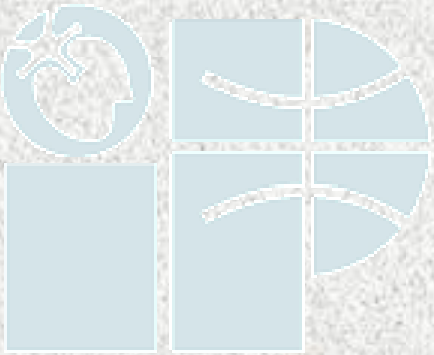
INFORMATION BULLETIN

RECRUITMENT FOR THE POSTS OF EXAMINER OF PATENTS & DESIGNS

2018-19

INTELLECTUAL PROPERTY INDIA
PATENTS | DESIGNS | TRADE MARKS
GEOGRAPHICAL INDICATIONS

Office of the Controller General of
Patents, Designs & Trade Marks
Department of Industrial Policy & Promotion
Ministry of Commerce & Industry
Government of India



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IMPORTANT INFORMATION

All applicants are advised to read the Information Bulletin carefully before starting the process of Online Registration and filling up of the application form.

1. ***Eligibility For The Examination :*** *The Candidates applying for the examination for the recruitment of Examiner of Patents and Designs should ensure that they fulfill all eligibility conditions for admission to examination. Their admission to all the stages of the examination will be purely provisional subject to satisfying the prescribed eligibility conditions. Mere issue of e-Admit Card to the candidate will not imply that his/her candidature has been finally cleared by the competent authority.*

   Candidature of the candidate is liable to be rejected at any stage of the selection process or after selection or even at the time of joining, if any information provided by the candidate is found to be false or is not found in conformity with eligibility criteria mentioned in the advertisement.

2. ***Verification of Documents :*** *Verification of eligibility conditions with reference to original documents shall be taken up for shortlisted candidates only after the Mains Examination.*

3. ***Candidates are required to apply Online only.***

4. ***Start Date & Time for Online Applications:*** *6th August 2018 from 1200 hrs.*

5. ***Last Date & Time for Online Applications:*** *4th September 2018 up to 1200 hrs.*

6. ***e-Admit Card:*** *The eligible candidates shall be issued downloadable e-Admit Card two-three weeks before the examination. No Admit Card will be sent by post/email.*

7. ***Penalty for Wrong Answers:*** *There will be penalty (negative marking) for wrong answers in the Preliminary Examination. Refer this Information Bulletin for further details.*

8. ***Facilitation Counter for Guidance of Candidates:*** *In case of any guidance/information/clarification regarding their applications, candidature etc, please refer Chapter7 in the Information Bulletin i.e. "Contact Us".*

9. ***Mobile Phones/other electronic devices Banned:***
   - *(a) Mobile phones or any other communication devices are not allowed inside the examination hall. Any infringement of these instructions shall entail disciplinary action including ban from future examinations of CGPDTM.*
   - *(b) Candidates are advised in their own interest not to bring any of the banned items including* ***Mobile Phones/Bluetooth/Watches*** *or any valuable/costly items to the venue of the examination, as arrangement for safe-keeping cannot be assured. CGPDTM will not be responsible for any loss in this regard.*
   - *(c) Candidates are permitted to bring and use battery operated pocket calculators for ONLY Paper I of Mains Examination. Loaning or inter-changing of calculators in the Examination Hall is not permitted.*
   - *(d) It is also important to note that candidates are not permitted to use calculators in the Preliminary Examination. They should not therefore, bring the same inside the Examination Hall.*

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IMPORTANT DATES AT A GLANCE

Sl. No.	Activity	Scheduled Dates
1.	Online Applications starts on	06/08/2018
2.	Online Applications closes on	04/09/2018
3.	Downloadable e-Admit Card for Preliminary Exam (Tentative)	15/09/2018
4.	Date of Preliminary Examination (Tentative)	30/09/2018
5.	Downloadable e-Admit Card for Mains Examination (Tentative)	30/10/2018
6.	Date of Mains Examination (Tentative)	18/11/2018
7.	Select Merit List Declaration(Tentative)	22/01/2019

RECRUITMENT FOR THE POSTS OF EXAMINER OF PATENTS & DESIGNS

1. INTRODUCTION

1.1 Department of Industrial Policy & Promotion

Department of Industrial Policy & Promotion (DIPP) is responsible for formulation and implementation of promotional and developmental measures for growth of the industrial sector, keeping in view the national priorities and socio-economic objectives. While individual Administrative Ministries look after the production, distribution, development and planning aspects of specific industries allocated to them, Department of Industrial Policy & Promotion is responsible for the overall Industrial Policy.

The Department of Industrial Policy and Promotion herein after referred as "DIPP" is the nodal Authority for the Formulation and Implementation of Intellectual property Rights Policy. The DIPP recognizes the importance of Intellectual Property in the day to day's global business environment. The Department formulates and implements a comprehensive Intellectual Property Rights policy covering Patents, Designs, Trade Marks and Geographical Indications (GI) of Goods. Apart from this the Department works towards creating awareness regarding IPRs by working closely with organizations such as the World Intellectual Property Organization (WIPO).

1.2 Controller General of Patents, Designs& Trade Marks

The Controller General of Patents, Designs and Trademarks (CGPDTM) is responsible for the administration of the Industrial Property laws related to Patents, Designs, Trade Marks and Geographical Indications in the country. The CGPDTM has quasi-judicial functions as Controller of Patents & Designs under the Patents Act and Designs Act, Registrar of Trade Marks and Geographical Indications under the Trade Marks Act 1999 and Geographical Indications of Goods (Registration & Protection) Act, 1999.The Office of the Controller General of Patents Designs & Trade Marks is located at Mumbai. The Patent Office is located at four places viz., Mumbai, Delhi, Chennai and Kolkata and responsible for the processing and examination of patent applications for the grant of patents under the Patents Act 1970. The Trade Marks Registry is located at five places viz., Mumbai, Delhi, Chennai and Kolkata and Ahmadabad and responsible for the registration of Trademarks.

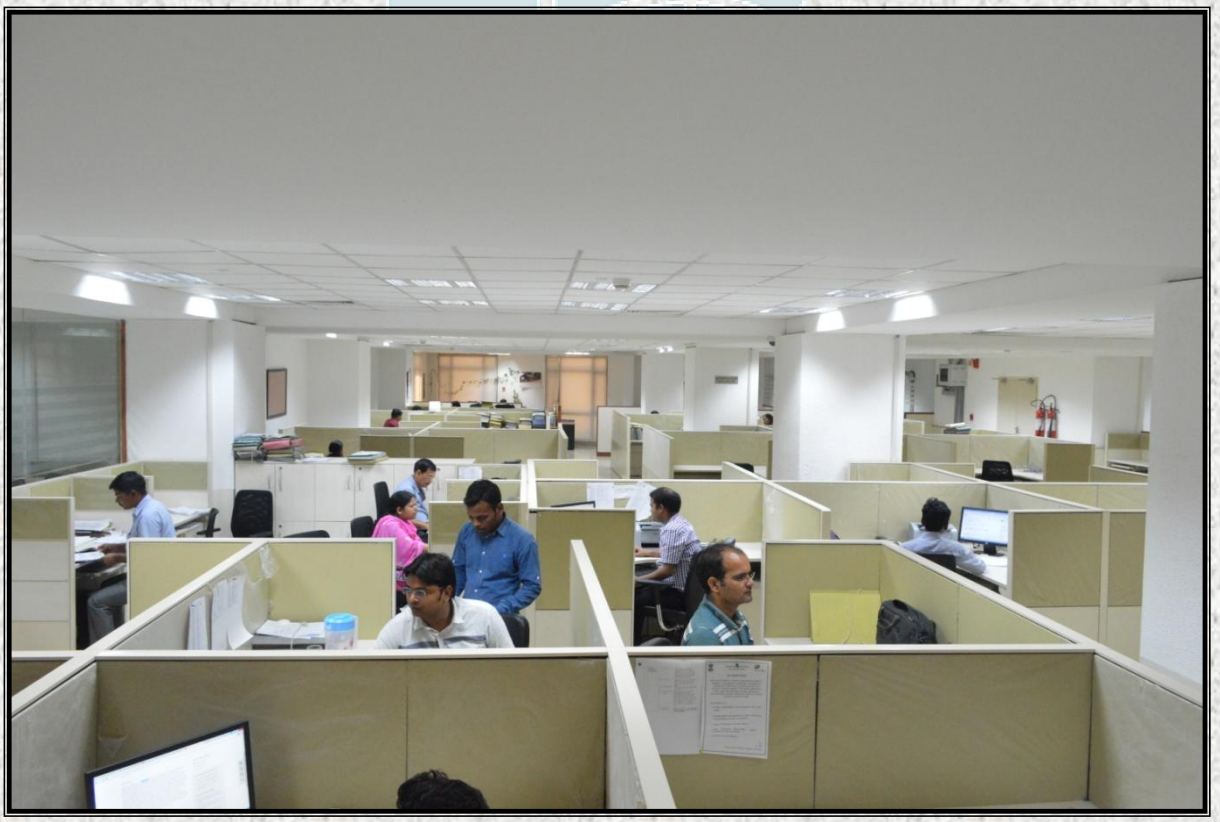
The Geographical Indication Registry is located at Chennai. All Intellectual property Offices function under the superintendence and control of the CGPDTM. Day-to-day functioning of the office of CGPDTM and other IPO offices involves a wide spectrum of activities ranging from receiving of applications for grant of IPRs to international relations with various countries in the matters relating to IPRs. The Rajiv Gandhi National Institute of Intellectual Property Management (RGNIIPM) and Patent Information System, Nagpur also function under the superintendence and control of the CGPDTM.

1.3 Vacancies

CGPDTM intends to recruit 220 Examiner of Patents and Designs in the Level 10 in Pay Matrix (Rs. 56100-177500) plus applicable allowances as admissible under the Government of India rules. This is General Central Services (Group 'A' Gazetted).The vacancies are tentative, which may be decreased or increased depending upon the actual requirement at the time of final selection/appointment.

A glimpse of office of the Controller General of Patents, Designs, & Trade Marks, India

Reception of the CGPDTM office at Dwarka, New Delhi.



Working ambiance for examiners at IPO, Dwarka, New Delhi

IPO Kolkata

IPO Chennai

IPO Mumbai

RGNIIPM Nagpur

2. RECRUITMENT FOR THE POST OF EXAMINER

2.1 Job Responsibilities

The role of the Patent Office is to process the applications for grant of patents to protect and encourage inventions. The Patent Examiner is the backbone of the Patent office who is responsible for examination of the Patent applications for inventions and its claims and determines/recommends whether the patent can be granted. The duties of the examiners includes, inter alia:

i. To investigate each application and ascertain that the invention is described clearly in such a way that a skilled person would be able to use it.
ii. To determine and assign the international patent classification (IPC) on the basis of disclosure made in the application.
iii. To examine the application containing the invention under the provisions of the Patents Act1970 (as amended).
iv. To conduct search through patent and non-patent literature of earlier publications, technical literature through database or otherwise including online databases of India and foreign patent specifications to make sure that the invention is novel.
v. To read and understand a patent application and comparing with the prior art to determine new and inventive technological contribution made in the invention disclosed in the patent application and its industrial application.
vi. To prepare an examination report by analyzing the search results obtained.
vii. To undertake all such tasks as may be assigned from time to time including the other tasks as may be required in future, as patents is an evolving field.

2.2 Distribution of Vacancies

Distribution of vacancies of examiner of Patents and Designs as per reservation rules:

Distribution of 220 posts subject wise and category wise

Sl. No.	Subject	SC	ST	OBC	UR	TOTAL
01	Biochemistry	1	1	1	3	6
02	Chemistry	7	3	12	23	45
03	Polymer Science	1	-	1	2	4
04	Electrical Engineering	4	2	8	16	30
05	Bio-Medical Engineering	1	-	1	2	4
06	Computer Science / Information Technology	8	4	15	28	55
07	Electronics & Telecommunication	10	5	19	36	70
08	Metallurgical Engineering	1	1	2	2	6
	Total	**33**	**16**	**59**	**112**	**220**

Note 1: The number of vacancies given above is tentative and may be changed at any stage by the Competent Authority. The PH Category shall be filled according to the Government of India rules. **At present, there is only one vacancy of HH category.**

Note 2: The age is relaxable for SC/ST candidates upto 5 years and upto 3 years for OBC candidates in respect of vacancies reserved for them.

2.3 Posting

Candidates selected through this recruitment process are liable to be posted anywhere in India in the offices under the office of CGPDTM.

3. APPLICATION RELATED INFORMATION

3.1 Application Process

Candidates shall be required to register and fill the application form via ONLINE mode ONLY by accessing the website ***www.cgpdtmrecruitment.in***. The photograph and signature of the applicant must be uploaded during the online application. Please note that all necessary certificates, such as, degree certificate, category certificate etc., should be kept ready in digital form of appropriate size for uploading at a later stage, if required. Please note that application forms are not available in physical form for sale.

3.2 Eligibility Criteria

Nationality

A candidate must be either:—

(a) a citizen of India, or
(b) a subject of Nepal, or
(c) a subject of Bhutan, or
(d) a Tibetan refugee who came over to India before 1st January, 1962 with the intention of permanently settling in India, or
(e) a person of Indian origin who has migrated from Pakistan, Burma, Sri Lanka, East African countries of Kenya, Uganda, the United Republic of Tanzania, Zambia, Malawi, Zaire, Ethiopia and Vietnam with the intention of permanently settling in India.

Provided that a candidate belonging to categories (b), (c), (d) and (e) shall be a person in whose favour a certificate of eligibility has been issued by the Government of India.

A candidate in whose case a certificate of eligibility is necessary, may be admitted to the examination but the offer of appointment may be given only after the verification of necessary eligibility certificate issued to him/her by the Government of India.

3.3 Minimum Essential Educational Qualifications

Sl. No.	Subject / Discipline	Essential qualification: following Degree from a recognized university
1.	Biochemistry	Master's Degree in Biochemistry
2.	Chemistry	Master's Degree in Chemistry
3.	Polymer Science	Master's Degree in Polymer Science or Bachelor Degree in Polymer Engineering / Technology
4.	Electrical Engineering	Bachelor Degree in Electrical Engineering
5.	Bio-Medical Engineering	Bachelor Degree in Bio-Medical Engineering / Technology
6.	Computer Science / Information Technology	Master Degree in Computer Science/ Information Technology or Bachelor Degree in Engineering/Technology in Computer Science/Information Technology
7.	Electronics &Telecommunication	Bachelor Degree in Electronics & Telecommunication Engineering / Technology
8.	Metallurgical Engineering	Bachelor Degree in Metallurgical Engineering / Technology

Note : The candidate must hold the degree from any of Universities incorporated by an Act of the Central or State Legislature in India or other educational institutions established by an Act of Parliament or declared to be deemed as a University under Section-3 of the University Grants Commission Act, 1956, on the closing date of the receipt of application

3.4 Division of marks:

The division of marks shall be classified as mentioned below:

a) 1class/division = 60% and above
b) II class/division = 45% and above but less than 60%
c) Pass class/division = 33% and above but less than 45%

Where the percentage is given in the form of CGPA/OGPA etc, the conversion into percentage shall be provided by the candidate according to the norms of the concerned University/ Institution in the application form.

3.5 Age Limit

a. A candidate must have attained the age of not less than 21 years and must not have attained the age of 35 years. The crucial date for determining the age-limit shall be the closing date for submission of online recruitment application.

b. The upper age limit of 35 years will be relaxable upto 40 years in the case of government servants in accordance with the instructions or orders issued by the Central Government.

c. The upper age limit prescribed above will be relaxable:

i. upto a maximum of five years if a candidate belongs to a Scheduled Caste or a Scheduled Tribe.

ii. upto a maximum of three years in the case of candidates belonging to Other Backward Classes who are eligible to avail of reservation applicable to such candidates. The OBC certificate shall be issued by the competent authority only. The competent authority shall be state government or central government i.e. the OBC certificate shall be issued by the state or central government.

iii. upto a maximum of five years if a candidate had ordinarily been domiciled in the State of Jammu & Kashmir during the period from the 1st January, 1980 to the 31st day of December, 1989.

iv. upto a maximum of three years in the case of Defence Services personnel disabled in operations during hostilities with any foreign country or in a disturbed area and released as a consequence thereof.

v. upto a maximum of five years in the case of ex-servicemen including Commissioned Officers and ECOs/SSCOs who have rendered at least five years Military Service as on 1st August, 2018 and have been released.

a. on completion of assignment (including those whose assignment is due to be completed within one year from 1st August, 2018) otherwise than by way of dismissal or discharge on account of misconduct or inefficiency, or

b. on account of physical disability attributable to Military Service, or

c. on invalidment.

vi. upto a maximum of five years in the case of ECOs/SSCOs who have completed an initial period of assignment of five years Military Service as on 1st August, 2018 and whose assignment has been extended beyond five years and in whose case the Ministry of Defence issues a certificate that they can apply for civil employment and that they will be released on three month notice on selection from the date of receipt of offer of appointment.

vii. Upto a maximum of 10 years in the case of candidates belonging to physically challenged categories as per the following eligibility:

S.No	Category (ies) for which applicable	Functional Classification
1	(HH) Hearing Impairment	PD (Partially Deaf)

Note: The above mentioned PH Category shall be filled according to the Government of India rules.

Note I: Candidates belonging to the Scheduled Castes and the Scheduled Tribes and the Other Backward Classes who are also covered under any other clauses of Para3.5(c) above, viz. those coming under the category of Ex-servicemen, persons domiciled in the State of J & K, etc. will be eligible for grant of cumulative age-relaxation under both the categories.

Note II: The term ex-servicemen will apply to the persons who are defined as ex-servicemen in the Ex-servicemen (Re-employment in Civil Services and Posts) Rules, 1979, as amended from time to time.

Note III: The age concession under Para3.5 (c) (v) and (vi) will not be admissible to Ex-Servicemen and Commissioned Officers including ECOs/SSCOs who are released on own request.

Note IV: Notwithstanding the provision of age relaxation under Para3.5 (c) (vii) above, a physically disabled candidate will be considered to be eligible for appointment only if he/she (after such physical examination as the Government or appointing authority, as the case may be, may prescribe) is found to satisfy the requirements of physical and medical standards for the concerned Services/posts to be allocated to the physically disabled candidates by the Government.

Note V: A candidate will be eligible to get the benefit of community reservation only in case the particular caste to which the candidates belong is included in the list of reserved communities issued by the central government. If a candidate indicates in his/her application form that he/she belongs to general category but subsequently writes to the competent authority to change his/her category to a reserved one, such request shall not be entertained by the office of CGPDTM.

Save as provided above the age limits prescribed can in no case be relaxed.

The date of birth accepted by the Competent Authority is that entered in the Matriculation or Secondary School Leaving Certificate or in a certificate recognized by an Indian University as equivalent to Matriculation or in an extract from a Register of Matriculates maintained by a University, which extract must be certified by the proper authority of the University or in the Higher Secondary or an equivalent examination certificate.

No other document relating to age like horoscopes, affidavits, birth extracts from Municipal Corporation, service records and the like will be accepted.

The expression Matriculation/Secondary Examination Certificate in this part of the instruction includes the alternative certificates mentioned above.

Note I: CANDIDATES SHOULD NOTE THAT ONLY THE DATE OF BIRTH AS RECORDED IN THE MATRICULATION/SECONDARY EXAMINATION CERTIFICATE OR AN EQUIVALENT CERTIFICATE AS ON THE DATE OF SUBMISSION OF APPLICATIONS WILL BE ACCEPTED BY THE COMPETENT AUTHORITY AND NO SUBSEQUENT REQUEST FOR ITS CHANGE WILL BE CONSIDERED OR GRANTED.

Note 2 : CANDIDATES SHOULD ALSO NOTE THAT ONCE A DATE OF BIRTH HAS BEEN CLAIMED BY THEM AND ENTERED IN THE RECORDS OF THE COMPETENT AUTHORITY FOR THE PURPOSE OF ADMISSION TO AN EXAMINATION, NO CHANGE WILL BE ALLOWED SUBSEQUENTLY (OR AT ANY OTHER EXAMINATION OF THE COMPETENT AUTHORITY) ON ANY GROUNDS WHATSOEVER.

Note 3:THE CANDIDATE SHOULD EXERCISE DUE CARE WHILE ENTERING THEIR DATE OF BIRTH IN THE ONLINE APPLICATION FORM FOR THE PRELIMINARY EXAMINATION. IF ON VERIFICATION AT ANY SUBSEQUENT STAGE, ANY VARIATION IS FOUND IN THEIR DATE OF BIRTH FROM THE ONE ENTERED IN THEIR MATRICULATION OR EQUIVALENT EXAMINATION CERTIFICATE, DISCIPLINARY ACTION WILL BE TAKEN AGAINST THEM BY THE COMPETENT AUTHORITY UNDER THEIR RULES.

3.6 Test Centers for Preliminary and Mains Examination

The Preliminary Examination will be tentatively held on **30th September, 2018** in the following 14 cities:

1. Ahmedabad
2. Bengaluru
3. Bhopal
4. Bhubaneshwar
5. Chandigarh
6. Chennai
7. Delhi
8. Guwahati
9. Hyderabad
10. Jaipur
11. Kolkata
12. Lucknow
13. Mumbai
14. Patna

The Mains Exam will be tentatively held on **18th November, 2018** in the following 4 Cities:

1. Chennai 2. Delhi 3.Kolkata 4.Mumbai

Note 1: The centers and the date of the examination as mentioned above are liable to be changed at the discretion of the Competent Authority. Applicants should note that there will be a ceiling on the number of candidates allotted to each of the Centers. Allotment of Centers will be on the "first-apply-first allot" basis, and once the capacity of a particular Centre is attained, the same will be frozen. Applicants are, thus, advised that they may apply early so that they could get a Centre of their choice.

Note 2: Allotment of centre is made by Computer and there is no human intervention. Under no circumstances, the allottee centre shall be changed by CGPDTM.

NOTE: The candidates (Whether Local or Outstation) called for written test (preliminary or mains examination)/ verification of documents shall not be paid any TA/DA or travel allowances or fare of any kind for attending the same.

NB: Notwithstanding the aforesaid provision, Competent Authority reserves the right to change the Centers at their discretion if the situation demands. Candidates admitted to the examination will be informed of the time table and place or places of examination. The candidates should note that no request for change of center will be entertained..

3.7 Application Fee and Payment Gateway

i. Candidates belonging to General/OBC category are required to pay a fee of **Rs. 200/- (Rupees Two Hundred only)** either by using net banking or by using visa/master, credit/debit card only.

ii. Candidates belonging to SC/ST/PH/Women candidates of any community are exempted from application fee.

iii. Applications without the prescribed fee (for General/ OBC category) will not be accepted. No representation against such rejection would be entertained.

iv. Fee once paid shall not be refunded under any circumstance nor can the fee be held in reserve for any other examination or selection.

v. For online net banking payment details and procedure candidates are required to refer the website i.e., ***www.cgpdtmrecruitment.in***.

vi. Payment of Fees by Candidate(s):

a. Candidates can pay the fees online using any Visa/Master Debit or Credit Card issued by any bank/institution.
b. They can pay online using the internet banking facility of the mentioned banks in the Information Bulletin.
c. The candidates are required to go through the website "www.cgpdtmrecruitment.in" for further details regarding the payment details.
d. All Fees quoted are in Indian Rupees.
e. CGPDTM reserve the right to change the fees as per government directions.
f. Your payment must normally reach to the account within two working days.
g. CGPDTM shall not be responsible for any delay in receipt of fee payment due to any reason including incorrect account number or incorrect personal details.
h. CGPDTM shall not accept liability if payment is refused or declined by the credit/ debit card supplier for any reason.
i. In no event CGPDTM will be liable for any damages whatsoever arising out of the use, inability to use, or the results of use of this site, any websites linked to this site, or the materials or information contained at any or all such sites, whether based on warranty, contract, tort or any other legal theory and whether or not advised of the possibility of such damages.

Terms & Condition for Internet Payment Gateway Users
Transaction Charges

For making online payment through Credit/Debit Card or Internet Banking, the candidates will need to pay an additional processing charge as "transaction charge" in addition to the fees. The necessary transaction charge plus service tax as applicable on date, for online payment of the service will be borne by the candidate. The charges as mentioned below will be levied by the e-payment solution provider for giving this service.

SL. No	Payment Mode	Amount (Rs.)	Transaction Charges (@2.25%)	GST (@18%)	Total Amount
1	Credit Card	INR 200.00	INR 4.50	INR 0.81	INR 205.31
2	Net Bank	INR 200.00	INR 4.50	INR 0.81	INR 205.31
3	I-Cash Card	INR 200.00	INR 4.50	INR 0.81	INR 205.31
4	Mobile Wallet	INR 200.00	INR 4.50	INR 0.81	INR 205.31
5	RuPay Card	INR 200.00	INR 4.50	INR 0.81	INR 205.31
6	Debit Card	INR 200.00	0	0	INR 200

Payment Gateway/Net Banking Disclaimer

Payment of examination fees will be made by the candidate using Payment Gateway hosted by designated bank. The Payment Gateway Service is being provided to the candidates so as to facilitate online payment. By using these services of the payment Gate Way, candidates expressly agrees that use of this online payment service is entirely at their own risk and cost.

Cancellation of Transaction and Refund Policy

- Candidates are required to pay a NON-REFUNDABLE APPLICATION fee as prescribed in the information bulletin.
- The fee once paid will NOT be refunded on any account nor would this fee be held in reserve for future examination/selection.
- For making online payment through Credit/Debit Card or Internet Banking, the candidates will need to pay an additional processing charge as "transaction charge" in addition to the fees.
- In case of any applicant found to have paid more fee than prescribed, due to technical reason and on receiving the communication from the said applicant, the said extra payment, if found, shall be refunded to the same account from which the payment has been received.
- There is no provision for cancellation and request for refund of examination fees including transaction/Service charges, etc. No request will be entertained in any circumstances. Any types of charge for refunding back will not be considered by the bank except in the case of failed transaction which will be settled solely by the bank with the applicants/customers.

Failed and Fraudulent Transaction

- CGPDTM will have no role in failed transactions and fraudulent use of card/net banking in any manner. Applicants are advised to use their own debit/credit card/net banking. Users/Applicants will be solely responsible for using debit/credit card & net banking for payment of examination fees.
- Any fraudulent transaction/attempt will attract action as per service rules and relevant section of Indian Penal Code (IPC) and other provisions under any relevant law. Applicants providing improper details will not be allowed to appear in the examination and the examination fees will be forfeited.

Debit/Credit card /Net banking Transaction

- The user/applicant further agrees and undertakes to provide correct and valid debit/credit card / Net Banking details. In default of the above conditions, Payment Gateway Service Provider shall be entitled to recover the amount of transaction from the user against whom the credit/debit card/Net banking has been used.
- Further, Payment Gateway service provider also reserves the right to initiate any legal action for recovery of cost/penalty or any other punitive measure, as it may deem fit.
- For other/detailed terms and condition of examination fees, please refer to instruction bulletin on the website i.e. www.cgpdtmrecruitment.in

NOTE: Candidates facing the problem of deduction of application fee amount without getting the Registration Slip generated (failed registration) are required to apply again in the online application portal before the last date of online application. These candidates can submit the request for refund of failed registration amount along with details separately.

3.8 Photograph and Signature Requirements

Online application requires your recent passport size colour photograph and signature to be uploaded electronically at the time of submitting your application. Uploaded photograph or signature that does not meet the specifications required or does not match with the identity of the candidate produced at the time of examination can result in the disqualification of the application without any refund of the application fee. Please pay attention to upload good quality photograph. Poor quality of the photograph submitted will lead to rejection of your application, without any notice including refund of the application fee. The photograph must be in color and must be taken in a professional studio.

3.9 Photographs Requirements

i. The candidate should upload the photograph without sunglasses, head scarf etc.

ii. The photograph must be taken in a white background only.

iii. The photograph must have been taken after 1st July 2018.

iv. In the photograph, the face should occupy about 50% of the area, and with a full-face view looking into the camera directly.

v. The main features of the face must not be covered by hair of the head, any cloth or any shadow. Forehead, eyes, nose and chin should be clearly visible.

vi. If you normally wear spectacles, glare on glasses is not acceptable in your photo. Glare can be avoided with a slight downward tilt of the glasses or by removing the glasses for the photo shoot.

vii. You must not wear spectacles with dark or tinted glasses, only clear glasses are permitted.

viii. Ask your photo studio to provide the image in a JPEG format and also on a standard 3.5 cm × 4.5 cm (Width x Height) print.

ix. Preferred dimensions of your photograph should be equal to or less than 100-200 KB with 200 dpi. The Dimension should be 3.5 cms (width) X 4.5 cms (height).

x. For your own benefit it may be prudent not to intentionally change your facial features or hair style as in the photograph until the day of the exam.

3.10 Signature Specification

i. Please draw a rectangular box of size 2 cm × 7 cm (Height x Width) on an A4 white paper. Put your signature with black or dark blue ink pen within this box.

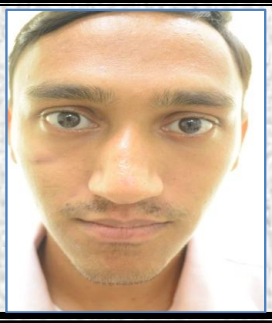
ii. Get the signature digitally image scanned by a professional using a scanner, and get the image cropped to the box by the professional.

iii. Only JPG/JPEG image formats will be accepted.

iv. Preferred dimensions of your Signature size should be equal or less than 100-200 KB with 200 dpi. The Dimension should be 6 cms (width) X 3 cms (height).

v. Photographs of the signatures taken using mobile phone are not acceptable, and can result in disqualification of the application without any refund of the fee.

3.11 The Sample Photographs which are aceeptable.

Photographs Not Acceptable	Why Photographs Is Rejected	Acceptable Photographs For The Application Form
	Cloth covering facial features	
	Photo taken with mobile phone or distorted face	
	Improper flash or improper lighting	
	Green background	
	Facial area is less than 50% of total	

Photographs Not Acceptable	Why Photographs Is Rejected	Acceptable Photographs For The Application Form
	Not looking straight into camera	
	Shadow on face	
	Too much glare on spectacles	
	Dark/tinted spectacles or sunglasses	
	Poor digital resolution	

HOW TO APPLY

4. HOW TO APPLY

4.1 Guidelines for applying for the examination

a) Candidates are required to refer the website for details and apply online using the website **www.cgpdtmrecruitment.in.**

b) No hard copy of the application shall be entertained. Any copy sent by post or email shall not be considered and no reply to such request will be sent to the candidates.

c) Only successfully online submitted application of the candidate shall be considered for further processing of e-Admit card for examination.

d) Candidate should avoid submitting more than one online application, in case of doing so, the data provided in the last application that is successfully submitted online is accepted by CGPDTM. All previous applications are ignored. No fees will be refunded, in any circumstances.

e) In case you have submitted the application form successfully but later on you come to know that you have committed a grave mistake, then you should resubmit your application afresh duly correcting the errors/omissions/mistakes/quality of photo or sign. However in this case you will have to make the requisite fee payment again, if required. However, you would need a different email ID for resubmission.

f) Persons already in Government Service, whether in a permanent or temporary capacity or as work charged employees other than casual or daily rated employees or those serving under the Public Enterprises are however, required to submit an undertaking that they have informed in writing to their Head of Office/Department that they have applied for the Examination. Candidates should note that in case a communication is received from their employer by the Competent Authority withholding permission to the candidates applying for/appearing at the examination, their application will be liable to be rejected/candidature will be liable to be cancelled even after qualifying the examination or their selection.

g) While filling in his/her Application Form, the candidate should carefully decide about his/her choice of center for the Examination. If any candidate appears at a center other than the one indicated by the Competent Authority in his/her Admit Card, the papers of such a candidate will not be evaluated and his/her candidature will be liable to cancellation.

h) Candidates are not required to upload any certificate in support of their claims regarding Age, Educational Qualifications, Scheduled Castes/ Scheduled Tribes/Other Backward Classes and Physically disabled etc. along with their applications, which will be verified at the time of the Mains examination only. (*Please note that all necessary certificates, such as, degree certificate, category certificate etc., should be kept ready in digital form of appropriate size for uploading at a later stage, if required*).

i) The candidates applying for the examination should ensure that they fulfill all the eligibility conditions for admission to the Examination. Their admission at all the stages of examination for which they are admitted by the Competent Authority viz. Preliminary Examination and Mains (Written) Examination will be purely provisional,

subject to their satisfying the prescribed eligibility conditions. If on verification at any time before or after the Preliminary Examination and Mains (written) Examination, it is found that they do not fulfill any of the eligibility conditions, their candidature for the examination will be cancelled by the Competent Authority. If any of their claims is found to be incorrect, they may render themselves liable to disciplinary action by the CGPDTM.

j) Candidates are required to provide the CGPA/OGPA etc. scores wherever applicable and convert the CGPA/OGPA etc. scores into percentage according to the rules and regulations of issuing institutes/ universities while filling the online application form.

4.2 List of original documents required for verification

a) Matriculation/10th Standard or equivalent certificate indicating date of birth, or mark sheet of Matriculation/10th Standard or equivalent issued by Central/State Board indicating Date of Birth in support of their claim of age. Where date of birth is not available in certificate/mark sheets, issued by concerned Educational Boards, School leaving certificate indicating Date of Birth will be considered (like in case of Tamil Nadu & Kerala).

b) Degree certificate along with mark sheets pertaining to all the academic years as proof of educational qualification claimed. In the absence of Degree certificate, provisional certificate along with mark sheets pertaining to all the academic years will be accepted.

c) Caste certificate in the case of candidates seeking reservation as SC/ ST/ OBC from the competent authority indicating clearly the candidate's Caste, the Act/ Order under which the Caste is recognized as SC/ ST/ OBC and the village/ town the candidate is ordinarily a resident of.

d) A certificate from issuing authority for candidates seeking reservation as OBC, that he/she does not belong to the creamy layer on the crucial date, in addition to the community certificate (OBC). Unless specified otherwise, the prescribed last date for receipt of Online Application on website mentioned for the post is to be treated as crucial date.

e) Physically Handicapped (PH) certificate issued by the competent authority by Physically Handicapped persons eligible for appointment to the post.

f) Candidate claiming change in name after matriculation on marriage or remarriage or divorce etc. must submit the following documents: a) In case of marriage of women - Photocopy of Husband's passport showing names of spouses or an attested copy of marriage certificate issued by the Registrar of Marriage or an Affidavit from husband and wife along with a joint photograph duly sworn before the Oath Commissioner. b) In case of re-marriage of women - Divorce Deed/Death certificate as the case may be in respect of first spouse; and photocopy of present husband's passport showing names of spouse or an attested copy of marriage certificate issued by the Registrar of Marriage or an Affidavit from the husband and wife along with joint photograph duly sworn before the Oath Commissioner. c) In case of divorce of women - Certified copy of Divorce Decree and Deed Poll/Affidavit duly sworn before the Oath Commissioner. d) In other circumstances for change of name for both male and

female - Deed Poll/Affidavit duly sworn before the Oath Commissioner and paper cuttings of two leading daily newspaper in original(One daily newspaper should be of the area of applicants permanent and present address or nearby area) and Gazette Notification. e) The candidates should ensure that in case of any discrepancy between name recorded in the Matriculation/other certificates/documents and Online application (such as spelling error or due to addition/deletion of part of any name or when name of the candidate is inclusive of the name of father and/or mother) an affidavit in ORIGINAL is required to be produced at the time of certificate verification that both the name/names in both the certificates belong to one and same person.

g) Certificate in respect of age relaxation in case of: a) Ex-Servicemen and Commissioned Officers including ECOs/SSCOs from competent authority. b) Central/UT Government Employees/Servants from competent authority. d) Widows/Divorced Women/Women Judicially separated from Husbands. e) Persons who had ordinarily been domiciled in the State of J & K during the period from 1st January, 1980 to 31st December, 1989.

h) Persons already in regular Government service, whether in permanent or temporary capacity other than casual/adhoc/daily wages/hourly paid/contract basis are however required to submit a declaration that they have informed in writing to their Head of Office/Department that they have applied for the selection NOC.

i) In case you have claimed to be a Government servant a certificate from your employer clearly stating that as on the closing date for this/these posts(s) you were a Government servant.

4.3 E-Admit Card

The eligible candidates shall be issued an e-Admit Card at least two – three weeks before the commencement of the examinations. The e-Admit Card will be made available on the website **www.cgpdtmrecruitment.in.**Admit cards will NOT be sent by e-mail/post, they can ONLY be downloaded from the above mentioned website. The candidate has to bring the printed admit card to the test center along with at least one original and valid (not expired) ID document forphoto identification. It may be noted that one of the following photo identifications is ONLY permitted: Driving license/ Passport/ PAN Card/ Voter ID/ Aadhaar card.

1.4 Subject Code

Sl. No.	Subject / Discipline	Subject code
1.	Biochemistry	**BC**
2.	Chemistry	**CH**
3.	Polymer Science	**PS**
4.	Electrical Engineering	**EE**
5.	Bio-medical Engineering	**BE**
6.	Computer Science / Information Technology	**CS**
7.	Electronics & Communication	**EC**
8.	Metallurgical Engineering	**MT**

EXAMINATION RELATED INFORMATION

5. EXAMINATION RELATED INFORMATION

5.1 Structure of the Examination

The Examination shall be held in two Phases, i.e. Preliminary Examination & Mains Examination.

S. No.	Stage of Exam	Max Marks	Timing	Duration of Exam
PHASE I: Preliminary Examination				
1.	Preliminary Exam **(Screening Exam)**	150	10.00AM- 12.00PM	2 Hours
PHASE II: Mains Examination				
2.	Mains Exam Paper-I **(Scoring Exam)**	300	10.00AM- 1.00PM	3 Hours
3.	Mains Exam Paper-II **(Qualifying Exam)**	100	3.00PM-4.00PM	1 Hour

5.2 Preliminary Examination

This will be an OMR (Optical Mark Reader) based Multiple Choice Question (MCQ) Paper with one correct Answer out of four alternative choices i.e. A to D. This paper will be of 2 hours duration with 150 Questions of 1 Mark each, totaling to a maximum of 150 marks. There will be 05 sections comprising 30 questions each on General English, General Science, Verbal and Non-Verbal Reasoning, Quantitative Aptitude and General Knowledge & Current Affairs. There will be no Sectional Cut-offs, in this Exam. However, there will be a negative marking @ 33% for wrong answers. This paper will be a **Screening Exam** only.

5.3 Mains Examination

The Mains Examination will have two Papers namely Mains Exam Paper-I and Mains Exam Paper-II:

Mains Exam Paper I: This will be a descriptive Question Paper of the concerned Discipline/Subject opted by the candidate. This paper shall be of 3 hours duration and shall have a maximum of 300 marks. The question shall be designed to test the knowledge in the subject. The candidate will be provided with Answer Booklet with sufficient pages to answer all questions. No electronic gadgets except battery operated scientific calculator shall be permitted. If required, Log Tables within the question paper shall be provided. This will be a **Scoring Examination.**

Mains Exam Paper II: It will be an English Proficiency Question Paper. This paper shall be of 1 hour duration and shall have a maximum of 100 marks. This test is designed to test the English Writing, Power of Expression & Report Writing Skills/Ability of the candidates. This paper will be qualifying in nature and will comprise of Questions based on Comprehension, Short Essay, Usage & Vocabulary, Report Writing and Precis Writing. This will be a **Qualifying Examination.**

5.4 Selection Process and cut off

Candidates around 12-15 times of number of vacancies i.e. 220 nos., shall be short-listed for appearing in the Mains examination. Approximately not more than 3000 nos. candidates across all disciplines including reserved category shall be called for the Mains examination.

The evaluation for the paper I in the Mains examination will be done only for those candidates who qualify in the paper II of Mains examination which is qualifying in nature.

The final merit list shall be prepared based on the scores obtained by the candidates out of 300 marks in the Mains examination.

A Common Seniority List of the selected candidates under various disciplines will be prepared by normalization procedure.

The rules for reservation for various reserved category shall be followed as per government of India norms.

5.5 Summary of Recruitment Test Pattern

PRELIMINARY EXAM (SCREENING EXAM)		
01	Mode & Type of Examination	Offline, Objective
02	Duration of Examination	2 Hours
03	Date of Examination (tentative)	Sunday, 30th September, 2018
04	Number of shifts	One
05	Timing of the examination	10.00AM- 12.00PM
06	Location	14 cities in India
07	Language of examination	Hindi & English
08	Number of Questions	150 MCQs (Multiple Choice Questions)
09	Total Marks	150 Marks
10	Marking Scheme	Correct Answer : 1 mark Wrong Answers : 33% Negative Marking for each wrong answer
MAINS EXAM PAPER - I(SCORING EXAM)		
01	Mode & Type of Examination	Offline, Subjective
02	Duration of Examination	3 Hours
03	Date of Examination (tentative)	Sunday, 18thNovember, 2018
04	Number of shifts	One

05	Timing of the examination	10.00AM- 1.00PM
06	Total Marks	300
07	Location	4 cities in India
08	Language of examination	English
09	Method of Resolving Ties	(i) Candidate securing more marks in the Scoring paper of Mains Examination is to be ranked higher; (ii) In case where the marks mentioned at (i) above are equal, the candidate senior in age is to be ranked higher; and (iii) In case where the (i) and (ii) above are same, then the candidate getting more marks in Degree (Essential Educational Qualification) is to be ranked higher.
MAINS EXAM PAPER-II (QUALIFYING EXAM)		
01	Mode & Type of Examination	Offline, Subjective
02	Duration of Examination	1 Hour
03	Date of Examination	Sunday, 18th November, 2018
04	Number of shifts	One
05	Timing of the examination	3.00PM-4.00PM
06	Total Marks	100
07	Location	4 cities in India
08	Language of examination	English
09	Qualifying Criteria	To be decided by Competent Authority

5.6 Syllabi for Preliminary Examination

5.6.1. General English

The aim of the paper is to test the candidate's ability to read and understand prose, and express his ideas clearly and correctly. The pattern of questions would be broadly as follows:

1. Comprehension of given passages
2. Precis Writing
3. Usage and Vocabulary
4. Short Essays

5.6.2. Numerical/Quantitative Aptitude

The quantitative aptitude test measures the numerical ability and accuracy in mathematical calculations. The questions range from purely numeric calculations to problems of arithmetic reasoning, graph and table reading, percentage analysis, categorization and quantitative analysis.

5.6.3. Reasoning: Verbal /Logical Reasoning & Non-Verbal Reasoning

The Verbal /Logical Reasoning test involves letter sequences and tests your ability to think logically and analytically. It is the process of using a rational, systematic series of steps based on sound mathematical procedures and given statements to arrive at a conclusion. Non-verbal reasoning involves the ability to understand and analyze visual information and solve problems using visual reasoning.

5.6.4. General Science

These tests are designed to test the knowledge and competencies for scientific methodology concepts, principles, techniques and physics, chemistry, life sciences (Biology), the earth/space sciences, technologies etc

5.6.5. General Knowledge & Current Affairs

Current affairs are the day to day incidents and events around us. It revolves around happenings in different field related to national, international, economy, sports, science and technology, environment. For example national events include within its fold aspects like economy, social, political, sports, science, environment, etc.

5.7 Sample Questions for Preliminary Examination

SPOTTING ERRORS

Direction: Each question in this section has a sentence with three underlined parts labeled (a), (b) and (c). Read each sentence to find out whether there is any underlined part and indicate your response in the Answer Sheet against the corresponding letter i.e. (a) or (b) or (c). if you find no error, your response should be indicated as (d).

Q.1. The President reached back (a) This morning (b)

After a visit to the southern states. (c) No error (d)

Q.2. The administrator is entrusted the responsibility (a) Of the overall management of an industry (b)

While the technical personnel remain advisers to the administration (c) No error (d)

RECONSTRUCTING PASSAGES

Direction for the following TWO items: In the following **TWO** items, there are six sentences marked S1, P, Q, R, S and S6. The position of S1 and S6 are fixed. You are required to choose one of the four alternatives given below every passage which would be the most logical sequence of the sentences in the passage and mark your response on the Answer Sheet.

Q.3. **S1**: The open and disguised unemployment in the rural areas is often thought to be due entirely to population growth and no doubt this is an important contributory factor.

S6: The lack of capital can explain a low level of productivity but it cannot explain a lack of opportunities.

P:It is said that they cannot work because they lack 'capital'.

Q: It is the Product of human work.

R: But those who hold this view still have to explain why additional people cannot dois 'capital'.

S: But what is 'capital'?

The proper sequence should be:

A. QRPS
B. RPSQ
C. SQPR
D. PRQS

Q.4. S1: Mineral oil originates from the carcasses of tiny creatures and from plants that live in the sea.

S6: Their pressure generates heat, which transforms the marine deposits into crude oil.

P: As a result, it prevents decompositions of the marine deposits underneath.

Q: Over millions of years, they from large deposits on the seabed, and ocean currents cover them with a blanket of sand silt.

R: As this material hardens, it becomes sedimentary rock and thus shuts out the oxygen.

S: The layers of sedimentary rock become thicker and thicker.

The proper sequence should be:

A. PQRS
B. QRPS
C. RSPQ
D. SRQP

ANTONYMS

Direction for the following two items: In this section each item consists of a word printed in capital letters followed by words or phrases listed as (a), (b), (c) and (d). choose the word or phrase which is closest to the opposite in meaning of the word in capital letters.

Q.5. OMNISCIENT

A. Subordinate
B. Ignorant
C. Ignoble
D. Weak

Q.6. JEOPARDISE

A. Help
B. Encourage
C. Take care
D. Preserve

Q.7. Which one of the following is spread over three states?

A. Mudumalai Wildlife Sanctuary
B. National Chambal Sanctuary
C. Eravikulam National Park
D. Bandavgarh National Park

Q.8. Which one of the following became extinct in India a few decades ago and is proposed to be re-introduced?

A. Cheetah
B. Gharial
C. Salt water crocodile
D. Snow leopard

Q.9. India is a member of:

1. Asia-pacific Economic Cooperation(APEC)
2. Asian Development Bank (ADB)
3. Organization for Economic Cooperation and Development (OECD)
4. World Trade Organization (WTO)

Select the correct answer using the code given below:

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

Q.10. Which of the following are sources of methane, a greenhouse gas?

1. Domestic animals
2. Coal mining
3. Wetlands

Select the correct answer using the code given below

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

Q.11. Duodenum in human body is a part of:

A. Digestive system
B. Excretory system
C. Reproductive system
D. Respiratory system

Direction: In each of the following questions, a number series is given with one term missing. Choose the correct alternative that will continue the same pattern and replace the question mark in the given series.

Q.12. 325, 259, 204, 160, 127, 105,?

A. 94
B. 96
C. 98
D. 100

Q.13. 6, 13, 25, 51, 101, ?

A. 201
B. 202
C. 203
D. 205

Q.14. If DELHI is coded as 73541 and CALCUTTA as 82589662, how can CALICUT be coded?
A. 5279431
B. 5978213
C. 8251896
D. 8543691

Q.15. N ranks fifth in a class. S is eighth from the last. If T is sixth after N and just in the middle of N and S, then how many students are there in the class
A. 23
B. 24
C. 25
D. 26

Q.16. If Tuesday falls on the fourth of the month, then which day will fall three days after the 24^{th} ?
A. Monday
B. Tuesday
C. Thursday
D. Friday

Q.17. The ratio of two numbers is 15: 11. If their HCF is 13, then the numbers are :
A. 75,55
B. 45,22
C. 104,44
D. 195,143

Q.18. Which is the smallest number that can be subtracted from 1936 so that on being divided by 9, 10, 15 the reminder is 7 every time?
A. 93
B. 46
C. 76
D. 39

Q.19. Traffic lights at three different points are changing respectively at 24, 48 and 72 seconds. If all the three are changed together at 9:10:24 hours, then when will the next change take place together?
A. 9:12:25 hrs
B. 9:10:48 hrs
C. 9:12:48 hrs
D. 9:10:50 hrs

Q.20. The least multiple of 13, which on dividing by 4, 5, 6, 7 and 8 leaves reminder 2 in each case is
A. 2520
B. 842
C. 2522
D. 840

Q.21. Which of the following is the lightest metal?
A. Mercury
B. Silver
C. Lithium

D. Lead

Q.22. The most important ore of Aluminium is —
A. Bauxite
B. Calamine
C. Calcite
D. Galena

Q.23. The element present in the largest amount in rocks and minerals is —
A. Carbon
B. Silicon
C. Hydrogen
D. Aluminium

Q.24. An alloy used in making heating elements for electric heating devices is —
A. Solder
B. Alloy steel
C. Nichrome
D. German Silver

Q.25. German Silver is an alloy of —
A. Copper, Silver & Nickel
B. Silver, Copper &Aluminium
C. Zinc, Copper & Nickel
D. Silver, Zinc & Nickel

Q.26. Recently, Lok Sabha Passes this bill for allowing a court trying an offence related to cheque bouncing.
A. National Council For Teacher Education (NCTE) Amendment Bill
B. Specific Relief (Amendment) Bill
C. Negotiable Instruments (Amendment) Bill
D. Prevention of Corruption (Amendment) Bill

Q.27. The Union Cabinet chaired by Prime Minister Narendra Modi has approved an agreement between India and _____ on Cooperation in the field of Science, Technology and Innovation.
A. Singapore
B. Denmark
C. Germany
D. France

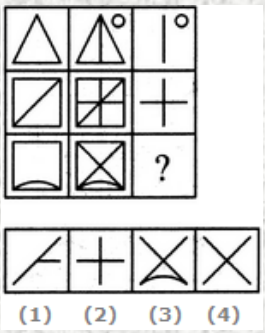
Q.28. Garampani sanctuary is located at
A. Junagarh, Gujarat
B. Diphu, Assam
C. Kohima, Nagaland
D. Gangtok, Sikkim

Q.29. _____ and China in talks to form bloc against Opec
A. Netherland
B. Germany
C. Iraq
D. India

Q.30. For which company, the European Union fined $5 Billion for abusing the dominance of its Android mobile operating system?

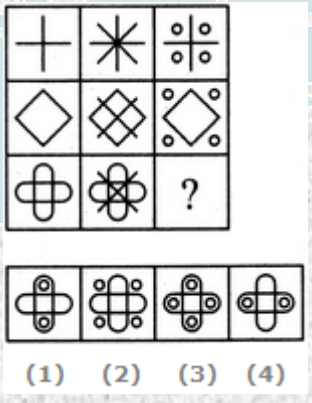
A. Samsung
B. Microsoft
C. Apple
D. Google

Q.31. Select a suitable figure from the four alternatives that would complete the figure matrix.



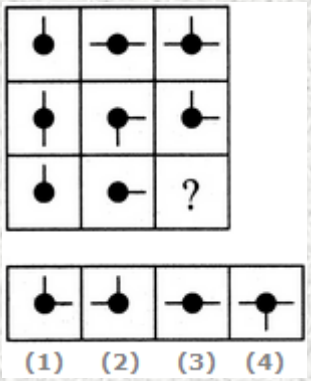
A. 1
B. 2
C. 3
D. 4

Q.32. Select a suitable figure from the four alternatives that would complete the figure matrix.



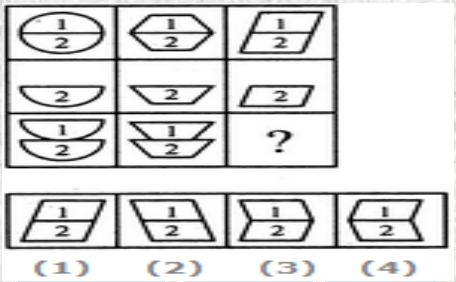
A. 1
B. 2
C. 3
D. 4

Q.33. Select a suitable figure from the four alternatives that would complete the figure matrix.



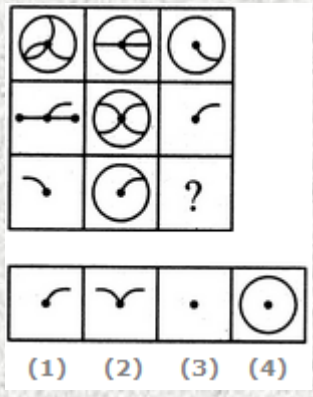
A. 1
B. 2
C. 3
D. 4

Q.34. Select a suitable figure from the four alternatives that would complete the figure matrix.



A. 1
B. 2
C. 3
D. 4

Q.35. Select a suitable figure from the four alternatives that would complete the figure matrix.



A. 1
B. 2
C. 3
D. 4

5.8 Syllabi for Mains Examination (Part-I) Descriptive Type

CHEMISTRY

Inorganic Chemistry

1. Chemical periodicity
2. Structure and bonding in homo- and heteronuclear molecules, including shapes of molecules (VSEPR Theory).
3. Concepts of acids and bases, Hard-Soft acid base concept, Non-aqueous solvents.
4. Main group elements and their compounds: Allotropy, synthesis, structure and bonding, industrial importance of the compounds.
5. Transition elements and coordination compounds: structure, bonding theories, spectral and magnetic properties, reaction mechanisms.
6. Inner transition elements: spectral and magnetic properties, redox chemistry, analytical applications.
7. Organometallic compounds: synthesis, bonding and structure, and reactivity. Organometallics in homogeneous catalysis.
8. Cages and metal clusters.
9. Analytical chemistry- separation, spectroscopic, electro- and thermoanalytical methods.
10. Bioinorganic chemistry: photosystems, porphyrins, metalloenzymes, oxygen transport, electron- transfer reactions; nitrogen fixation, metal complexes in medicine.
11. Characterisation of inorganic compounds by IR, Raman, NMR, EPR, Mössbauer, UV-vis, NQR, MS, electron spectroscopy and microscopic techniques.
12. Nuclear chemistry: nuclear reactions, fission and fusion, radio-analytical techniques and activation analysis.

Physical Chemistry

1. Basic principles of quantum mechanics: Postulates; operator algebra; exactly-solvable systems: particle-in-a-box, harmonic oscillator and the hydrogen atom, including shapes of atomic orbitals; orbital and spin angular momenta; tunneling.
2. Approximate methods of quantum mechanics: Variational principle; perturbation theory up to second order in energy; applications.
3. Atomic structure and spectroscopy; term symbols; many-electron systems and antisymmetry principle.

4. Chemical bonding in diatomics; elementary concepts of MO and VB theories; Huckel theory for conjugated π-electron systems.
5. Chemical applications of group theory; symmetry elements; point groups; character tables; selection rules.
6. Molecular spectroscopy: Rotational and vibrational spectra of diatomic molecules; electronic spectra; IR and Raman activities – selection rules; basic principles of magnetic resonance.
7. Chemical thermodynamics: Laws, state and path functions and their applications; thermodynamic description of various types of processes; Maxwell's relations; spontaneity and equilibria; temperature and pressure dependence of thermodynamic quantities; Le Chatelier principle; elementary description of phase transitions; phase equilibria and phase rule; thermodynamics of ideal and non-ideal gases, and solutions.
8. Statistical thermodynamics: Boltzmann distribution; kinetic theory of gases; partition functions and their relation to thermodynamic quantities – calculations for model systems.
9. Electrochemistry: Nernst equation, redox systems, electrochemical cells; Debye-Huckel theory; electrolytic conductance – Kohlrausch's law and its applications; ionic equilibria; conductometric and potentiometric titrations.
10. Chemical kinetics: Empirical rate laws and temperature dependence; complex reactions; steady state approximation; determination of reaction mechanisms; collision and transition state theories of rate constants; unimolecular reactions; enzyme kinetics; salt effects; homogeneous catalysis; photochemical reactions.
11. Colloids and surfaces: Stability and properties of colloids; isotherms and surface area; heterogeneous catalysis.
12. Solid state: Crystal structures; Bragg's law and applications; band structure of solids.
13. Polymer chemistry: Molar masses; kinetics of polymerization.
14. Data analysis: Mean and standard deviation; absolute and relative errors; linear regression; covariance and correlation coefficient.

Organic Chemistry

1. IUPAC nomenclature of organic molecules including regio- and stereoisomers.
2. Principles of stereochemistry: Configurational and conformational isomerism in acyclic and cyclic compounds; stereogenicity, stereoselectivity, enantioselectivity, diastereoselectivity and asymmetric induction.

3. Aromaticity: Benzenoid and non-benzenoid compounds – generation and reactions.
4. Organic reactive intermediates: Generation, stability and reactivity of carbocations, carbanions, free radicals, carbenes, benzynes and nitrenes.
5. Organic reaction mechanisms involving addition, elimination and substitution reactions with electrophilic, nucleophilic or radical species. Determination of reaction pathways.
6. Common named reactions and rearrangements – applications in organic synthesis.
7. Organic transformations and reagents: Functional group interconversion including oxidations and reductions; common catalysts and reagents (organic, inorganic, organometallic and enzymatic). Chemo, regio and stereoselective transformations.
8. Concepts in organic synthesis: Retrosynthesis, disconnection, synthons, linear and convergent synthesis, umpolung of reactivity and protecting groups.
9. Asymmetric synthesis: Chiral auxiliaries, methods of asymmetric induction – substrate, reagent and catalyst controlled reactions; determination of enantiomeric and diastereomeric excess; enantio-discrimination. Resolution – optical and kinetic.
10. Pericyclic reactions – electrocyclisation, cycloaddition, sigmatropic rearrangements and other related concerted reactions. Principles and applications of photochemical reactions in organic chemistry.
11. Synthesis and reactivity of common heterocyclic compounds containing one or two heteroatoms (O, N, S).
12. Chemistry of natural products: Carbohydrates, proteins and peptides, fatty acids, nucleic acids, terpenes, steroids and alkaloids. Biogenesis of terpenoids and alkaloids.
13. Structure determination of organic compounds by IR, UV-Vis, 1H & 13C NMR and Mass spectroscopic techniques.

Interdisciplinary topics

1. Chemistry in nanoscience and technology
2. Catalysis and green chemistry
3. Medicinal chemistry
4. Supramolecular chemistry
5. Environmental chemistry

POLYMER SCIENCE

Chemistry of high polymers: Monomers, functionality, degree of polymerizations, classification of polymers, glass transition, melting transition, criteria for rubberiness, polymerization methods: addition and condensation; their kinetics, metallocene polymers and other newer techniques of polymerization, copolymerization, monomer reactivity ratios and its significance, kinetics, different copolymers, random, alternating, azeotropic copolymerization, block and graft copolymers, techniques for copolymerization-bulk, solution, suspension, emulsion.

Polymer Characterization: Solubility and swelling, concept of average molecular weight, determination of number average, weight average, viscosity average and Z-average molecular weights, polymer crystallinity, analysis of polymers using IR, XRD, thermal (DSC, DMTA, TGA), microscopic (optical and electronic) techniques.

Synthesis and properties: Commodity and general purpose thermoplastics: PE, PP, PS, PVC, Polyesters, Acrylic, PU polymers. Engineering Plastics: Nylon, PC, PBT, PSU, PPO, ABS, Fluoropolymers Thermosetting polymers: PF, MF, UF, Epoxy, Unsaturated polyester, Alkyds. Natural and synthetic rubbers: Recovery of NR hydrocarbon from latex, SBR, Nitrile, CR, CSM, EPDM, IIR, BR, Silicone, TPE.

Polymer blends and composites: Difference between blends and composites, their significance, choice of polymers for blending, blend miscibility-miscible and immiscible blends, thermodynamics, phase morphology, polymer alloys, polymer eutectics, plastic-plastic, rubberplastic and rubber-rubber blends, FRP, particulate, long and short fibre reinforced composites.

Polymer Technology: Polymer compounding-need and significance, different compounding ingredients for rubber and plastics, crosslinking and vulcanization, vulcanization kinetics.

Polymer rheology: Flow of Newtonian and non-Newtonian fluids, different flow equations, dependence of shear modulus on temperature, molecular/segmental deformations at different zones and transitions. Measurements of rheological parameters by capillary rotating, parallel plate, cone-plate rheometer. viscoelasticity-creep and stress relaxations, mechanical models, control of rheological characteristics through compounding, rubber curing in parallel plate viscometer, ODR and MDR.

Polymer processing: Compression molding, transfer molding, injection molding, blow molding, reaction injection molding, extrusion, pultrusion, calendaring, rotational molding, thermoforming, rubber processing in two-roll mill, internal mixer.

Polymer testing: Mechanical-static and dynamic tensile, flexural, compressive, abrasion, endurance, fatigue, hardness, tear, resilience, impact, toughness. Conductivity-thermal and electrical, dielectric constant, dissipation factor, power factor, electric resistance, surface resistivity, volume resistivity, swelling, ageing resistance, environmental stress cracking resistance.

BIOCHEMISTRY

Organization of life; Importance of water; Structure and function of biomolecules: Amino acids, Carbohydrates, Lipids, Proteins and Nucleic acids; Protein structure, folding and function: Myoglobin, Hemoglobin, Lysozyme, Ribonuclease A, Carboxypeptidase and Chymotrypsin.

Enzyme kinetics including its regulation and inhibition, Vitamins and Coenzymes ; Metabolism and bioenergetics; Generation and utilization of ATP; Metabolic pathways and their regulation: glycolysis, TCA cycle, pentose phosphate pathway, oxidative phosphorylation,gluconeogenesis, glycogen and fatty acid metabolism; Metabolism of Nitrogen containing compounds: nitrogen fixation, amino acids and nucleotides. Photosynthesis: Calvin cycle.

Biochemical separation techniques: ion exchange, size exclusion and affinity chromatography, Characterization of biomolecules by electrophoresis, UV-visible and fluorescence spectroscopy and Mass spectrometry.

Cell structure and organelles; Biological membranes; Transport across membranes; Signal transduction; Hormones and neurotransmitters.

DNA replication, transcription and translation; Biochemical regulation of gene expression; Recombinant DNA technology and applications: PCR, site directed mutagenesis and DNA-microarray.

Immune system: Active and passive immunity; Complement system; Antibody structure, function and diversity; Cells of the immune system: T, B and macrophages; T and B cell activation; Major histocompatibilty complex; T cell receptor; Immunological techniques: Immunodiffusion, immunoelectrophoresis, RIA and ELISA.

COMPUTER SCIENCE/ INFORMATION TECHNOLOGY

Digital Logic : Boolean algebra. Combinational and sequential circuits. Minimization. Number representations and computer arithmetic (fixed and floating point).

Computer Organization and Architecture : Machine instructions and addressing modes. ALU, data-path and control unit. Instruction pipelining. Memory hierarchy: cache, main memory and secondary storage; I/O interface (interrupt and DMA mode).

Programming and Data Structures: Programming in C. Recursion. Arrays, stacks, queues, linked lists, trees, binary search trees, binary heaps, graphs.

Algorithms : Searching, sorting, hashing. Asymptotic worst case time and space complexity. Algorithm design techniques: greedy, dynamic programming and divide-and-conquer. Graph search, minimum spanning trees, shortest paths.

Theory of Computation: Regular expressions and finite automata. Context-free grammars and push-down automata. Regular and contex-free languages, pumping lemma. Turing machines and undecidability.

Compiler Design: Lexical analysis, parsing, syntax-directed translation. Runtime environments. Intermediate code generation.

Operating System: Processes, threads, inter-process communication, concurrency and synchronization. Deadlock. CPU scheduling. Memory management and virtual memory. File systems.

Databases :ER-model. Relational model: relational algebra, tuple calculus, SQL. Integrity constraints, normal forms. File organization, indexing (e.g., B and B+ trees). Transactions and concurrency control.

Computer Networks: Concept of layering. LAN technologies (Ethernet). Flow and error control techniques, switching. IPv4/IPv6, routers and routing algorithms (distance vector, link state). TCP/UDP and sockets, congestion control. Application layer protocols (DNS, SMTP, POP, FTP, HTTP). Basics of Wi-Fi. Network security: authentication, basics of public key and private key cryptography, digital signatures and certificates, firewalls.

ELECTRICAL ENGINEERING

Electrical Materials : Electrical Engineering Materials, crystal structures and defects, ceramic materials, insulating materials, magnetic materials – basics, properties and applications; ferrities, ferro-magnetic materials and components; basics of solid state physics, conductors; Photo-conductivity; Basics of Nano materials and Superconductors.

Electric Circuits and Fields: Circuit elements, network graph, KCL, KVL, Node and Mesh analysis, ideal current and voltage sources, Thevenin's, Norton's, Superposition and Maximum Power Transfer theorems, transient response of DC and AC networks, Sinusoidal steady state analysis, basic filter concepts, two-port networks, three phase circuits, Magnetically coupled circuits, Gauss Theorem, electric field and potential due to point, line, plane and spherical charge distributions, Ampere's and Biot Savart's laws; inductance, dielectrics, capacitance; Maxwell's equations.

Electrical and Electronic Measurements: Principles of measurement, accuracy, precision and standards; Bridges and potentiometers; moving coil, moving iron, dynamometer and induction type instruments, measurement of voltage, current, power, energy and power factor, instrument transformers, digital voltmeters and multi-meters, phase, time and frequency measurement, Q-meters, oscilloscopes, potentiometric recorders, error analysis, Basics of sensors, Transducers, basics of data acquisition systems

Computer Fundamentals: Number systems, Boolean algebra, arithmetic functions, Basic Architecture, Central Processing Unit, I/O and Memory Organisation; peripheral devices, data represenation and programming, basics of Operating system and networking, virtual memory, file systems; Elements of programming languages, typical examples.

Basic Electronics Engineering: Basics of Semiconductor diodes and transistors and characteristics, Junction and field effect transistors (BJT, FET and MOSFETS), different types of transistor amplifiers, equivalent circuits and frequency response; oscillators and other circuits, feedback amplifiers.

Analog and Digital Electronics: Operational amplifiers – characteristics and applications, combinational and sequential logic circuits, multiplexers, multi-vibrators, sample and hold circuits, A/D and D/A converters, basics of filter circuits and applications, simple active filters; Microprocessor basics- interfaces and applications, basics of linear integrated circuits; Analog communication basics, Modulation and demodulation, noise and bandwidth, transmitters and receivers, signal to noise ratio, digital communication basics, sampling,

quantizing, coding, frequency and time domain multiplexing, power line carrier communication systems.

Systems and Signal Processing: Representation of continuous and discrete-time signals, shifting and scaling operations, linear, time-invariant and causal systems, Fourier series representation of continuous periodic signals, sampling theorem, Fourier and Laplace transforms, Z transforms, Discrete Fourier transform, FFT, linear convolution, discrete cosine transform, FIR filter, IIR filter, bilinear transformation.

Control Systems: Principles of feedback, transfer function, block diagrams and signal flow graphs, steady-state errors, transforms and their

applications; Routh-hurwitz criterion, Nyquist techniques, Bode plots, root loci, lag, lead and lead-lag compensation, stability analysis, transient and frequency response analysis, state space model, state transition matrix, controllability and observability, linear state variable feedback, PID and industrial controllers.

Electrical Machines : Single phase transformers, three phase transformers - connections, parallel operation, auto-transformer, energy conversion

principles, DC machines - types, windings, generator characteristics, armature reaction and commutation, starting and speed control of motors, Induction motors - principles, types, performance characteristics, starting and speed control, Synchronous machines - performance, regulation, parallel operation of generators, motor starting, characteristics and applications, servo and stepper motors.

Power Systems : Basic power generation concepts, steam, gas and water turbines, transmission line models and performance, cable performance, insulation, corona and radio interference, power factor correction, symmetrical components, fault analysis, principles of protection systems, basics of solid state relays and digital protection; Circuit breakers, Radial and ring-main distribution systems, Matrix representation of power systems, load flow analysis, voltage control and economic operation, System stability concepts, Swing curves and equal area criterion. HVDC transmission and FACTS concepts, Concepts of power system dynamics, distributed generation, solar and wind power, smart grid concepts, environmental implications, fundamentals of power economics.

Power Electronics and Drives : Semiconductor power diodes, transistors, thyristors, triacs, GTOs, MOSFETs and IGBTs - static characteristics and principles of operation, triggering

circuits, phase control rectifiers, bridge converters - fully controlled and half controlled, principles of choppers and inverters, basis concepts of adjustable speed DC and AC drives, DC-DC switched mode converters, DC-AC switched mode converters, resonant converters, high frequency inductors and transformers, power supplies.

ELECTRONICS AND TELECOMMUNICATION ENGINEERING

Basic Electronics Engineering: Basics of semiconductors; Diode/Transistor basics and characteristics; Diodes for different uses; Junction & Field Effect Transistors (BJTs, JFETs, MOSFETs); Transistor amplifiers of different types, oscillators and other circuits; Basics of Integrated Circuits (ICs); Bipolar, MOS and CMOS ICs; Basics of linear ICs, operational amplifiers and their applications-linear/non-linear; Optical sources/detectors; Basics of Opto electronics and its applications.

Basic Electrical Engineering: DC circuits-Ohm's & Kirchoff's laws, mesh and nodal analysis, circuit theorems; Electro-magnetism, Faraday's & Lenz's laws, induced EMF and its uses; Single-phase AC circuits; Transformers, efficiency; Basics-DC machines**,** induction machines, and synchronous machines; Electrical power sources- basics: hydroelectric, thermal, nuclear, wind, solar; Basics of batteries and their uses.

Materials Science: Electrical Engineering materials; Crystal structure & defects; Ceramic materials-structures, composites, processing and uses; Insulating laminates for electronics, structures, properties and uses; Magnetic materials, basics, classification, ferrites, ferro/paramagnetic materials and components; Nano materials-basics, preparation, purification, sintering, nano particles and uses; Nanooptical/magnetic/electronic materials and uses; Superconductivity, uses.

Electronic Measurements and Instrumentation: Principles of measurement, accuracy, precision and standards; Analog and Digital systems for measurement, measuring

instruments for different applications; Static/dynamic characteristics of measurement systems, errors, statistical analysis and curve fitting; Measurement systems for non-electrical quantities; Basics of telemetry; Different types of transducers and displays; Data acquisition system basics.

Network Theory: Network graphs & matrices; Wye-Delta transformation; Linear constant coefficient differential equations- time domain analysis of RLC circuits;Solution of network equations using Laplace transforms- frequency domain analysis of RLC circuits; 2-port network parametersdriving point & transfer functions; State equations for networks; Steady state sinusoidal analysis.

Analog and Digital Circuits: Small signal equivalent circuits of diodes, BJTS and FETs; Diode circuits for different uses; Biasing & stability of BJT & JFET amplifier circuits; Analysis/design of amplifier- single/multi-stage; Feedback& uses; Active filters, timers, multipliers, wave shaping, A/D-D/A converters; Boolean Algebra& uses; Logic gates, Digital IC families, Combinatorial/sequential circuits; Basics of multiplexers, counters/registers/ memories /microprocessors, design& applications.

Analog and Digital Communication Systems: Random signals, noise, probability theory, information theory; Analog versus digital communication & applications: Systems- AM, FM, transmitters/receivers, theory/practice/ standards, SNR comparison; Digital communication basics: Sampling, quantizing,coding, PCM, DPCM, multiplexing-audio/video; Digital modulation: ASK, FSK, PSK; Multiple access: TDMA, FDMA, CDMA; Optical communication: fibre optics, theory, practice/standards.

Control Systems: Classification of signals and systems; Application of signal and system theory; System realization; Transforms& their applications; Signal flow graphs, Routh-Hurwitz criteria, root loci, Nyquist/Bode plots; Feedback systems-open &close loop types, stability analysis, steady state, transient and frequency response analysis; Design of control systems, compensators, elements of lead/lag compensation, PID and industrial controllers.

Computer Organization and Architecture: Basic architecture, CPU, I/O organisation, memory organisation, peripheral devices, trends; Hardware /software issues; Data representation& Programming; Operating systems-basics, processes, characteristics, applications; Memory management, virtual memory, file systems, protection & security; Data bases, different types, characteristics and design; Transactions and concurrency control; Elements of programming languages, typical examples.

Electro Magnetics: Elements of vector calculus, Maxwell's equations-basic concepts; Gauss', Stokes' theorems; Wave propagation through different media; Transmission Lines-different types, basics, Smith's chart, impedance matching/transformation, S-parameters, pulse excitation, uses; Waveguides-basics, rectangular types, modes, cut-off frequency,

dispersion, dielectric types; Antennas-radiation pattern, monopoles/dipoles, gain, arrays-active/passive, theory, uses.

Advanced Electronics Topics: VLSI technology: Processing, lithography, interconnects, packaging, testing; VLSI design: Principles, MUX/ROM/PLA-based design, Moore & Mealy circuit design; Pipeline concepts & functions; Design for testability, examples; DSP: Discrete time signals/systems, uses; Digital filters: FIR/IIR types, design, speech/audio/radar signal processing uses; Microprocessors & microcontrollers, basics, interrupts, DMA, instruction sets, interfacing; Controllers & uses; Embedded systems.

Advanced Communication Topics: Communication networks: Principles /practices /technologies /uses /OSI model/security; Basic packet multiplexed streams/scheduling; Cellular networks, types, analysis, protocols (TCP/TCPIP); Microwave & satellite communication: Terrestrial/space type LOS systems, block schematics link calculations, system design; Communication satellites, orbits, characteristics, systems, uses; Fibre-optic communication systems, block schematics, link calculations, system design.

METALLURGICAL ENGINEERING

Thermodynamics and Rate Processes: Laws of thermodynamics, activity, equilibrium constant, applications to metallurgical systems, solutions, phase equilibria, Ellingham and phase stability diagrams, thermodynamics of surfaces, interfaces and defects, adsorption and segregation; basic kinetic laws, order of reactions, rate constants and rate limiting steps; principles of electro chemistry- single electrode potential, electro-chemical cells and polarizations, aqueous corrosion and protection of metals, oxidation and high temperature corrosion – characterization and control; heat transfer – conduction, convection and heat transfer coefficient relations, radiation, mass transfer – diffusion and Fick's laws, mass transfer coefficients; momentum transfer – concepts of viscosity, shell balances, Bernoulli's equation, friction factors.

Extractive Metallurgy: Minerals of economic importance, comminution techniques, size classification, Flotation, gravity and other methods of mineral processing; agglomeration, pyrohydro- and electro-metallurgical processes; material and energy balances; principles and processes for the extraction of non-ferrous metals – aluminium, copper, zinc, lead, magnesium, nickel, titanium and other rare metals; iron and steel making – principles, role structure and properties of slags, metallurgical coke, blast furnace, direct reduction

processes, primary and secondary steel making, ladle metallurgy operations including deoxidation, desulphurization, sulphide shape control, inert gas rinsing and vacuum reactors; secondary refining processes including AOD, VAD, VOD, VAR and ESR; ingot and continuous casting; stainless steel making, furnaces and refractories.

Physical Metallurgy: Crystal structure and bonding characteristics of metals, alloys, ceramics and polymers, structure of surfaces and interfaces, nano-crystalline and amorphous structures; solid solutions; solidification; phase transformation and binary phase diagrams; principles of heat treatment of steels, cast iron and aluminum alloys; surface treatments; recovery, recrystallization and grain growth; industrially important ferrous and non-ferrous alloys; elements of X-ray and electron diffraction; principles of scanning and transmission electron microscopy; industrial ceramics, polymers and composites; electronic basis of thermal, optical, electrical and magnetic properties of materials; electronic and opto-electronic materials.

Mechanical Metallurgy: Elasticity, yield criteria and plasticity; defects in crystals; elements of dislocation theory – types of dislocations, slip and twinning, source and multiplication of dislocations, stress fields around dislocations, partial dislocations, dislocation interactions and reactions; strengthening mechanisms; tensile, fatigue and creep behaviour; super-plasticity; fracture – Griffith theory, basic concepts of linear elastic and elasto-plastic fracture mechanics, ductile to brittle transition, fracture toughness; failure analysis; mechanical testing – tension, compression, torsion, hardness, impact, creep, fatigue, fracture toughness and formability.

Manufacturing Processes: Metal casting – patterns and moulds including mould design involving feeding, gating and risering, melting, casting practices in sand casting, permanent mould casting, investment casting and shell moulding, casting defects and repair; hot, warm and cold working of metals, Metal forming – fundamentals of metal forming processes of rolling, forging, extrusion, wire drawing and sheet metal forming, defects in forming; Metal joining – soldering, brazing and welding, common welding processes of shielded metal arc welding, gas metal arc welding, gas tungsten arc welding and submerged arc welding;

welding metallurgy, problems associated with welding of steels and aluminium alloys, defects in welded joints; powder metallurgy; NDT using dye-penetrant, ultrasonic, radiography, eddy current, acoustic emission and magnetic particle methods.

BIO-MEDICAL ENGINEERING

Basics of Human Physiology : Organization of Human Body, Muscle Physiology, Cardiovascular System, ECG, Einthoven's Triangle, Twelve Lead System and ECG Waveforms, Respiratory System,Blood,Alimentary System, Urinary System, Nervous System, Special Senses, Eyes ,Ear ,Reproductive System ,Endocrine System

Electrical Network Analysis and Synthesis : Review of D.C. & A.C. circuits, DC Circuits, Mesh & Node Analysis, Network Theorems (D.C. & A.C. circuits), Circuit Analysis, Time and Frequency Response of Circuits, Two-Port Networks, Fundamentals of Network Synthesis

Electronic circuit analysis and design: Diodes Circuits, Bipolar Junction Transistor, A.C. Equivalent Model, Junction Field Effect Transistor: Working and basic terminology related to JFET, MOSFET, and Multistage Amplifiers.

Biomaterials , Prosthetics and Orthotics: Introduction of Biomaterials, Classification of Biomaterials, General Applications, Techniques for characterization of Surface properties of Biomaterials, Properties and Applications of Polymeric and degradable Biomaterials, Composite Biomaterials, Properties and Applications of Metallic Biomaterials and its Biocompatibility, Properties and Applications of Ceramic Biomaterials, Biological Testing of Biomaterials, Movement biomechanics Overview of joints and movements, anatomical levers, gait cycle (stance and swing phase with stick diagram), gait parameters. Prosthetics and Orthotics Principles of three point pressure, Lower limb prostheses, partial weight bearing-PTB socket, total contact- quadrilateral socket. Upper limb prosthesis (terminal devices) Spinal orthoses.

Biomedical Transducers and Measuring Instruments : Generalized Instrumentation System, General Properties of Input Transducer. Static Characteristics: Accuracy, Precision, Resolution, Reproducibility, Sensitivity, Drift, Hysteresis, Linearity, Input Impedance and Output Impedance. Dynamic Characteristics: First Order and Second Order Characteristics, Time Delay, Error Free Instrument, Transfer Functions. Design Criteria, Generalized Instrument Specifications, Medical Instruments,Oscilloscopes,Displacement, motion and Pressure Measurement, Temperature Measurement, Bio potential Electrodes, Chemical Sensors,Fiber Optic Sensors, Biosensor: Classifications and types with examples.

Linear Integrated Circuits : Differential Amplifiers, Differential amplifiers with Swamping Resistor Constant current source, current mirror circuits, Introduction to operational Amplifier, Applications of operational Amplifier , Oscillators using Operational Amplifier,Negative Feedback, Negative feedback characteristics, Feedback Topologies, Series-Shunt, Shunt-Series, Series-Series, Shunt-Shunt Configurations Negative feedback amplifiers, Power Amplifiers.

Digital Electronics: Introduction to Number system, Binary, Octal, Hexadecimal and other. Conversion from One system to another, Binary, BCD and Hexadecimal. Binary Arithmetic (addition, subtraction, multiplication, division) Hexadecimal and octal arithmetic, first and second complement methods, Binary Codes, Boolean Algebra Logic Gates, Combinational Circuits, Combinational Logic Circuit Design, Use of Multiplexers in Logic Design, Sequential Logic Circuits,Registers

Signals and Control System: Introduction to Signals, Introduction to Systems, Fourier Analysis of Continuous time Signals Orthogonal functions, Representation of signals in terms of weighted orthogonal basis functions, Coefficient calculation on the basis of minimum square error. Fourier series: Representation of Fourier series in terms of sine, cosine, exponential functions. The complex Fourier spectrum, Properties of Fourier series, convergence of Fourier series, Gibbs phenomenon. Fourier transform and its properties. Fourier transform of singular functions. Energy density spectrum Laplace Transform,Introduction to Control Systems, Time domain and Frequency domain behaviour of Systems Time domain analysis of first order and second order systems. Condition of BIBO stability in time domain. Frequency response of linear systems. Stability and Routh array, Bode plots, Root Locus

Biomedical Instrumentation-I: Basic principle, technical specification, working and applications of Laboratory Instruments:Spectrophotometer,Colorimeter Electrolyte Analyser Blood cell counter Auto-analyser Blood gas analyser Basic principle, technical specification, working and applications of Laboratory Instruments, Blood Flow Measurement, Pulmonary Function Analyser and Ventilator, Heart Lung machine and types of artificial oxygenator, Audiometers, Introduction to Microprocessor, Architecture of Intel 8086 Microprocessor, Instruction set and Programming of 8086, 8086 Addressing modes,8086 Instruction encoding formats and instruction set, Assembler directives, 8086 programming and debugging of assembly language program, Memory Interfacing with 8086, Peripherals interfacing with 8086, 8087 Math coprocessor

Analog and Digital Circuits Design : Waveform Generation IC's,Special Function IC's, Active Filters, KRC filter, Capacitor filter, switched capacitor filter, Generalized Impedance Convertor (GIC), Power Devices and Circuits,SCR's: Basic structure, characteristics, Two transistor and Operations. series and parallel connections of SCRs.,DIAC and TRIAC: Basic Structure and characteristics, applications, UJT, Voltage Controllers and Regulators ,Analog switches, Relays ,Types of voltage regulators, Motors And Drivers

Biomedical Digital Signal Processing :Basic Elements of DSP concepts of frequency in analog and digital signals –sampling theorems –Discrete time signals and systems-Properties –Z-transform- linear & circular convolution- Correlation –DTFT,Introduction to DFT-Properties of DFT,Introduction DIT and DIF FFT algorithms. Use of FFT in linear filtering, Discrete Cosine transforms,Review of Design of analog Butterworth and Chebyshev Filters, Frequency transformation in analog domain, Design of IIR Digital Filters using Impulse invariance method-Design of digital Filters using Bilinear transformation, Structure of FIR filters-Linear phase filters –Filter design using window technique- Frequency sampling techniques –Finite Word length effects in digital filters. Realisation of FIR &IIR filters Direct ,cascade and parallel forms Introduction to Digital signal Processors–Architecture –Features-addressing formats –functional mode-introduction to commercial Processors. Application of DSP in Biomedical Applications

Principles of Communication Engineering: Introduction to communication system, Elements of communication system, types of communication system, Noise, Signal to Noise ratio, Noise factor, Noise figure, Noise Temperature. Amplitude Modulation, AM Receiver, AM detectors, FM Modulation, FM demodulation, Analog Pulse Modulation Techniques, Digital Pulse Modulation and Transmission Techniques, Multiplexing techniques, Generation of Bioelectric Potentials, Biofeedback Technique: EEG, EMG, Patient Monitoring System, Biotelemetry, Telemedicine concepts and its application

Biostatistics : Physiological Modelling, Model of Neurons, Neuromuscular System, Eye Movement Model, Thermo regulatory systems, modelling of other physiological systems, Modelling the Immune response, Modelling of Drug delivery systems, Modelling of Insulin Glucose feedback system and Pulsatile Insulin secretion

Microcontrollers and Embedded Systems : Embedded Systems, MCS-51 Microcontroller,8051programming,Microcontroller design and interfacing case studies, Interfacing with PC using RS232, Serial Communication Protocols, Real time operating

system

Medical Imaging-I: Ultrasound in Medicine,Display System ,Real time Ultrasound ,X- ray Imaging,Flouroscopic Imaging and x ray Image Intensifier Digital subtraction Angiography, Computed Radiography and Digital Radiography ,Mammography, Medical Thermography,Endoscopy.

Digital Image Processing : Basics of Image Processing, Image Enhancement, Image Segmentation, Image Transforms, Image Compression, Morphology, Representation and Description: Dilation, Erosion, Open, Close, Hit- or-miss, Boundary extraction, Region filling, Thinning and thickening Chain Codes, Polygonal approximations, Signatures, Fourier descriptors, Moments.

Biomedical Instrumentation=II: Physiotherapy, Electrotherapy Equipments: Basic principle, working and technical specifications of Shortwave Diathermy, Ultrasonic therapy unit, Infrared and UV lamps, Nerve and Muscle Stimulator.Surgical Instruments,Cardiac Pacemakers,Cardiac Defibrillators, Hemodialysis Machine, Laser Applications in Biomedical Engineering .

Medical Imaging-II:Principle of Computed tomography :Scanner configurations/generations, CT system: Scanning unit(gantry), detectors, data acquisition system, spiral CT, scanner parameters, CT Number Reconstruction ,techniques, Radon Transform, Filtered Back projection, Fourier Reconstruction, Technique, Iterative reconstruction Technique, Image quality and artifacts, Clinical applications of CT, Advancements in CT, Nuclear Magnetic Resonance, Magnetic Resonance Imaging, Magnetic Resonance Spectroscopy (MRS).

Biomechanics Prosthesis and Orthosis : BIOMECHANICS: Force system, Tissue Biomechanics, Movement Biomechanics, Joint analysis: Instrumentation for gait analysis: Measurement devices. PROSTHETICS AND ORTHOTICS : Principles in designing orthoses and prostheses, Principles of three point pressure, total contact, partial weight bearing, Classification in prosthetics and orthotics: Lower Extremity orthoses andprostheses, Upper Extremity orthoses and prostheses. Spinal orthoses.

Very Large Scale Integrated Circuits : Introduction to VHDL hardware description language, core features of VHDL, data types, concurrent and sequential statements, data flow, behavioral, structural architecture. Architecture of Xilinx XC4000 FPGA family, Combinational and Sequential Logic design using VHDL ,Very Large Scale Integration

(VLSI) Technology , MOS Transistors, Design rules and Layout NMOS and CMOS design rules and layout, Design of NMOS and CMOS inverters, NAND and NOR gates. Interlayer contacts, butting and buried contacts, stick diagrams, layout of inverter, NAND and NOR gates. Design of basic VLSI circuits Design of circuits like multiplexer, decoder, priority encoder, Flip flops, shift registers using MOS circuits

Networking and Information System in Medicine :LAN, MAN, WAN, Performance of network/device parameters ,Ethernet Technology: Ethernet types, Types of cables and connectors, Crossover and straight through cables, Colour coding of cables : OSI Model, TCP/IP, Addressing types (IP, MAC & Port), IP V4 addressing, Basic Security Concepts, PACS Components, Generic workflow, PACS architectures, Introduction to RIS and HIS, HIS/RIS/PACS integration, PIR, Storage Area Network, Network Attached storage, RAID, PACS Server & Archive and operating systems,Introduction to Healthcare informatics standard HL7 and DICOM, IHE, IHE Domains, Legal issues in PACS, HIPAA.

Nuclear Medicine : Basics of Nuclear Physics, Radiopharmaceuticals, Radiation Safety, Detectors in Nuclear Medicine & Counting and Measuring System, In Vitro techniques(Brief Description): Introduction, Single and Double Isotope method, Radioimmunoassay, RIA Counting System, Liquid scintillation Counting system, RIA, Applications.: In Vivo Techniques, Emission Tomography ,Introduction to Hybrid Modalities, Radionuclide Therapy

Biomedical Microsystems : Basics of miniaturization & materials, mems fabrication processes, polymers coating techniques: spinning, spraying and electrode position, photolithography, etching processes , soft lithography, surface characterization techniques, micro total analysis systems (μtas) ,micro/ nano biosensors, drug delivery devices ,microsystem packaging .

Hospital Management : Process of management, organization of the hospital & Hospital Planning, Planning for Clinical and Supportive Services ,Planning for Engineering and Auxiliary Services, Auxiliary Services ,Management Marketing Department, Material Management & Inventory Control Classification of Materials, Purchase Management, Store Management, Inventory Control.

Mains Examination (Part II) – English

This test is a qualifying test and is to be designed to assess the working English knowledge, efficiency and expression of English and Report Writing abilities. Accordingly, the Question paper, suggestively, may have Essay, Précis-writing, comprehension, case analysis & Report writing.

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CONTACT US

6. CONTACT US

The candidates are advised to carefully go through the Information Bulletin and Instructions for filling up the online application before registering provided on the website www.cgpdtmrecruitment.in. However, in case of any other queries pertaining to the examination please contact the Helpline provided below:

Helpline Number: 011-40555076, 011-40555065 , 011-40555088, 011-40555087, 011-40555089 (10 hrs. to 19 hrs. from Monday to Saturday)

Helpline Email id: cgpdtmrecruitment@gmail.com

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FREQUENTLY ASKED QUESTIONS

7. FREQUENTLY ASKED QUESTIONS

1. **What is the process for filling online application?**

   The online application involves the following process:

   STEP 1 – Registration/Login, Re-login with Application Number & Auto Generated Password
   (A mail and SMS will be sent with unique Application Number and password).

   STEP 2 – Enter Personal details & Educational qualification

   STEP 3 – Upload photograph and signature

   STEP 4 – Preview – Edit Application / Proceed For Payment

   STEP 5 – Complete the Payment & Print Application Form

2. **How do I access the site to fill up the online application?**
   An applicant should log on to www.cgpdtmrecruitment.in**.**

3. **Are there any detailed instructions to guide an applicant for submitting an online application?**
   Yes, an applicant must refer to the detailed instructions which are available on website www.cgpdtmrecruitment.in for filling up the online application.

4. **What should I do if there is lot of delay in accessing the page?**
   The delay in accessing the Page depends upon various factors like Internet Speed, large number of applicants trying to register the application at the same time etc. Therefore if you are not able to get the page for registration promptly, please retry after some time or during off-peak hours.

5. **What information/ details /items are required while filling the on-line application form?**
   The information/items which are required have been explained in the Information Bulletin. In addition to these, you should check the websites mentioned above frequently.

6. **Is it necessary to fill up the details related to area pin code/phone number with area code/Mobile No./e-mail?**
   Yes, all information to be filled in the application form is mandatory.

7. **How do I move to the next page when columns on one page have been completely filled?**
   An applicant should click on the "Save and Continue" button of the page to move to the next page.

8. **I have successfully submitted the online application, should I send the print outs of the application to the CGPDTM by post?**
   Once an applicant has successfully submitted the online application, the same gets registered with the CGPDTM and the applicant is not required to send any hard copy of the application.

9. **How will I get the admit card if I have submitted the application online? Whether I will get an e-mail or I will get the admit card by post or it is to be collected personally from the CGPDTM's office or it will be available on the website of the commission?**
   The eligible candidates shall be issued an e Admit Card around two weeks to three weeks before the commencement of the examination. The e -Admit Card will be made available on the website www.cgpdtmrecruitment.in for downloading by candidates. E -Admit Card will not be sent by post.

10. **What are the precautions to be taken while uploading candidates' photographs and signatures?**
    Before filling up the Online Application, a candidate must have his/her photograph and signature duly scanned in the "JPG" format in such a manner that the file should not exceed 200 KB in size for the photograph and the signature. The photograph and signature must be clearly discernible. Sample of Acceptable photograph is displayed in the Information Bulletin. Candidates should take due care while uploading their photograph since no change is allowed once the photograph is uploaded and online application is submitted. Uploading of photograph/signature is the sole responsibility of the candidate and in case a wrong photograph/signature is uploaded, his/her candidature is liable to be cancelled for false identity. Please check the e Admit Card carefully and discrepancies/ errors, if any, should be brought to notice through email or on helpline numbers provided in the Information Bulletin.

11. **Whether the photograph should be in Black& White or should it be in a colour?**
    Photograph should be in colour only.

12. **I have filled up the form successfully but now, I want to change / correct the details I entered in the Application?**
    In case you have submitted the application form successfully but later on you come to know that you have committed any mistake, then you may resubmit your application afresh duly correcting the errors/omissions/mistakes/quality of photo or sign. For this you will need to register afresh with new email ID. You would be issued new Application number and password which shall be required to complete the new online application. You will have to make the requisite payment again.

13. **I did not receive the e-mail intimation for online submission of my application?**
    After the completion of the online application, a fresh page displays the message that the application has been submitted successfully. An email is also automatically sent to you stating that you have successfully submitted your application. However it is still subject to the verification of various information submitted by you as per examination rules including verification of quality of photo/sign and payment details.

14. How do I re-confirm that my application is saved?

The successful submission of the online application requires the completion of six parts of the application correctly. After completing the Registration Form of the application the system generates a unique number which is known as the Application number along with the password. After the completion of all the columns in subsequent parts, a fresh page displays the message that the application has been submitted successfully as an acknowledgement. The receipt of the acknowledgement in your email ID indicates that the application has been submitted.

15. What details should I retain after completion of successful submission of my form?

It is strongly advised that after the completion of the process of submission of the online application, the applicant must take a print out of the submitted application form and keep the same for future reference.

16. What details should I provide to make correspondence with the CGPDTM?

In case of correspondence with the competent authority an applicant must mention these details -Name of Examination, Applicant's name, father's name, date of birth and the Application number.

17. Can I change my center after submission of application?

No. Change of Centre is not possible.

18. How to get refund of payment as I have made payment more than once towards its fee.

CGPDTM has no provision to refund any fee amount paid by candidates.

19. Can I deposit the fees by cash?

No, the fee CANNOT be deposited in cash.

20. What is the procedure to pay the fee for the examination?

There are only three options for the payment of fees

i) Pay by debit Card
ii) Pay by credit Card and
iii) Pay by Net Banking facility
iv) I-Cash Card
v) Mobile Wallet
vi) RuPay Card

21. Do I require to send a hard copy of application to CGPDTM after submitting my online application?

No hard copy to be sent to CGPDTM unless it is asked for any reason.

22. I am unable to upload Photo / Sign in my application. What should I do?

Please check the properties of photo and signature images. Resize them as per specifications given in instructions for filling online application on the website itself.

23. If the Photograph is not in the desired format, then how to convert it?

If the image is in other formats such as .tiff,.bmp etc, then open the photo in MsPaint or Irfanview and click save as option to save it in the desired format (.jpg).

24. I have submitted two applications for the examination, Will my both applications be accepted/ rejected or one of them will be accepted/ rejected? hat will be status of my candidature if I have successfully submitted more than one application?

Your Application number for latest submitted completed application will be considered for processing and all earlier submitted applications will be cancelled by online system.

25. How eligibility of age are calculated?

It is calculated based on cut-off date according to the Information Bulletin.

26. How I will take print of my submitted application?

You need to first login with Application Number and Password. Subsequently, click on "Print Application".

27. What items are banned at the Examination Venues?

Mobile Phones, Watches, Bluetooth, pagers or any other communication devices and IT gadgets are banned items and are therefore not allowed inside the premises where the examination is being conducted.

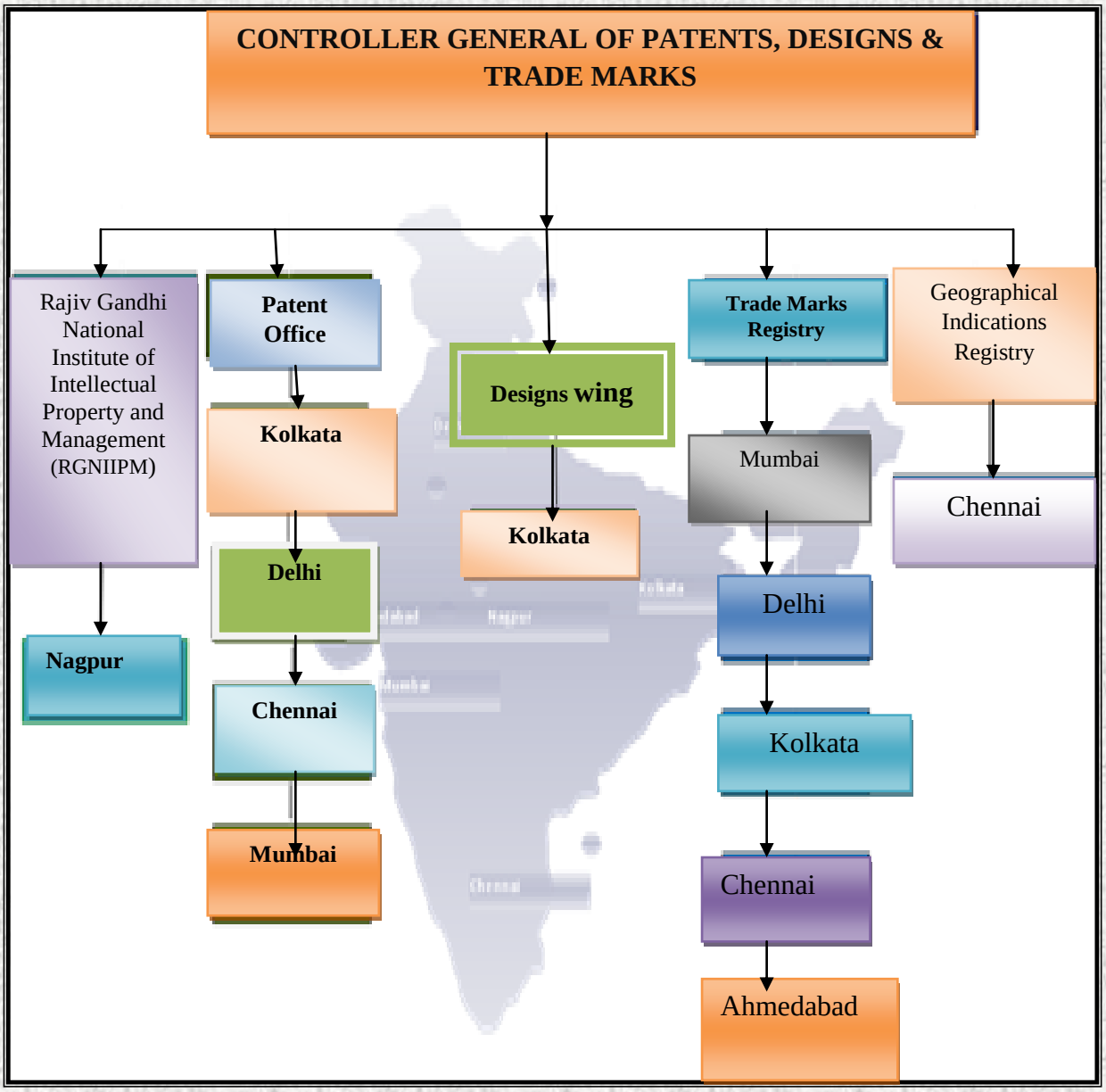
28. I am filling up the various columns in the application and the process of filling up the form is yet to be completed. I want to change the filled up information in one/many columns. How should I do this? Or I filled my form and completed the form. I have made some errors. What should I do to remove these errors?

After the filling up of the various columns in part II of the online application, the system displays a message whether an applicant desires to change/update any of the information which has been filled in and if so, is required to click on the Update button. In case, changes are to be made this facility may be utilized. Once the payment is made, thereafter no change is accepted by the system. However, an applicant may submit a fresh online application.

29. My photograph and signature as I loaded on the site are not appearing right. What should I do?

After uploaded the photograph and the signature a fresh page shows the preview of the uploaded images. If, the applicant is satisfied with the uploaded images he may click on Confirm Upload button. In case the applicant is not satisfied with the uploaded images, he may click on the Upload Photograph or Upload Signature button. The Uploaded photograph/ signature can again be viewed by clicking on the Image refresh button. The process can be repeated till satisfaction. The Candidates may please note that if the quality of photograph/signature is poor, the application is liable to be rejected after having clicked on the confirm Upload button, the system will not allow any changes in the photograph/signature. However, if an applicant is not satisfied with the format/size/quality of the photograph or signature, the applicant may submit a fresh online application with the revised photograph and signature along with prescribed fee to be paid again.

THE INDIAN INTELLECTUAL PROPERTY OFFICE ACROSS INDIA



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