

VALLIAMMAI ENGINEERING COLLEGE

SRM Nagar, Kattankulathur – 603 203

DEPARTMENT OF CIVIL ENGINEERING

QUESTION BANK



VI SEMESTER

CE 6604 - RAILWAYS AIRPORT AND HARBOUR ENGINEERING

Regulation – 2013

Academic Year 2018 – 19

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VALLIAMMAI ENGINEERING COLLEGE

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DEPARTMENT OF CIVIL ENGINEERING QUESTION BANK

SUBJECT : RAILWAYS AIRPORT AND HARBOUR ENGINEERING

SEM / YEAR: VI/III

UNIT I - RAILWAY PLANNING

Significance of Road, Rail, Air and Water transports - Coordination of all modes to achieve sustainability - Elements of permanent way – Rails, Sleepers, Ballast, rail fixtures and fastenings, - Track Stress, coning of wheels, creep in rails, defects in rails – Route alignment surveys, conventional and modern methods- - Soil suitability analysis - Geometric design of railways, gradient, super elevation, widening of gauge on curves- Points and Crossings.

PART - A

Q.No	Questions	BT Level	Competence
1.	Define creep in sleepers.	BT-1	Remember
2.	What do you mean by crossing?	BT-1	Remember
3.	Define super elevation in railways. Specify the value of super elevation adopted for Indian B.G railways for speed less than 100kmph.	BT-1	Remember
4.	What do you mean by ballast?	BT-1	Remember
5.	If the ruling gradient is 1 in 150 on a particular section of broad gauge and at the same time a curve of 4 degree is situated on this ruling gradient, Find the allowable ruling gradient.	BT-1	Remember
6.	List the necessities of points and crossings?	BT-1	Remember
7.	Compare any two characteristics of railways with those roads.	BT-2	Understand
8.	Explain sleeper density.	BT-2	Understand
9.	Compare the different types of gauges used in India.(any two pints)	BT-2	Understand
10.	Outline about pandrol clip in rail railways.	BT-2	Understand
11.	Develop the sketch of permanent way cross section.	BT-3	Application
12.	Identify the cause of kinks in rails?	BT-3	Application
13.	Build some points on uses of Fish plates?	BT-3	Application
14.	List the uses of remote sensing in route alignment?	BT-4	Analyze
15.	Classify the different surveys required for railway projects.	BT-4	Analyze
16.	Classify the types of gradient in railways.	BT-4	Analyze
17.	Write the importance of widening of gauge in curves.	BT-5	Evaluate
18.	Conclude few points about grade compensation in curves.	BT-5	Evaluate
19.	Develop few points on coning of wheels.	BT-6	Create
20.	Discuss the functions of ballast in railways.	BT-6	Create

PART - B

1.	i) List the advantages of railways over the other modes of transport.(6) ii) What to you understand by cant deficiency? (7)	BT-1	Remember
2.	What is a sleeper? List the functions, types of sleepers and compare one another.	BT-1	Remember
3.	What are the requirements of an ideal rail joint and also explain the various rail joints used in railways with neat sketches.	BT-1	Remember

4.	i) List the different types of defect in rails. (6) ii) What are the different types of rails? Elaborate in detail. (7)	BT-1	Remember
5.	i) Outline about super elevation and derive its expression in railways (7) ii) Summarize about negative super elevation and cant deficiency. (6)	BT-2	Understand
6.	Explain with neat sketches any four obligatory points controlling railway alignment.	BT-2	Understand
7.	Illustrate with neat sketches points and crossings and state its working principles.	BT-2	Understand
8.	i) Build up points on role of remote sensing and GIS technology in track alignment. ii) Develop points on different types of stresses in railway track?	BT-3	Application
9.	Develop points on functions and requirements of various elements of railway permanent way.	BT-3	Application
10.	i) Distinguish between various modes of transport Road, Rail, Air and Water transports. (7) ii) Compare the various types of switches in railway track. (6)	BT-4	Analyze
11.	Compare the widening of gauges on curves with formula and coning of wheels with neat sketches.	BT-4	Analyze
12.	Draw a neat sketch way and list the functions of different components of permanent way.	BT-4	Analyze
13.	i) If the wheel base of a vehicle moving on a B.G track is 6m, the diameter of wheel is 1.5m and depth of flange below the top of rail is 3.17 cm. Determine the extra width required to be provided on a gauge, if the radius of the curve is 160 m. (7) ii) A branch line of eight degree curve diverges in opposite direction from a broad gauge main line with five degree curve. The speed on the branch line is 30 km/hr. Determine the super elevation and permissible speed on the main line. (6)	BT-5	Evaluate
14.	i) Elaborate in detail ballast materials used for railway track. (7) ii) Discuss on ballastless track. (6)	BT-6	Create

PART-C			
1.	i) Explain the necessity of sleepers in railway track .What are the desirable qualities or requirements of good sleepers. (7) ii) What are the requirements and characteristics of good crossing types of crossing? (8)	BT-1	Understand
2.	Explain in detail about the various types of gradient used in railway track and grade compensation.	BT-2	Understand
3.	Build up points on conventional method of surveying in track alignment.	BT-3	Create
4.	Explain what is meant by track alignment? What are the basic requirements of good alignment? Discuss in detail, the factors which control the alignment of a railway track.	BT-6	Create

UNIT II - RAILWAY CONSTRUCTION AND MAINTENANCE			
Earthwork – Stabilization of track on poor soil – Tunneling Methods, drainage and ventilation – Calculation of Materials required for track laying - Construction and maintenance of tracks –Modern methods of construction & maintenance - Railway stations and yards and passenger amenities- Urban rail – Infrastructure for Metro, Mono and underground railways.			
PART - A			
Q.No	Questions	BT Level	Competence
1.	Write the significance of earthwork in railway station.	BT 1	Remember
2.	Define Tunneling.	BT 1	Remember
3.	List the components of a switch.	BT 1	Remember
4.	What are the different methods of plate laying?	BT 1	Remember
5.	What are the methods to improve the poor subgrade soil?	BT 1	Remember
6.	When is a branch line called as siding?	BT 1	Remember
7.	Classify the methods used for stabilization of tracks in poor soil.	BT 2	Understand
8.	Explain about marshaling yard.	BT 2	Understand
9.	Outline the use of ‘formation in embankment ‘with neat sketch.	BT 2	Understand
10.	Summarize the materials required for laying of track.	BT 2	Understand
11.	Build points on various platforms in railways.	BT 3	Application
12.	Develop points on principle of measured shovel packing.	BT 3	Application
13.	How in modern era mono rail is utilized to reduce the traffic?	BT 3	Application
14.	Differentiate between ‘loop’ and ‘siding’.	BT 4	Analyze
15.	List any two basic types of tunneling methods and state the contexts of their adoption.	BT 4	Analyze
16.	Distinguish ‘gravity yard’ and ‘hump yard’.	BT 4	Analyze
17.	Write Cole’s method to determine the number of crossing.	BT 5	Evaluate
18.	Write few points on importance of ventilation of tunnels.	BT 5	Evaluate
19.	Build points on directed track maintenance.	BT 6	Create
20.	Summarize the operations to be carried out for drainage in track.	BT 6	Create
PART - B			
1.	Describe in detail about plate laying techniques.	BT 1	Remember
2.	When and where should a tunnel be provided and explain the methods of tunnel construction in soft ground?	BT 1	Remember

3.	List out the type of railway stations and explain each one of them in detail.	BT 1	Remember
4.	Write short notes on i. Track drainage (6) ii. Tunneling methods (7)	BT 1	Remember
5.	Discuss in detail about the modern methods of maintenance.	BT 2	Understand
6.	Summarize how poor soil is being stabilized and explain the methods in detail.	BT 2	Understand
7.	Discuss in detail the materials required for track laying and also write factors considered in the construction of railway track.	BT-2	Understand
8.	Classify the stages in construction of railway track and explain in detail.	BT 3	Application
9.	i. Calculate the quantity of all the materials required for track laying (6) ii. Classify the advantages and disadvantages of conventional maintenance and modern maintenance techniques. (7)	BT 3	Application
10.	i. Explain in detail about the passenger amenities to be provided in passenger railway station (9) ii. Explain the purpose of different types of yards. (4)	BT 4	Analyze
11.	Explain in detail. i. Wayside Station (3) ii. Branch line siding. (4) iii. Junction Station (3) iv. Passenger Platform (3)	BT 4	Analyze
12.	Explain in detail when a branch line called as siding and the circumstances wayside station to be selected.	BT 4	Analyze
13.	Design and draw a neat sketch of marshaling yard and explain detail.	BT 5	Evaluate
14.	i. On what situations will mono rails, metro rails be selected? (4) ii. Explain in detail about how ventilation and drainage should be provided in tunneling. (9)	BT 6	Create
PART-C			
1.	Summarize the working principle of Measured shovel packing and list the equipment's used for M.S.P.	BT 2	Understand
2.	Develop points various methods of tunneling.	BT 3	Application
3.	Explain in detail modern methods of track maintenance.	BT-5	Evaluate

4.	Elaborate about mono rail and metro rail and give few examples of the same in India.	BT-6	Create
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UNIT III - AIRPORT PLANNING

Air transport characteristics-airport classification-air port planning: objectives, components, layout characteristics, and socio-economic characteristics of the Catchment area, criteria for airport site selection and ICAO stipulations, Typical airport layouts, Case studies, Parking and circulation area.

PART - A

Q.No	Questions	BT Level	Competence
1.	List the components of an airport.	BT 1	Remember
2.	List the components of an aircraft.	BT 1	Remember
3.	Tell the advantages of air transport.	BT 1	Remember
4.	Write the objectives of airport master plan.	BT 1	Remember
5.	Write the airport parking configuration .	BT 1	Remember
6.	Describe the general classification of airport.	BT 1	Remember
7.	Distinguish terminal apron and cargo apron	BT 2	Understand
8.	Predict why regional planning is to be done.	BT 2	Understand
9.	Discuss the characteristics of airport layout.	BT 2	Understand
10.	Summarize the four groupings of Aircraft parking system.	BT 2	Understand
11.	Illustrate what is a hangar and mention its types.	BT 3	Application
12.	Show the outline of ICAO master planning process.	BT 3	Application
13.	Classify airport codes based on aircraft wheel load.	BT 3	Application
14.	Drawings for layout plan for an airport - explain	BT 4	Analyze
15.	Comment on the sequence of passenger flow in an airport.	BT 4	Analyze
16.	Analyze the importance of preplanning for an airport project.	BT 4	Analyze
17.	Prepare a typical layout of airport for a single runway and two parallel runways	BT 5	Evaluate
18.	Prepare a list of data's to be collected before site selection.	BT 5	Evaluate
19.	Summarize how the size of gate position decided.	BT 6	Create
20.	Recommend the criteria for site selection.	BT 6	Create

PART - B

1.	(i) List the factors to be considered for the selection of site for a commercial airport (6) (ii) Explain the importance of airport planning. (7)	BT 1	Remember
2.	What is a master plan? Explain the recommendation by ICAO & FAA master plan in detail.	BT 1	Remember
3.	(i) List out the classification of airport. (7) (ii)Examine the socio-economic characteristics of catchment area (6)	BT 1	Remember
4.	Describe the necessity, functions and types of hangers.	BT 1	Remember
5.	(i)Summarize the survey that is to be done for airport location. (6) (ii)Summarize the planning consideration of a terminal building. (7)	BT 2	Understand
6.	Describe in detail the various components parts of aero plane.	BT 2	Understand

7.	Describe i) Motor vehicle parking area & its patterns (6) ii) Aircraft parking system. (7)	BT 2	Understand
8.	Briefly explain how the size of apron decided.	BT 3	Application
9.	(i) Describe briefly the salient features and functions of aprons in an airport. (6) (ii) Classify the different flying activity. (7)	BT 3	Application
10.	(i)What are the passenger facilities, required at an airport terminal? Explain using sketches. (6) (ii)Analyze the relationship between aircrafts and airports. (7)	BT 4	Analyze
11.	Analyze how the aircraft characteristics importance in designing of airport.	BT 4	Analyze
12.	Explain with neat sketch the typical layout of airport based on runway configuration.	BT 4	Analyze
13.	Draw a typical layout of any international airport in India and explain its concept.	BT 5	Evaluate
14.	Discuss the advantage, disadvantage of air transportation and list the aircraft characteristics for airport planning.	BT 6	Create
PART - C			
1.	What is an airport master plan? Briefly describe the steps in its formulation.	BT 1	Remember
2.	Write about a Case study of any one Typical airport layout.	BT 1	Remember
3.	(i) Describe the points to be considered for the site selection of airports. (9) (ii) Summarize briefly the various geometrics of the runway as recommended by the ICAO. (6)	BT 2	Understand
4.	Bring out the purpose of airport imaginary surfaces.	BT 4	Analyze

UNIT IV - AIRPORT DESIGN

Runway Design: Orientation, Wind Rose Diagram - Runway length - Problems on basic and Actual Length, Geometric design of runways, Configuration and Pavement Design Principles – Elements of Taxiway Design – Airport Zones – Passenger Facilities and Services – Runway and Taxiway Markings and lighting.

PART - A

Q.No	Questions	BT Level	Competence
1.	How orientation of runway is done? On what basis it is decided.	BT 1	Remember
2.	What is meant by basic runway length	BT 1	Remember
3.	List the elements to be considered in the Geometric design of runways.	BT 1	Remember
4.	Describe bypass taxiway.	BT 1	Remember
5.	Define clear zone.	BT 1	Remember
6.	Tell about Exit Taxiway	BT 1	Remember
7.	Differentiate runway and taxiway.	BT 2	Understand

8.	List out the different design methods for flexible pavement	BT 2	Understand
9.	Classify the various types of runway marking	BT 2	Understand
10.	Illustrate the types of wind rose diagram in airport design	BT 2	Understand
11.	Identify the significance of wind rose diagram	BT 3	Application
12.	Model a sketch of runway shoulder marking	BT 3	Application
13.	Show the importance of various imaginary surfaces around the airport.	BT 3	Application
14.	Explain the term cross wind components and wind coverage.	BT 4	Analyze
15.	Classify the elements of airport lightings.	BT 4	Analyze
16.	List the elements to be considered in the Geometric design of taxiways.	BT 4	Analyze
17.	Justify the importance of zoning laws	BT 5	Evaluate
18.	Prepare the list of factors affecting runway capacity.	BT 5	Evaluate
19.	Turning radius in a taxiway is decided based on what?	BT 6	Create
20.	Explain the factors to be considered in locating exit taxiways.	BT 6	Create
PART - B			
1.	What are the items to be considered in the geometric design of runway and explain it in detail.	BT 1	Remember
2.	write in detail the various design elements to be considered in taxiway laying as per IS standards	BT 1	Remember
3.	List out and briefly explain the night time aids provided at airports	BT 1	Remember
4.	What are the basic patterns of runway configuration? Discuss each pattern	BT 1	Remember
5.	Discuss in detail about i) Various design factors to be considered in determining the thickness of pavement. (6) ii) Special consideration for pavement design. (7)	BT 2	Understand
6.	Summarize and explain the services and facilities to be provided for the passengers in an airport.	BT 2	Understand
7.	Distinguish between Type I and Type II wind rose diagrams. Explain how the optimum runway orientation is determined.	BT 2	Understand
8.	The typical wind data for an airport site is given in the following table. Determine the best orientation of the runway with the help of a wind rose diagram given in table 1	BT 3	Application
9.	(i) The length of a runway at mean sea level, standard temperature and zero gradients is 1600m. The site has an elevation of 320m, with a reference temperature of 33.6°C. The runway has to be constructed with an effective gradient of 0.25%. Calculate the actual length of the runway at site. (6) (ii) The length of runway under standard conditions is 1620m. the airport site has an elevation of 270m. its reference temperature is 32.90°C . if the runway is to be constructed with an effective gradient of 0.20%. Determine the corrected runway length. (7)	BT 3	Application

10.	Evaluate and explain with a neat sketch 1. Approach Zone (3) 2. Clear Zone (4) 3. Clearance over Highways and Railways (3) 4. Turning Zone. (3)	BT 4	Analyze
11.	Analyze the different methods for designing flexible pavements and explain any two in detail.	BT 4	Analyze
12.	(i) The length of runway at standard condition is 2500m. determine the required runway length at an airport site with the following particulars mean maximum daily temperature – 44.5°c mean average daily temperature – 28.3°c elevation of site above MSL – 350m effective gradient of runway – 0.21% (6) (ii) Analyze the cases usually considered in determining the basic runway length. (7)	BT 2	Understand
13.	Describe the importance of runway lighting. Explain threshold lighting with the help of sketches.	BT 1	Remember
14.	Explain the various runway and taxiway markings.	BT 4	Analyze

PART-C

1.	(i) What are the facilities to be provided in the terminal building of an international airport. (8) (ii) explain the different runway geometrics as recommended by ICAO. (7)	BT 1	Remember																																		
2.	Explain what are different control surfaces at an airport? Explain the concepts of airport zoning with the help of sketches.	BT 4	Analyze																																		
3.	(i)Following is the average wind data for ten years , when wind intensity is above 6Km/hr. An airport is to be designed for two runways. Determine the best runway orientation and calculate total wind coverage. (7)	BT 1	Remember																																		
<table border="1" style="width: 100%; border-collapse: collapse;"> <thead> <tr> <th style="width: 50%;">Wind direction</th> <th style="width: 50%;">percentage of time</th> </tr> </thead> <tbody> <tr><td>N</td><td>6.5</td></tr> <tr><td>NNE</td><td>10.4</td></tr> <tr><td>NE</td><td>8.0</td></tr> <tr><td>ENE</td><td>4.2</td></tr> <tr><td>E</td><td>1.7</td></tr> <tr><td>ESE</td><td>0.6</td></tr> <tr><td>SE</td><td>0.7</td></tr> <tr><td>SSE</td><td>3.9</td></tr> <tr><td>S</td><td>7.5</td></tr> <tr><td>SSW</td><td>14.5</td></tr> <tr><td>SW</td><td>10.2</td></tr> <tr><td>WSW</td><td>5.9</td></tr> <tr><td>W</td><td>4.2</td></tr> <tr><td>WNW</td><td>0.3</td></tr> <tr><td>NW</td><td>0.2</td></tr> <tr><td>NNW</td><td>4.8</td></tr> </tbody> </table>		Wind direction	percentage of time	N	6.5	NNE	10.4	NE	8.0	ENE	4.2	E	1.7	ESE	0.6	SE	0.7	SSE	3.9	S	7.5	SSW	14.5	SW	10.2	WSW	5.9	W	4.2	WNW	0.3	NW	0.2	NNW	4.8		
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NNW	4.8																																				
(ii) The runway length required for landing at sea level in standard																																					

	atmospheric condition is 3000m. Runway length required for take- off at a level site at sea level in standard atmospheric condition is 2500m. Aerodrome reference temperature is 25 ⁰ C & that of standard atmosphere at aerodrome elevation of 150m is 14.025 ⁰ C. If the effective gradient is 0.5%, determine the runway length to be provided. (8)		
4.	What are the different types of terminals? Explain its concepts with neat sketch.	BT 2	Understand

Table 1

Wind Direction	Percentage of time		
	6.4 – 25 Kmph	25-50 Kmph	50-80 Kmph
N	N	4.7	1.50
NNE	NNE	3.5	0.75
NE	NE	1.8	0.03
ENE	ENE	3.0	0.02
E	E	2.2	2.40
ESE	ESE	5.8	4.95
SE	SE	7.0	1.40
SSE	SSE	8.0	0.02
S	S	4.8	1.40
SSW	SSW	2.6	0.75
SW	SW	1.2	0.03
WSW	WSW	3.8	0.02
W	W	1.9	2.40
WNW	WNW	6.4	5.25
NW	NW	6.3	1.40
NNW	NNW	7.2	5.20

UNIT V - HARBOUR ENGINEERING

Definition of Basic Terms: Harbor, Port, Satellite Port, Docks, Waves and Tides – Planning and Design of Harbours: Requirements, Classification, Location and Design Principles – Harbour Layout and Terminal Facilities – Coastal Structures: Piers, Break waters, Wharves, Jetties, Quays, Spring Fenders, Dolphins and Floating Landing Stage – Inland Water Transport – Wave action on Coastal Structures and Coastal Protection Works – Environmental concern of Port Operations – Coastal Regulation Zone, 2011.

PART - A

Q.No	Questions	BT Level	Competence
1.	How is breakwater classified?	BT-1	Remember
2.	Write in short about the features of port.	BT-1	Remember
3.	List source of the special types of break water.	BT-1	Remember
4.	What do you understand by littoral drift?	BT-1	Remember
5.	What is a graving dry dock?	BT-1	Remember
6.	Why a shore protection work is needed?	BT-1	Remember
7.	Differentiate Quay and Pier.	BT-2	Understand
8.	Distinguish between diurnal and semi-diurnal tides.	BT-2	Understand
9.	Describe wharf. Name the types.	BT-2	Understand
10.	Distinguish between Dolphins, Wharves & Jetties	BT-2	Understand
11.	Classify Harbour based on location.	BT-3	Apply
12.	Illustrate coastal shipping with an example	BT-3	Apply
13.	List the erosion protection methods in coastal zone.	BT-3	Apply
14.	Mention some of the features of a harbour.	BT-4	Analyze
15.	Explain Breakwater.	BT-4	Analyze
16.	How to design the entrance of a harbor?	BT-4	Analyze
17.	Prepare the list of requirements that is to be considered during design of port.	BT-5	Evaluate
18.	How is Inland Water Transport different from sea transport?	BT-5	Evaluate
19.	Summarize about marine survey.	BT-6	Create
20.	Summarize the requirements of good port.	BT-6	Create
PART - B			
1.	Draw a layout of Chennai harbour and explain its salient features and list out various terminal facilities normally to be provided.	BT-1	Remember
2.	What is a fender. Explain in detail about its types and classification.	BT-1	Remember
3.	Write in detail about Inland water transports and coastal protection works.	BT-1	Remember
4.	Define dredging? Explain the reasons for its adoptions. How dredged Materials are disposed off?	BT-1	Remember
5.	(a) Discuss the factors to be considered while selecting a suitable site for the construction of a port. (6) (b) Distinguish Between Pier Wharf. Explain their utility with the help of sketches. (7)	BT-2	Understand

6.	Discuss in detail about the environmental concern required for port operation.	BT-2	Understand
7.	(a) What are the functions of wet Docks? Explain with Sketches, their working & main features. (7) (b) Explain with sketch the features of a composite Breakwater. (6)	BT-2	Understand
8.	(a) Classify harbours on broad basis and on the basis of utility and explain them. (5) (b) With a case study explain about the planning and design of harbours. (8)	BT-3	Apply
9.	(a) Classify different types of break water. Explain any one in brief. (6) (b) Define a port and bring out the differences between a port and a harbor. What are the requirements of good port? (7)	BT-3	Apply
10.	(a) Explain the facilities to be provided in a port. (6) (b) What is the function of a dry dock? Explain the working of a floating dry dock. (7)	BT-4	Analyze
11.	Explain in brief: (a) Littoral drift (3) (b) Wharves and Jetties (4) (c) Fenders and Mooring accessories (6)	BT-4	Analyze
12.	Write short notes on the following: (a) Wave action on coastal structures. (6) (b) Environmental concern on port operations. (7)	BT-4	Analyze
13.	Discuss the tides and wave effects and its action on coastal structures.	BT-5	Evaluate
14.	Explain clearly about the coastal regulation zone, 2011.	BT-6	Create

PART-C

1.	Describe briefly the functions of fixed and floating signals with necessary sketches.	BT-2	Understand
2.	Explain the different types of wind rose diagram for determining the harbor entrance.	BT-4	Analyze
3.	Briefly explain the various types of dredging.	BT-5	Evaluate
4.	Explain about the wave action on Coastal Structures and Coastal Protection Works	BT-6	Create

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S.no	Subject		BT1	BT2	BT3	BT4	BT5	BT6	Total Question
1	Unit-1	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
2	Unit-2	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
3	Unit-3	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
4	Unit-4	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14
5	Unit-5	Part-A	6	4	3	3	2	2	20
		Part-B	4	3	2	3	1	1	14

TOTAL NO.OF QUESTIONS IN EACH PART

PART A	100
PART B	70
TOTAL	170