etc.
- There is urgent need to increase the forest cover by the countries.
- Technological solution like artificial leaf, dry sorbent technology and solar radiation management by geo engineering can bring major change in climate change.
- Various agreements like Paris climate should be followed in spirit and also CBDR should be implemented.

36. Project Life Cycle:

- The project life cycle shows how a project can be subdivided into a number of phases presented sequentially along a project timeline.
- All the phases of a project from start to end are known as life cycle phases. The project life cycle i.e. number of phases may differ from project to project.

The main phases of life cycle are:

Project Life Cycle (4 Phases):



Phase-1. Feasibility Stage or Conception Stage/ Initiation stage

- The feasibility phase assesses the business case to confirm it is feasible to manufacture and implement.
- This is the phase when a problem is identified and potential solutions are suggested i.e. ideas are conceived.
- After feasibility study once the objectives have been clearly defined then the appraisal of the solutions is conducted in terms of risk, financial commitment and benefits.

Phase-2. Design Stage (Planning & Scheduling Stage)/Definition Phase

- The project definition phase uses the guidelines from the feasibility study to design the product, outline the build-method and develop detailed schedules and plans (baseline plan) for all the knowledge area topics required to make the project.
- Once the investment decision is taken, the design or the planning stage of project starts.

Phase-3. Execution or Production Phase

- The project execution phase uses the design and project plan from the definition phase, together with the execution strategy, to construct the project.
- In this phase procurement of resources (material/machinery) starts.
- **The intensity of activities further builds up and reaches to peak in 3rd phase, however when execution approaches to completion the intensity of activities start falling again.** This is most important phase. The demands on the project manager is at its peak in this phase.
- There is a great need of continuous monitoring and control to all activities in this phase.

Phase-4. Termination or Commissioning or Handover Phase

- It is the last phase of the project cycle. During this phase the constructed facilities are tested one by one and final teething problems are solved. If trial is successful then the commissioning is complete.
- After commissioning, the project is handed over. This stage might include training of operating personals. In this phase *intensity of activities reduces* to minimal at the end.

37. Attributes/ Qualities of a Good Project Manager

An effective project manager is one who should have the following skills/capacities:

- Planning and organisational skills
- Personnel management skills
- Communication skills
- Ability to take decisions
- Understanding the views of project team members and having a sympathetic attitude towards them
- Effective time management
- Initiative and risk taking ability
- Familiarity with the organisation
- Conflict resolving capacity
- Entrepreneurial skills

Role of the Project Manager

Appointment: The project manager is appointed by the project sponsor as the single point of responsibility for completing the project as outlined in the project charter.

Management Skill: The project manager will require a range of management skills to plan and control all aspects to the project.

Leadership Skills: The project manager will require appropriate leadership skills and persuasive powers to lead, influence and negotiate with the project team, the contractors, the suppliers, the consultants and the stakeholders.

Project Organization Structure: The project manager is responsible for setting up the temporary project organisation structure to integrate and interlink the resource providers (functional departments and contractors), suppliers and consultants.

Execution Strategy: The project manager is responsible for developing the executing strategy, which makes the 'make or buy' decision and selects the best option for the project.

Procurement Management: The project manager is responsible for setting up the procurement management system to procure all the required materials and components at the best price and at the right time. This process includes expending to make the procurement happen.

Resource Management: The project manager is responsible for developing the resource histogram and analysing the resource loading.

38. The amount of data that's being created and stored is incredible and it keeps on growing. One can get potential key insights from the information collected however in reality only a small percentage of data is analyzed. Big data solution plays a key role in analyzing the data irrespective the source and structure of data. Government of Rajasthan is desirous to build an environment using big data solution technology which shall provide with a framework to store the varieties of structured and unstructured data which may include text, image, video etc. The Big data solution should be appliance based. The stored data is humongous. The stored datasets which are diverse, complex and massive are to be retrieved and processed in tolerable elapsed time. The department intends to leverage the advanced analytics big data solution available. The SAS solution may be used for analytical services on big data platform.

Government can take data from any source and analyze it to find answers that enable Cost reductions, Time reductions and Smart Decision Making etc.

When Big data is combined with high-powered analytics, Government can accomplish tasks such as:

- Determining root causes of failures, issues and defects in near-real time.
- Recalculating entire risk portfolios in minutes.
- Detecting fraudulent behavior before it affects our nation.

39. The Chandrayaan-2 mission by ISRO will be launched by Geosynchronous Satellite Launch Vehicle Mk III (GSLV-F10) from the Satish Dhawan Space Centre at Sriharikota in Andhra Pradesh. It is completely indigenous mission comprising of an Orbiter, Lander (called Vikram) and Rover (called Pragyan). It includes a lunar orbiter, lander and rover, all developed indigenously. It will be ISRO's first interplanetary mission to land a rover on any celestial body. The mission will attempt to soft land a rover 600 km from the lunar south pole.

- **Primary Objective/goals:** To demonstrate the ability to soft-land on the lunar surface and operate a robotic rover on the surface.
- Scientific Goals include studies of lunar topography, mineralogy, elemental abundance, the lunar exosphere, and signatures of hydroxyl and water ice.
- **Scientific Payload:** It comprises a visible terrain mapping camera, a neutral mass spectrometer, a synthetic aperture radar, a near infrared spectrometer, a radio occultation experiment, a soft X-ray spectrometer and solar X-ray monitor.
- The lander will carry a camera, seismometer, thermal profiler, and Langmuir probe, while the rover will hold cameras, alpha-proton X-ray spectrometer, and a laser-induced ablation spectroscopy experiment to analyse the lunar soil.
- It will also carry NASA-owned laser retroreflector arrays that allow scientists to make precise measurements of the distance to the Moon.

