

Government of India
Central Water Commission

50th Departmental Examination for Engineering Officers of CWC

Time: 3 Hours
Max. Marks: 100

Professional Paper – I

(This paper containing 14 pages is divided into three sections – A, B & C. These sections are further subdivided into two parts – Part-1 & Part 2. Section A carries 60 marks, while B& C carry 40 marks each)

Important Instructions

- a) *Civil Engineers shall attempt Section A & B. Mechanical Engineers shall attempt Section A & C.*
- b) *The multiple choice questions are to be attempted/answered in the question paper only. Answers in separate sheet will not be evaluated.*
- c) *Please write your Roll Number on each section of the question paper.*
- d) *The question paper has to be returned back along with the answers sheets.*

Roll No.

SECTION A (Common to both Civil & Mechanical Engineers)

Part-I Multiple Choice Objective Type Questions

Note: Attempt all questions. Each question carries 1 mark

Indicate the Correct Choice

1. Pick the TRUE statement in respect of Appraisal of Projects by CWC: -

- a) Both Major and Medium Projects are appraised at CWC(HQ).
- b) Both Major and Medium Projects are appraised at CWC Regional Offices.
- c) Major Projects are appraised at CWC(HQ) and Medium Projects are appraised at CWC Regional Office.
- d) Major Projects are appraised at CWC Regional Office and Medium Projects are appraised at CWC (HQ).

2. What is the criteria for economic evaluation of Irrigation Project?

- a) Financial Rate of Return.
- b) Internal Rate of Return.
- c) Benefit-Cost Ratio.
- d) Cost per hectare.

3 Please read the following statements

- i. Flood schemes of Ganga basin are appraised in CWC(HQ).
- ii. Medium Irrigation schemes are appraised in CWC Regional office.

Pick the correct statement from below:

- a) Only (a) is correct.
- b) Only (b) is correct.
- c) Both (a) and (b) are correct.
- d) Both (a) and (b) are incorrect.

4. The Project Monitoring exercise does not comprise of the following: -

- a) Preliminary preparations.
- b) Field visit.
- c) Concurrence of incurred expenditure as a share of Central Assistance by State Govt.
- d) Wrap up meeting with Project Authorities.

5. Following is not an agency categorised as externally funding agency in context of Water Resources Projects: -
 - a) NABARD
 - b) World Bank
 - c) Japan International Cooperation Agency
 - d) Asian Development Bank

6. The Right to Fair Compensation & Transparency in Land Acquisition, Rehabilitation and Resettlement Act, 2013 extends to: -
 - a) Whole of India
 - b) Whole of India except the State of Jammu & Kashmir
 - c) Whole of India except the State of Jammu & Kashmir, and N E States
 - d) Whole of India except the Union Territories

7. In the recent past, the major factor which contributed a substantial increase in the cost of Irrigation and Multipurpose projects in India is: -
 - a) Increase in cost of construction material
 - b) Increase in cost of heavy machineries
 - c) Increase in cost of Land acquisition & R&R Provision
 - d) Global increase in oil prices

8. Which of these is NOT an expected effect of climate change?
 - a) Sea levels rising
 - b) Flooding in coastal cities
 - c) Expanding glaciers
 - d) Extreme weather

9. The most serious environmental effect posed by hazardous wastes is: -
 - a) Air pollution.
 - b) Contamination of groundwater.
 - c) Increased use of land for landfills.
 - d) Destruction of habitat.
 - e) None of the above.

10. Which of the following is NOT an example of spatial data?
 - a) Lines showing the route of linear objects
 - b) Polygons showing the area occupied by a particular land use or variable
 - c) Points showing location of discrete objects
 - d) Times of particular events.

11. Remote sensing techniques makes use of the properties of ----- emitted, reflected or diffracted by the sensed objects: -
 - a) electric waves
 - b) sound waves
 - c) electromagnetic waves
 - d) wind waves

12. To compare, overlay, or cross-analyze two maps in a GIS: -
- a) both maps must be in digital form.
 - b) both maps must be in the same map projection.
 - c) both maps must be at the same equivalent scale.
 - d) both maps must be on the same coordinate system.
 - e) all of the above.
13. The images provided by Remote Sensing Satellite are: -
- a) Raster Images
 - b) Vector Images
 - c) Combined Images
 - d) All of the above
14. A digital elevation model (DEM) is a: -
- a) A remote sensed image
 - b) 2D map of the surface
 - c) Digital model or 3D representation of a terrain's surface
 - d) Tool for Network analysis
15. One of the criteria for selection of gauge and discharge observation site is: -
- a) Location near international and inter-State boundaries
 - b) Just below the snow line.
 - c) All of above
 - d) None of above
16. Segmentation of river section is carried out in velocity-area method of discharge observation such that _____ percentage of total discharge does not pass through any segment.
- (a) 8%
 - (b) 10%
 - (c) 12%
 - (d) 14%
17. Tracer technique is one of the methods for measuring: -
- (a) Discharge
 - (b) Sediment load
 - (c) Total dissolved solid
 - (d) Humidity
18. Slope-area method for discharge observation utilize: -
- (a) Principle of energy loss
 - (b) Principle of conservation of momentum
 - (c) Principle of conservation of mass
 - (d) All of above

19. **Acoustic Doppler Current Profiler (ADCP) is an instrument for measuring: -**
- (a) Water depth
 - (b) Slope of water levels
 - (c) Discharge
 - (d) Current or wave profile
20. **Which of the organizations have been established under National Disaster Management Act 2005?**
- (a) National Disaster Response Force
 - (b) National Institute of Disaster Management
 - (c) National Disaster Management Authority
 - (d) All of the above

SECTION A (Common to both Civil & Mechanical Engineers)

Part-2 Short Answer Type Questions

Note: Attempt any 5 questions. Each question carries 8 marks.

1. i). What is Climate Change? Which factor is primarily responsible for climate Change? (4 marks)
 ii). What is the Impact of Climate Change on Water Resources of India? (4 marks)
2. i). What are positive and negative Ecological & Environmental impacts of WR projects. (4 marks)
 ii). What are the objectives of National Rehabilitation and Resettlement Policy, 2007? (4 marks)
3. i). What is Remote Sensing? (2 marks)
 ii). What is GIS? (2 marks)
 iii). What is the Vector and Raster Data in GIS? (2 marks)
 iv). What is WEB GIS? (2 marks)
4. i). Write a brief Note on Prime Minister Krishi Sinchai Yojna (PMKSY) highlighting the relevant aspects of this yojna. (4 marks)
 ii). What is the objective of Accelerated Irrigation Benefit Programme (AIBP)? (2 marks)
 iii). Write the five basic differences between PMKSY and AIBP Programmes. (2 marks)

5.
 - i). Explain the importance of techno-economic appraisal of a water resources project through a multi-disciplinary expert agencies system as adopted by CWC. (3 marks)
 - ii) Elaborate the methodology to estimate Gross Command Area and Culturable Command Area of a Water Resources Project. (3 marks)
 - iii) What is technical feasibility and economic viability of an irrigation project? (2 marks)

6.
 - i). What are the regions into which India has been divided from the point of view of data dissemination as per Hydro-meteorological Data Dissemination Policy' 2013? (2 marks)
 - ii). Briefly describe the procedure prescribed in Hydro-Meteorological Data Dissemination Policy' 2013 for release of unclassified Hydro-Meteorological data. (6 marks)

7.
 - i). Describe velocity-area method using current meter for measurement of discharges in the river. (4 marks)
 - ii). Compare this method with use of modern equipment's like Acoustic Doppler Current Profiler (ADCP) for measurements of discharge highlighting advantages of modern instrumentation. (4 marks)

Roll No.

SECTION B (For Civil Engineers only)

Part-I Multiple Choice Objective Type Questions

Note: Attempt all questions. Each question carries 1 mark

1. The runoff from a drainage basin of area 4320 sq.km is estimated at 5000 cumec-day. The depth of runoff is: -
 - (a) 20 cm
 - (b) 10 cm
 - (c) 40 cm
 - (d) 84.4 cm

2. A return period of 100 years' means: -
 - (a) The event is to come on every 100th year
 - (b) The event is expected only after 100 year
 - (c) Occurrence of at least once in every 100 years on an average
 - (d) Record of the maximum observed flood in the past 100 years

3. A 2 hour, 1 cm unit hydrograph of a catchment is triangular in shape with base width of 50 hour and peak discharge of 40 m³/s. The unit hydrograph refers to a catchment of area: -
 - (a) 720 km²
 - (b) 360 km²
 - (c) 180 km²
 - (d) 200 km²

4. The peak flow of a flood hydrograph caused by an isolated storm was observed as 660 m³/s. The storm was 4 hours' duration and had a total rainfall of 10 cm. If the base flow and ϕ - index are assumed to be 30 m³/s and 0.25 cm/h respectively, the peak ordinate of 4 hours' unit hydrograph of the catchment is: -
 - (a) 66 m³/s
 - (b) 70 m³/s
 - (c) 63 m³/s
 - (d) 165 m³/s

5. For identical channel cross sections of the two natural streams: -
- the attenuation of flood peak will be more in the stream with higher bed slope
 - the attenuation of flood peak will be more in the stream with lower bed slope
 - the attenuation of flood peak will not depend on bed slope of the streams
 - None of the above
6. A reservoir has a storage capacity of 200 million cubic meter. If the average annual estimated inflow into the reservoir is 250 million cubic meter, then the trap efficiency of this reservoir during initial two years of the normal operating conditions is about: -
- 10%
 - 50%
 - 80%
 - 100%
7. Pick up the correct match: -
- | | | | |
|------|--------|-----|------------------|
| I. | Kharif | (a) | Winter crops |
| II. | Rabi | (b) | Summer crops |
| III. | Zaid | (c) | Monsoon crops |
| | | (d) | June – October |
| | | (e) | November – March |
| | | (f) | April – June |
- I – (c) & (d), II – (a) & (e), III – (b) & (f)
 - I – (b) & (f), II – (a) & (e), III – (c) & (d)
 - I – (a) & (e), II – (b) & (f), III – (c) & (d)
 - I – (c) & (f), II – (a) & (e), III – (b) & (d)
8. The crop water requirement for a standing crop is: -
- The depth of water needed to meet the water loss through evaporation which includes evaporation from the adjacent soil and evaporation of water intercepted by vegetation
 - The depth of water needed to be used by the plants in transpiration and building of plant tissues
 - The sum of A and B above, commonly known as evapo-transpiration or consumptive use
 - None of the above
9. In a project, the amount of water lost through seepage, evaporation etc. in the lined canal & distribution system from the canal head to the canal outlet where water delivered to the farmers' water course is 20%. From there, a further loss of 30% was observed as field application losses. The conveyance efficiency (E_c), field application efficiency (E_a) and project efficiency (E_p) of the project respectively would be: -

- a) E_c - 20%, E_a - 30% and E_p - 60% respectively
 b) E_c - 80%, E_a - 70% and E_p - 56% respectively
 c) E_c - 20%, E_a - 70% and E_p - 14% respectively
 d) E_c - 80%, E_a - 30% and E_p - 24% respectively
10. Pick up the correct statement of success rate for different uses of project to be achieved as mentioned in the "Guidelines for preparation of Detailed Project Reports of Irrigation and Multipurpose Projects, 2010": -
- a) Irrigation - 100%; Hydro-power - 90%, Drinking water and Industry - 75%
 b) Irrigation - 90%; Hydro-power - 75%, Drinking water and Industry - 100%
 c) Irrigation - 75%; Hydro-power - 90%, Drinking water and Industry - 100%
 d) Irrigation - 75%; Hydro-power - 100%, Drinking water and Industry - 90%

SECTION B (For Civil Engineers only)

Part- 2 Short Answer Type Questions

Note: Attempt any 3 questions. Each question carries 10 marks

- A 6-hour, 1 cm rainfall excess unit hydrograph of a basin is triangular in shape with a peak of $200 \text{ m}^3/\text{s}$ occurring at 24^{th} hour from the start. The base of unit hydrograph is 72 hours. Compute the following: -
 - The area of the catchment represented by this unit hydrograph. (3 Marks)
 - Flood hydrograph due to a storm of rainfall excess of 3 cm during the first 6 hours and 4 cm during the second 6 hours' interval, assuming zero base flow. (7 Marks)
- What is meant by 75% dependable annual yield of a catchment? For a catchment the annual yield during the different years at its outlet is given in Table-1. Compute 75% and 90% dependable annual yield for the catchment using Weibull formula.

(10 marks)

Table-1

Year	Annual yield (million cubic meter)
1972-73	765
1973-74	714
1974-75	578
1975-76	564
1976-77	570
1977-78	664
1978-79	709
1979-80	654
1980-81	568
1981-82	455
1982-83	470
1983-84	581
1984-85	622
1990-91	598
1991-92	776
1992-93	603
1993-94	733
1994-95	817
2008-09	736

3. (a) What is meant by trap efficiency of a reservoir? List important factors that influence its value. (3 marks)

(b) For a drainage basin of 300 km², isohyets drawn for a storm gave the following data: -

(7 marks)

Isohyets interval (cm)	15-12	12-9	9-6	6-3	3-1
Inter-Isohyetal area (km ²)	46	64	60	72	58

Compute the average depth of precipitation over the catchment.

4. (a) What is the importance of soil survey in irrigation planning? Explain it briefly.

(4 marks)

(b). Write brief note on any two of the following.

(2x3=6 marks)

- (i) Conjunctive use of surface and ground water
- (ii) Water – logging problems of irrigated commands
- (iii) Agro – climatic zones of India

5. An irrigation project having CCA of 12000 ha has been planned for providing annual irrigation to an area of 18000 ha. With the following details and considering the life of project as 100 years for the purpose of depreciation charges, compute the Benefit Cost Ratio of the project. Consider interest @ 10% of total cost of the project (cost of the project + cost of land development) and maintenance cost of Head works @ 1% of its total cost.

(10 marks)

(i)	Estimated cost of the project	:	27900 lakh
(ii)	Cost of Head Works	:	16200 lakh
(iii)	Consider cost of land development @ Rs. 20000/- per ha of CCA		
(iv)	Consider Operation & maintenance (O&M) charges @ Rs. 1200/- per ha of CCA or annual irrigated area whichever is more.		
(v)	Gross annual receipts including dung receipts before project	:	1740 lakh
(vi)	Annual cost of cultivation (expenses) before project	:	1120 lakh
(vii)	Gross annual receipts including dung receipts after project	:	10960 lakh
(viii)	Annual cost of cultivation (expenses) after project	:	3750 lakh

Roll No.

SECTION C (For Mechanical Engineers only)

Part-I Multiple Choice Objective Type Questions

Note: Attempt all questions. Each question carries 1 mark

1. Which of the following cranes provide high lifting height with good working radius and take up limited space?
 - a) Tower cranes
 - b) Heavy lift cranes
 - c) Boom truck crane
 - d) Hydraulic truck cranes

2. Which type of concrete is usually terms as "transit-mixed concrete"?
 - a) Central mixed concrete
 - b) Shrink mixed concrete
 - c) Truck mixed concrete
 - d) All of the above

3. Which of the following is not used for Drill and Blast Tunneling Method?
 - a) One-Boom Drill Jumbo
 - b) Two-Boom Drill Jumbo
 - c) Jack Hammer
 - d) Tunnel Boring Machine (TBM)

4. Which one of the following equipment is most suitable for excavating trenches and pits?
 - a) Hydraulic excavator with back hoe attachment
 - b) Dragline
 - c) Front end loader
 - d) Crawler tractor

5. Following operations are generally employed for tunneling in hard rock: -
 - a) Supporting (shotcreting, rock bolting or steel supports)
 - b) Drilling of charge holes
 - c) Preparation
 - d) Defuming.
 - e) Charging & Blasting
 - f) Mucking

The correct sequence is

- i. cabfde
- ii. ebcdae
- iii. cbedfa
- iv. bcdefa

6. Fore-Polling method is generally adopted for tunneling in: -

- a) Soft strata
- b) Hard strata
- c) Running strata
- d) None of these

7. The book value of an equipment is Rs. 10,00,000/- and scrap value is Rs. 1,00,000/-. The life of same is 10 years/10000 hours. Yearly schedule production hours for the equipment are taken as 2200 hrs. What is the hourly depreciation as per CWC guidelines?

- a) Rs. 50/-
- b) Rs. 55/-
- c) Rs. 60/-
- d) Rs. 65/-

8. Specification of Batching and Mixing Plant is: -

- a) Capacity of concreting materials in cubic meter (cum)
- b) production of Concrete in Cum/hour
- c) Capacity of Engine in HP
- d) None of the above

9. Raise Climber is used for: -

- a) Open excavation
- b) Excavation of horizontal tunnels
- c) Excavation of vertical/inclined shafts
- d) For drilling holes for tunneling

10. What is a Critical Path?

- a) Path having maximum Float
- b) Path having minimum Float
- c) Shortest path
- d) None of above

SECTION C (For Mechanical Engineers only)

Part-2 Short Answer Type Questions

Note: Attempt any 3 questions. Each question carries 10 marks.

1. Estimate number of dumpers for dumper-loader combination for 3-shift of working using following given data: (10 marks)

Output of cum loader:	30 cubic meter/hr
Average Lead (assumed):	4 km
Travel Speed loaded/unloaded:	10 kmph / 15 kmph
Volumetric Capacity of dumper:	4.5 cubic meter
Spotting time:	1.0 min
Dumping/Turning time:	2.0 min

2. a). What is Break Even Point? Describe it graphically by highlighting the profit-area, loss area, total fixed cost, total variable cost. (5 marks)
- b). In a manufacturing unit, the total fixed cost is Rs. 6,000/- and variable cost is Rs. 2/- per unit. If revenue is Rs.7/- per unit, calculate the Break Even Quantity. If the company has manufactured 1000 units in November 2010, calculate the total profit/loss of the company in November 2010. (5 marks)
3. a). What is difference between CPM and PERT and explain with example where these methods are applied. (5 marks)
- b). What is difference between transfer value, book value and scrap value of an equipment. (5 marks)
4. a). What are several components of Hourly Use Rate Analysis and how it is used to determine the overall cost of the Water Resources Projects? (5 marks)
- b). What is the range of depreciation value of equipment? How depreciation is related to the life of equipment? (5 marks)
5. Write short notes on process layout, product layout and mixed layout with their advantages and disadvantages. (10 marks)

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Time : 3 hours
Max Marks : 100

PROFESSIONAL PAPER – III (With Books)

(This paper containing 10 pages is divided into two Sections – A & B. Section A carries 30 marks, while B carries 70 marks.)

Important Instructions:

- a. The multiple choice questions are to be attempted / answered in the question paper only. Answers in separate answer sheet will not be evaluated.
- b. Unless specifically mentioned, each multiple choice question has one and only one correct answer out of the four choices. If more than one choice is marked, the answer would not be evaluated.
- c. There is no negative marking, i.e., no deductions shall be made for incorrect answers.
- d. Please write your Roll No on each section of the question paper.
- e. The question paper has to be returned back along with the answer sheets.
- f. Questions pertaining to Accounts are marked with “Asterisk (*)”. Candidates who could not qualify Paper-III of Old Syllabi, shall attempt all questions OTHER THAN those marked with *.

Roll No.....

SECTION A

Part-I Multiple choice objective type questions

Note : Attempt all questions. Each question carries 1 mark.

Indicate the Correct Choice:

*1. The right of government servant to TA including Daily allowance is forfeited or deemed to have been relinquished within ----- from the date on which it becomes due.

- a) Three months.
- b) Six month
- c) One year
- d) 18 months

*2. Which of the following is NOT a valid reason for closure of New Pension Scheme Account of a Government Official prior to his attaining retirement age :

- a) Death
- b) Account value reduces to zero
- c) Change in Citizenship
- d) Proceeding on foreign service for more than a year.

3. Article 262 of Constitution of India pertains to:

- a) Adjudication of disputes relating to the waters of Inter-staterivers or river valleys.
- b) General authority given to the President for establishment of InterstateCouncil for co-ordination between states.
- c) Regulation and Development of Inter State Rivers and River Valleys.
- d) None of the above

4. Which of the following is true for the Rivers Board Act 1956 :

- a) It has been promulgated by Parliament.

- b) It has been promulgated by an Executive Order.
 - c) It has been provided for in the Constitution of India.
 - d) None of the above.
5. The basis of allocation of work amongst the different ministries under Govt. of India is :
- a) Executive Orders being issued by PMO from time to time.
 - b) Executive Orders being issued by President from time to time.
 - c) The Government of India (Allocation Of Business) Rules 1961.
 - d) Gazette Notification of Work Allocation by Speaker of Lok Sabha.
6. For an image file on a computer, which of the following is true :
- a) Raster image pixels do not retain their appearance as size increases.
 - b) Vector image pixels do not retain their appearance as size increases.
 - c) Both Raster and Vector image pixels retain their appearance as size increases.
 - d) Both Raster and Vector image pixels do not retain their appearance as size increases.
7. Which of the following is NOT an executable file:
- a) *.com
 - b) *.pif
 - c) *.scr
 - d) All of the above are executable files.
8. As per the latest DoPT guidelines, in case of recruitment for Group C and non-gazetted Group B officials in Govt. of India:
- a) The candidates cannot be subjected to undertake Skill Test or Physical Test.
 - b) The candidates can be subjected to skill test but not to physical test.
 - c) The candidates can be subjected to physical test, but not skill test.
 - d) The candidates can be subjected to physical or skill test, but such tests can be only qualifying in nature, and the results cannot be used for assessment of merit.

9. Maximum _____% of total vacancies arising in a year can be filled by Compassionate Appointment:

- a) 2%
- b) 3%
- c) 4%
- d) There is no such ceiling.

10. Which of the following is the maximum limit of Extra Ordinary Leave (EOL) without medical certificate which will count for increment :

- a) 3 months.
- b) 120 days.
- c) Less than 6 months.
- d) None of the above.

11. Preservation period for service book of an employee after his death/ resignation/ discharge, is:

- a) 7 years
- b) 10 years
- c) 5 years
- d) 3 years

12. In which case would you refer CWC Schedule of Rates (SOR) 2012:

- a) For conducting a DPC for work-charged staff.
- b) For deciding on quantum of honorarium for the staff.
- c) For deciding on quantum of over time to be paid to drivers.
- d) None of the above.

13. _____ is generally used for corresponding with other departments, or in calling for information from or conveying information to its employees:

- a) Office Memorandum
- b) Notification
- c) Circular
- d) Email

14. Which of the following is NOT applicable for draft Demi Official Letter:
- Targeted for personal attention of the addressee.
 - Style of writing should be direct, personal and friendly.
 - Use of passive voice should be preferred.
 - It should be preferably not exceed one page.
15. Which of the below is the correct order of the three Hindi courses prescribed for Central Government Employees, in INCREASING order of proficiency:
- Prabodh - Pragya - Praveen
 - Praveen - Pragya - Prabodh
 - Prabodh - Praveen - Pragya
 - Praveen - Pragya - Prabodh
16. In which form Rubber Stamps are to be prepared:
- Hindi English Bilingual form-one line Hindi and one line English.
 - Hindi English Bilingual form-First fully in Hindi and then fully in English.
 - Only Hindi.
 - Regional Language, Hindi and English - First fully in regional language, then fully in Hindi and then fully in English.
17. In case of CWES (Group A) Officers, who is the Disciplinary Authority:
- Chairman, CWC
 - Secretary, MoWR, RD & GR
 - Hon'ble Minister, MoWR, RD & GR
 - The President of India
18. Which Department/Ministry controls the Central Vigilance Commission :
- Ministry of Home Affairs
 - Cabinet Secretariat
 - Prime Minister's Office
 - None of the above

*19. TDS (Tax Deducted at Source) report is to be filed to tax authority by DDO at _____ basis.

- a) Daily
- b) Weekly
- c) Monthly
- d) Quarterly

20. If any adverse entry in the APAR is not communicated to the individual officer within the prescribed time limit of 1 month, then in that case:

- a) The adverse entry is deemed to have been expunged from the APAR.
- b) The individual officer can choose to get that APAR ignored for consideration, and his one earlier APAR is considered for all requirements.
- c) A fresh APAR is to be filled up by the individual officer, and fresh reporting and reviewing, albeit by the same officers, is required.
- d) None of the above.

21. When you assign a password for an account, the password is stored in the system in the form of :

- a) Clear text.
- b) Text encrypted through random text generator.
- c) The password is one-way hashed and stored.
- d) Encrypted through Local Machine software Keyloggers.

22. Which of the following statements is correct under the RTI Act 2005:

- a) An Information Commissioner can carry on his usual profession.
- b) An Information Commissioner can be a member of any Political Party.
- c) An Information Commissioner can be a member of the Legislature Assembly of a UT.
- d) An Information Commissioner can be removed from his office only by the President of India.

23. In which of the following cases, restricted tenders can be called?

- a) The work is required to be executed with very great speed which not all contractors are in a position to generate
- b) Where the work is of secret nature and public announcement is not desirable
- c) Maintenance of VIP residences/important buildings as decided by Chief Engineer concerned
- d) All of the above

24. Surplus or unutilized tender documents are:

- a) Kept safely for future
- b) Transferred to higher authority
- c) Destroyed
- d) None of the above

*25. Which of the following deals with the sanctioning authority for contingency expenditure:

- a) Schedule I
- b) Schedule II
- c) Schedule III
- d) Schedule V

*26. A Department of the Central Government with the Integrated Finance Schemes may exercise power to sanction Non-Plan expenditure on Schemes subject to the condition: (x) No Non plan post will be created and (y) No autonomous institution will be set up. Which of the following is true:

- a) Only (x) condition is true
- b) Only (y) condition is true
- c) Both (x) and (y) conditions are true
- d) Both (x) and (y) conditions are false

*27. A Divisional Officer is not empowered to make which of the following payments?

- a) Works and W.C. Establishment
- b) Pay & allowances of Regular Staff

- c) Short term advances
- d) Long term advances

*28. When is the recovery of GPF for an official due to retire on superannuation required to be stopped ?

- a) One month before retirement.
- b) Two month before retirement.
- c) Three month before retirement.
- d) Six months before retirement.

29. If a Government Servant is on ex-India leaves, then:

- a) Only one extension, on receipt of application before expiry of the leave.
- b) No extension can be granted in continuation of the sanctioned ex-India leave.
- c) extension for a maximum period of 6 months can be granted to him.
- d) extension for a maximum period of 12 months can be granted to him.

*30. Central Government servants are permitted to encash 10 days earned leave at the time of availing Leave Travel Concession, a balance of earned leave that should be his credit after taking into account the period of encashment as well leave should be at least :-

- a) 120 days EL
- b) 60 days EL
- c) 30 days EL
- d) 15 days EL

Roll No.....

SECTION B

Part-2 Short Answers

Note: Attempt all questions. Write Short Answer to the following Questions. Each question carries 7 marks.

1. Answer the following:

- a. Definition of Diarising (1)
- b. Format of Section Diary (2)
- c. Definition of Docketing (2)
- d. What all is to be included in a "Note" in official communication (2)

2. Answer the following:

- a. Write a note on key differences between erstwhile Planning Commission and Niti Aayog (5)
- b. Write full form represented by acronym N.I.T.I. in Niti Aayog. (2)

*3. The functions of PAO in the departmentalized system of accounting. (7)

*4. i) Describe the general principal of financial proprietary. (4)

- ii) Define
 - a) Consolidated fund of India (1)
 - b) Contingency fund of India (1)
 - c) Public Account (1)

*5. Write Short Notes on:

- i) Charged and voted Expenditure (4)
- ii) Capital and Revenue Expenditure (3)

6. A permanent Government Servant has been transferred from Station 'X' to 'Y' on promotion. The distance between the two stations is 2200 km. It also involves necessarily road journey over 200 km. Calculate the following:

(i) Total period of joining time. (2)

(ii) Pay and allowances payable during the joining time. (2)

(iii) The date by which the official should join his new post, if he has been relieved on the afternoon of 31.12.2015. (1)

(iv) In case the employee joins 2 days AFTER the end of joining time, whether the earlier office or the new office, would sanction his leaves beyond the joining time ? (2)

7. Write a note on the administrative rules and procedures specific to CWC. (7)

8. As an Executive Engineer, you are required to hire about 50 skilled workers through outsourcing, to man different sites during the monsoon. Please list out the steps, including requisite approvals, you would take for the above. (7)

9. Answer the following questions:

(i) On which type of contracts relevant to a Divisional Engineer in CWC is Service Tax required to be deducted at source. What steps are required once Service Tax is deducted at source ? (4)

(ii) In which type of contracts relevant to a Divisional Engineer in CWC is EPF and ESI is required to be considered ? (3)

10. Write a short note on Official Language Rules, 1976 **OR** Official Languages Act, 1963. (7)

Government of India
Central Water Commission

50th Departmental Examination for Engineering Officers of CWC

Time: 3 hours
Max. Marks: 100

PROFESSIONAL PAPER – II

(This paper containing 10 pages is divided into three Sections- A, B & C. Section A is further subdivided into two parts- Part-1 & Part-2. Section A carries 50 marks, while B & C carry 50 marks each.)

Important Instructions

- a. *Candidates shall first attempt Section A, and on completion of it they will submit it to Invigilator before they proceed to attempt Section B or C as the case may be.*
- b. *Civil Engineers shall attempt Section A & B. Mechanical Engineers shall attempt Section A & C.*
- c. *The multiple choice questions are to be attempted / answered in the question paper only. Answers in separate answer sheet will not be evaluated.*
- d. *Please write your Roll No on each section of the question paper.*
- e. *The question paper has to be returned back along with the answer sheets.*

Roll No-----

SECTION-A (COMMON TO BOTH CIVIL & MECHANICAL ENGINEERS)

Maximum Marks 50

Note-

1. Please attempt **ALL TWENTY** multiple choice objective type questions. Choose the correct option.
2. All questions carry one mark each.

Part 1- MULTIPLE CHOICE OBJECTIVE TYPE QUESTIONS

Q.No.1 When was the latest "National Water Policy" issued?

- a) 2005 b) 1987 c) 2012 d) 2001

Q.No.2 What is the average annual water resource potential in India?

- a) 670 BCM b) 1133 BCM c) 1869 BCM d) 700 BCM

Q.No.3 How many inter-basin links have been identified in the National perspective plan for inter-linking of rivers?

- a) 5 b) 15 c) 30 d) 100

Q.No.4 According to latest National Water Policy, what should be considered as pre-emptive need(s) of water?

- a) Irrigation b) Hydro-power c) drinking and sanitation d) None of them

Q.No.5 In the estimate of River valley projects, the cost of Hydro-electric works component has been kept under:

- (a) Unit-I b) Unit-II c) Unit-III d) All the above

Q.No.6 If one cumec of water is supplied to an industry throughout the year, what is the annual consumption of water by the industry in MCM?

- a) 31.5 b) 315 c) 0.315 d) 3.15

Q.No.7 In the cost estimate under detailed Sub Heads under I-Works in the DPR, the letters B, M & Q respectively define:

- a) Preliminary, Tanks & Losses on stock b) Land, Plantation & Special T &P
c) Communications, Plantation & Maint. d) Communications, Tanks & Spl T &P

Q.No.8 Which of the following measures are Non-structural measures for control of flood damages: (i) Embankment (ii) Flood plain zoning (iii) Channel improvement (iv) Flood Spill Channel (v) Flood forecasting

- a) (i) and (iv) b) (ii) and (v) c) all the above d) None of the above.

Q.No.9 As per IS 12094:2000, Flood embankment schemes should be prepared for a flood of -----years frequency in case of predominantly agricultural areas and for flood of ----- years frequency for works pertaining to protection of towns, important industrial and other vital installations.

- a) 75, 15 b) 100, 75 c) 75, 50 d) 25, 100

Q.No.10 What should be the basic unit for planning of water resources development?

- a) Village b) District c) Basin or sub-basin d) State

Q.No.11 As per IS: 11223, small dam is classified as

- (a) Gross storage between 0.5 and 10 million m³
(b) Hydraulic head between 7.5 and 12 m
(c) Both (a) and (b)
(d) None of the above

Q.No.12 As per the "Guidelines for preparation of Detailed Project Reports of Irrigation and Multipurpose Projects (2010), MoWR, the **minimum depth** of drill holes in to the fresh rock for Masonry and Concrete dam should be:

- a) 10 m b) 20 m c) 5 m d) 30 m

Q.No.13 Term "DGPS" stands for:

- a) Differential Global Positioning System b) Divisional Global Positioning System
c) Digital General Positioning System d) Dual Global Positioning Satellite

Q.No.14 Area liable to floods in India is about % of total geographical area of the country:

- a) 12 b) 50 c) 75 d) 2

Q.No.15 As per the Constitution of India, planning and development of water resources projects mainly comes under the jurisdiction of:

- a) Central government b) State governments c) Both State and Central governments
d) Panchayati Raj Institutions

Q.No.16 Which is categorized under Indirect charges in the account head of the estimate?

- (a) Establishment
(b) Receipt and recoveries on capital account
(c) Tools and Plant
(d) Audit and account charges

Q.No.17 Guidelines for operation of reservoirs are contained in which IS code?

- (a) IS: 7894-1975
- (b) IS: 4877-1968
- (c) IS: 7323 -1994
- (d) IS: 4851-1998

Q.No.18 In the context of dam safety initiatives in India, 'DRIP' stands for:

- (a) Dam Reconstruction and Improvement Project
- (b) Dam Rehabilitation and Improvement Project
- (c) Dam Rehabilitation and Insurance Project
- (d) Dam Rehabilitation and Investment Project

Q.No.19 It is understood that already high spatial and temporal variability of water availability in our country is likely to increase further due to climate change. In this context, what are the most appropriate measures to mitigate the impact of climate change: (i) Construction of large dams (ii) Interlinking of rivers (iii) construction of check dams.

- a) (i) and (ii)
- b) (ii) and (iii)
- c) (i) and (iii)
- d) None of them

Q.No.20 Which is the west flowing river in our country?

- a) Krishna
- b) Pennar
- c) Subernarekha
- d) Tapi

Part-2 SHORT ANSWER TYPE QUESTIONS

Instructions:

Please attempt **THREE** short answer type questions out of five. All questions carry 10 marks each.

Q.No.1 Expand and define following terms:

- a) MDDL
- b) DSL
- c) FRL
- d) MWL

Show all of them by drawing a neat diagram.

Q.No.2 Please match following by drawing arrows and explain the answer in brief.

Irrigation and Industrial water supply	Conflicting demands
Flood and Irrigation	Complimenting demands
Environmental flow and navigation	Competing demands

Q.No.3 Write short notes on classification of Units in the River Valley Projects' Estimate.

Q.No.4 Write names of any ten chapters to be included in a DPR of Multipurpose project and explain any two.

Q.No.5 How do the reservoirs help in controlling floods? Explain by drawing hydrographs of inflow into the reservoir and outflow from the reservoir during a flood event (time on x-axis and discharge on y-axis).

Roll No. -----

SECTION-B (for Civil Engineers only) [with related books]

Maximum Marks 50

Instructions:

1. Please attempt any **TWO** questions out of three.
2. All questions carry equal marks.

Q.No.1 Enumerate the various types of dams. Also, explain the factors governing the selection of a particular type of dam. (25 marks)

Q.No.2

A. Write short notes on any five of the following:

- i. Surge Tanks and its functions in hydropower
 - ii. Water hammer pressure and its importance in the design of penstock
 - iii. Scroll casing or spiral casing
 - iv. Draft tube
 - v. Hydropower intake
 - vi. Desilting Chambers
 - vii. Run-of-River (RoR) hydropower schemes
 - viii. Anchor blocks for penstocks
 - ix. Pumped storage schemes
 - x. Environmental considerations of hydropower
- (5x4=20 marks)

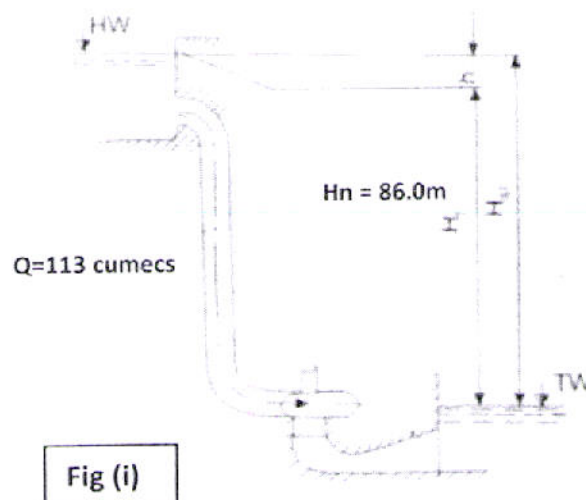
B. Explain rock mass classification as per Q-system (Rock Mass Quality). (5 marks)

Q.No.3

A. A schematic diagram for hydropower development is shown in fig. (i).

Net head (Hn)	=	86.0m
Design discharge	=	113.0 cumec
Overall efficiency	=	92.5%

Calculate the hydropower potential in MW (Mega Watt) for this scheme.



(10 marks)

B. Mark the following components in the schematic diagram of an underground hydroelectric project shown in fig (a). The fig (a) is given on a separate sheet at page no.8:

- i. Upstream water level
- ii. Power intake
- iii. Trash rack structure
- iv. Head Race Tunnel (HRT)
- v. Surge Shaft
- vi. Pressure Shaft
- vii. Power House Cavern
- viii. Transformer Cavern
- ix. Bus duct Tunnel
- x. Tail Race Tunnel (TRT)

(10 marks)

C. From the given data, calculate the thickness of penstock steel plate for internal pressure:

Internal diameter of penstock	=	4.5 m
Design internal pressure	=	22.0 kg/cm ²
Allowable stress for steel	=	1866 kg/cm ²
Joint efficiency	=	0.9

(5 marks)

Roll No. -----

SECTION-C (for Mechanical Engineers only) [with related books]

Maximum Marks 50

Instructions:

1. Please attempt any **TWO** questions out of three.
2. All questions carry equal marks.

Q.No.1

- A. Calculate horizontal, vertical and resultant water thrust and its direction for spillway crest radial gate with following specifications:

Sill Elevation	= 739.0 m
FRL/MWL	= 745.8 m
Trunnion Elevation	= 742.50 m
Top of gate	= 746.0 m
Radius of gate	= 10.0 m
Width of Gate	= 9.50 m

Assume any other required data suitably.

(15 marks)

- B. Explain suitability of tie flats and thrust pad in a radial gate installation.

(5 marks)

- C. Write down main advantages of a radial gate over a vertical lift gate.

(5 marks)

Q.No.2

- A. Draw pressure diagrams and calculate maximum static water loads in Tonnes for a fully closed spillway radial gate and vertical lift sluice gate of water resource project having following salient features:

- i) Full reservoir Level, EL=552.0m
- ii) Crest level of Spillway, EL=532.50m
- iii) Distance between center to center of adjacent piers of spillway overflow section=17.5m
- iv) Pier thickness/width=3.5m
- v) Sill elevation of Radial gate=532m
- vi) Elevation of top of Radial gate (when resting on sill)=552.2m
- vii) Sill elevation of sluice gate=472m
- viii) size of sluice opening=3m X4m

Assume any other required data suitably.

(20 marks)

- B. Draw a typical layout diagram of top sealing arrangement for a sluice radial gate.
(5 marks)

Q.No.3

- A. Over a period of time, hydraulic hoists are being preferred over rope drum hoists.
Justify the statement.
(10 marks)
- B. Explain necessity of providing air vents for high head gate installations. Explain
procedure to calculate air vent size.
(5 marks)
- C. Explain various dynamic forces encountered during operation of any high head the
gate and design methods adopted to reduce or overcome these forces.
(10 marks)

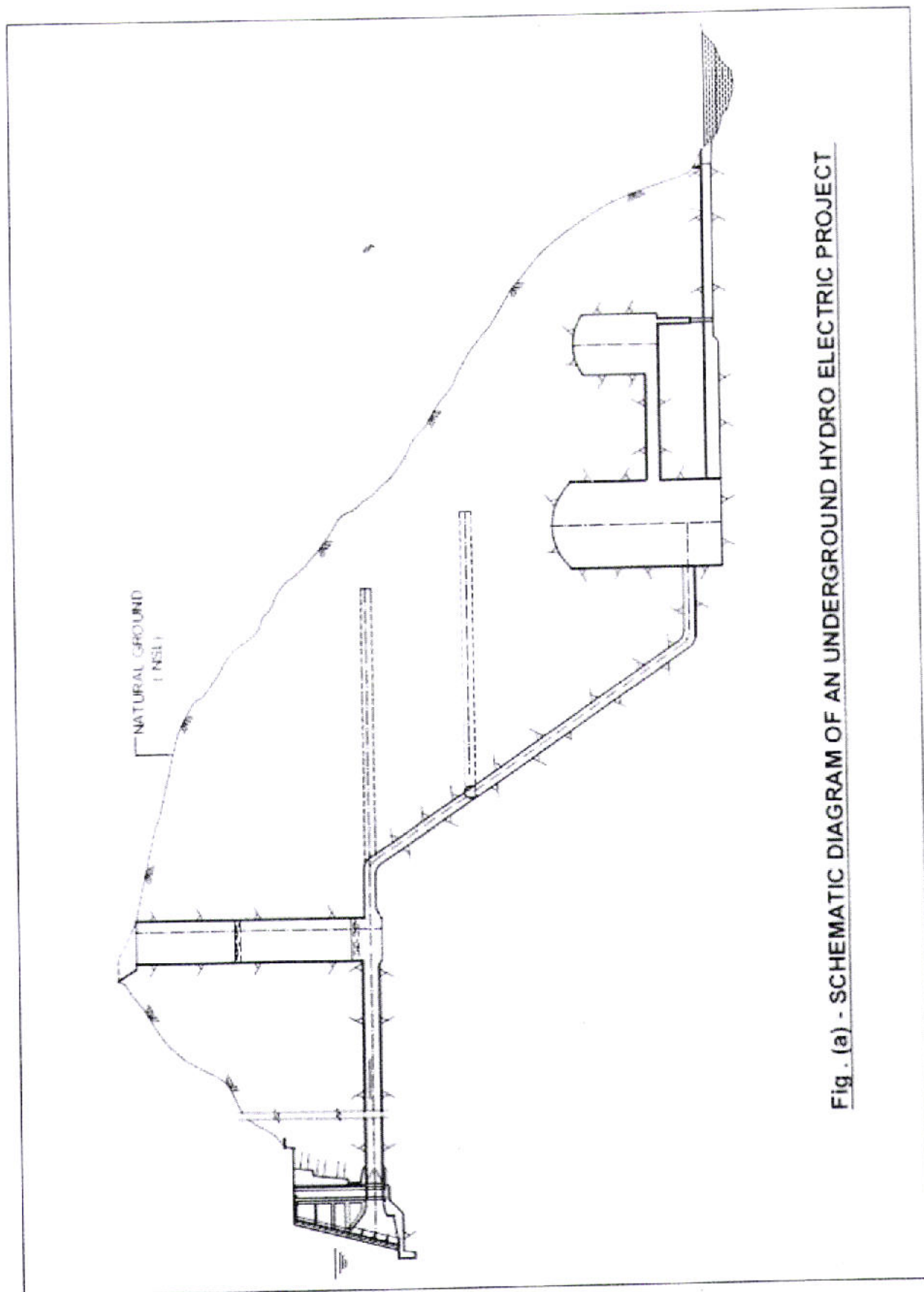


Fig. (a) - SCHEMATIC DIAGRAM OF AN UNDERGROUND HYDRO ELECTRIC PROJECT