AR : ARCHITECTURE AND PLANNING

Duration: Three Hours   *Maximum Marks*: 100

Read the following instructions carefully.

1. Write your name and registration number in the space provided at the bottom of this page.

2. Take out the **O**ptical **R**esponse **S**heet (**ORS**) from this Question Booklet **without breaking the seal**.

3. Do not open the seal of the Question Booklet until you are asked to do so by the invigilator.

4. Write your registration number, your name and name of the examination centre at the specified locations on the right half of the **ORS**. Also, using HB pencil, darken the appropriate bubble under each digit of your registration number and the letters corresponding to your test paper code (AR).

5. This Question Booklet contains **16** pages including blank pages for rough work. After opening the seal at the specified time, please check all pages and report discrepancy, if any.

6. There are a total of 65 questions carrying 100 marks. All these questions are of objective type. Questions must be answered on the left hand side of the **ORS** by darkening the appropriate bubble (marked A, B, C, D) using HB pencil against the question number. **For each question darken the bubble of the correct answer**. In case you wish to change an answer, erase the old answer completely. More than one answer bubbled against a question will be treated as an incorrect response.

7. Questions Q.1 – Q.25 carry 1-mark each, and questions Q.26 – Q.55 carry 2-marks each.

8. Questions Q.48 – Q.51 (2 pairs) are common data questions and question pairs (Q.52, Q.53) and (Q.54, Q.55) are linked answer questions. The answer to the second question of the linked answer questions depends on the answer to the first question of the pair. If the first question in the linked pair is wrongly answered or is unattempted, then the answer to the second question in the pair will not be evaluated.

9. Questions Q.56 – Q.65 belong to General Aptitude (GA). Questions Q.56 – Q.60 carry 1-mark each, and questions Q.61 – Q.65 carry 2-marks each. The GA questions begin on a fresh page starting from page **10**.

10. Unattempted questions will result in zero mark and wrong answers will result in **NEGATIVE** marks. For Q.1 – Q.25 and Q.56 – Q.60, $\frac{1}{3}$ mark will be deducted for each wrong answer. For Q.26 – Q.51 and Q.61 – Q.65, $\frac{2}{3}$ mark will be deducted for each wrong answer. The question pairs (Q.52, Q.53), and (Q.54, Q.55) are questions with linked answers. There will be negative marks only for wrong answer to the first question of the linked answer question pair, i.e. for Q.52 and Q.54, $\frac{2}{3}$ mark will be deducted for each wrong answer. There is no negative marking for Q.53 and Q.55.

11. Calculator is allowed whereas charts, graph sheets or tables are **NOT** allowed in the examination hall.

12. Rough work can be done on the question paper itself. Additionally, blank pages are provided at the end of the question paper for rough work.
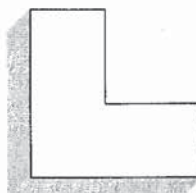
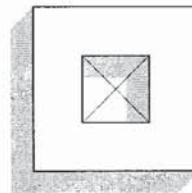| Name								
Registration Number	**AR**							

Q. 1 – Q. 25 carry one mark each.

Q.1 Capital town of Gandhinagar has been designed by

(A) Norman Foster (B) B.V. Doshi (C) H.K. Mewada (D) Le Corbusier

Q.2 Rajiv Awas Yojana of Ministry of Housing, Government of India addresses housing for

(A) Middle Income Group (B) Low Income Group
(C) High Income Group (D) Slum Dwellers

Q.3 The triangular space formed by two consecutive arches is

(A) Tympanum (B) Spandrel (C) Regula (D) Extrados

Q.4 Rose Window is an iconic feature of

(A) Notre Dame, Paris (B) Hagia Sophia, Istanbul
(C) St. Peter's, Rome (D) Victoria Memorial, Kolkata

Q.5 Purity of colour is described by

(A) Hue (B) Value (C) Chroma (D) Tone

Q.6 A slab simply supported on all its edges with a ratio of longer side to shorter side greater or equal to 2.0 is designed as

(A) One way slab (B) Two way slab
(C) Flat slab (D) Coffered Slab

Q.7 Entablature consists of

(A) Architrave, Tenia, Cornice (B) Architrave, Frieze, Cornice
(C) Frieze, Cornice, Triglyphs (D) Cornice, Guttae, Tympanum

Q.8 Town planned for 'Motor Age' refers to

(A) Toronto, Ontario (B) Nassan Shores, Long Island
(C) Radburn, New Jersey (D) Green Belt, Maryland

Q.9 The minimum road curb length required for parking 10 cars perpendicular to the road is

(A) 15 m (B) 25 m
(C) 35 m (D) 40 m

Q.10 Which of the following generates heat island?

(A) Urban areas (B) Coastal areas
(C) Wetlands (D) Forest areas

Q.11 The most suitable earthquake resistant built plan form is

(A)   (B)   (C)   (D)

Q.12   Transfer of Development Right (TDR) is a tool used for

(A) Human development   (B) Land development
(C) Economic development   (D) Infrastructure development

Q.13   Dandaka form of settlement layout is basically a

(A) Grid Iron pattern   (B) Ring radial pattern
(C) Radial pattern   (D) Informal Pattern

Q.14   Maximum horizontal angle from the speaker in a seating area of a lecture theatre should be

(A) 70°   (B) 90°   (C) 120°   (D) 140°

Q.15   'U-value' refers to

(A) Utility function for convective heat transfer
(B) Thermal transmittance of building components
(C) Energy transfer between thermal bridges
(D) Measure for area related heating and cooling loads

Q.16   Consistency of cement is measured by

(A) Pycometer   (B) Slump cone
(C) Universal Testing Machine   (D) Vicat's apparatus

Q.17   The appropriate material for flooring of an external ramp of a building would be

(A) Polished granite   (B) Wax polished marble
(C) Glazed ceramic tile   (D) Rough finish sandstone

Q.18   Which of the following is **NOT** a member of a Steel Truss?

(A) Gusset Plate   (B) Wall Plate   (C) Fish Plate   (D) Anchor Bolts

Q.19   Identify the odd one among the following

(A) Security deposit   (B) Professional tax
(C) Performance bank guarantee   (D) Earnest money

Q.20   Weep hole is a term used to describe

(A) Perforations in the cast iron pipe used for boring
(B) Holes in retaining wall for draining water
(C) Holes in the cover plate of floor traps
(D) Holes dug in earth to recharge ground water

Q.21   Busway, Busduct and Raceway are components of

(A) Security systems   (B) Air conditioning systems
(C) Electrical systems   (D) Water supply systems

Q.22   The difference between Wet Bulb Temperature and Dry Bulb Temperature is called

(A) Dry bulb depression   (B) Wet bulb depression
(C) Variable depression   (D) Atmospheric depression

Q.23   In India, one of the Slum Improvement initiatives is

(A) Special Residential Zone   (B) Valmiki Ambedkar Malin Basti Awas Yojana

(C) Indira Awas Yojana   (D) Eco Housing

Q.24   Suspended Floors is a structural system used in

(A) Lloyds Building, London   (B) Jin Mao Building, Shanghai

(C) Petronas Tower, Kualalampur   (D) Hongkong Shanghai Bank, Hongkong

Q.25   Residual method of valuation is used to determine

(A) Public Private Partnership Deal   (B) Rent

(C) Property Tax   (D) Selling Price

Q. 26 to Q. 55 carry two marks each.

Q.26   Match the buildings in **Group I** with their architects in **Group II**

Group I   **Group II**
P. Bibliotheca Alexandrina, Alexandria   1. I.M. Pei
Q. Institut du Monde Arab, Paris   2. Jean Nouvel
R. Bank of China, Hongkong   3. Daniel Libeskind
S. Jewish Museum, Berlin   4. Renzo Piano
                                         5. Snøhetta

(A) P-5, Q-2, R-1, S-4   (B) P-5, Q-4, R-1, S-3
(C) P-4, Q-2, R-5, S-3   (D) P-5, Q-2, R-1, S-3

Q.27   A room measuring 5 m × 3.5 m enclosed by brick wall has a ceiling at 3 m height. The room has a door and a window opening of 1 m × 2 m and 1 m × 1 m respectively. The quantity of plastering required for interior walls (in sqm) is

(A) 46.5   (B) 48   (C) 51   (D) 68.5

Q.28   One cubic metre of Ordinary Portland Cement yields a volume of M15 concrete in the range of

(A) 2 to 3 cum   (B) 4 to 5 cum   (C) 7 to 8 cum   (D) 8 to 9 cum

Q.29   Match the CAD commands in **Group I** with their functions in **Group II**

Group I   **Group II**

P. LAYISO   1. blends selected object to destination layer

Q. LAYMCH   2. freezes layer of selected object

R. LAYMRG   3. hides or locks layers other than those of selected objects

S. LAYLCK   4. assigns selected object to destination layer

                     5. locks object of destination layer

(A) P-2, Q-4, R-1, S-5   (B) P-3, Q-2, R-1, S-5
(C) P-4, Q-2, R-3, S-5   (D) P-3, Q-4, R-1, S-5

Q.30 Match the buildings in **Group I** with their corresponding structural forms in **Group II**

Group I

P. Hall of Nations, New Delhi
Q. Salvacao Church, Mumbai
R. State Trading Corporation Building, New Delhi
S. Matrimandir, Auroville

Group II

1. Spherical Structure
2. Folded Plates
3. Octahedral lattice structure
4. Vierendeel girders
5. Shell roof structure

(A) P-3, Q-5, R-4, S-1
(B) P-2, Q-5, R-4, S-1
(C) P-3, Q-5, R-4, S-2
(D) P-3, Q-5, R-2, S-1

Q.31 Identify the **INCORRECT** statement

(A) Guggenheim, Bilbao is an example of Deconstructivism
(B) Silver Abstraction is a term used for metal clad modern high rise buildings
(C) Spiral Building in Tokyo has a curvilinear built form
(D) Free Building plan form is a concept given by Le Corbusier

Q.32 Match the terms in **Group I** with their descriptions in **Group II**

Group I

P. Quoin
Q. Stucco
R. Mandala
S. Cupola

Group II

1. Geometric representation of the universe
2. Small dome
3. Triangular form above an opening
4. Corner stone at the angle of buildings
5. Plaster

(A) P-4, Q-3, R-2, S-1
(B) P-3, Q-5, R-1, S-4
(C) P-4, Q-5, R-1, S-2
(D) P-3, Q-1, R-5, S-4

Q.33 Match the architectural styles in **Group I** with their features in **Group II**

Group I

P. West Asiatic
Q. Greek
R. Byzantine
S. Japanese

Group II

1. Arches and pendentives
2. Pagodas
3. Flying buttresses
4. Orders and pediments
5. Hanging gardens

(A) P-3, Q-2, R-1, S-4
(B) P-5, Q-4, R-1, S-2
(C) P-5, Q-4, R-1, S-3
(D) P-4, Q-3, R-5, S-2

Q.34 Gestalt's Laws of visual perception **DO NOT** relate to

(A) Aesthetics of form are a function of Golden Section
(B) Things are perceived as a whole
(C) Whole is greater than the sum total of its parts
(D) Elements with continuity are perceived together

Q.35 A site in a map drawn to scale of 1:16000 measures 75 sqcm. The actual area of the site in hectares is

(A) 120
(B) 162
(C) 192
(D) 256

Q.36 Identify the **CORRECT** CAD statements
P. SPLINE connects sequence of line segments into a single object
Q. SPLINE is a smooth curve passing through or near a given set of points
R. PLINE creates straight line segments, arc segments or both
S. PLINE can be closed only when its start and end points are coincident and tangent
T. PLINE allows adjusting the width and curvature of its multiline segments
U. SPLINE can be exploded into smaller segments
V. PLINE can be converted into a continuous curve segment

(A) P, R, S, U   (B) Q, R, T, V   (C) R, S, T, V   (D) S, T, U, V

Q.37 Match the eminent personalities in **Group I** with their books and statements in **Group II**

Group I

P. Kevin Lynch
Q. Ayn Rand
R. Paul D. Spreiregen
S. E. F. Schumacher

Group II

1. The Fountainhead
2. Small is Beautiful
3. Site Planning
4. Urban Design : Architecture of Towns and Cities
5. Design of Cities

(A) P-4, Q-2, R-5, S-3   (B) P-3, Q-1, R-2, S-5
(C) P-5, Q-1, R-4, S-2   (D) P-3, Q-1, R-4, S-2

Q.38 Match the urban forms listed in **Group I** with the towns listed in **Group II**

Group I

P. Grid Iron
Q. Radial
R. Linear
S. Finger plan

Group II

1. New Delhi
2. Washington D.C.
3. Copenhagen
4. Mumbai
5. Canberra

(A) P-2, Q-1, R-4, S-3   (B) P-3, Q-1, R-2, S-5
(C) P-3, Q-1, R-4, S-2   (D) P-2, Q-1, R-4, S-5

Q.39 Consider the following features
1. Length finely proportional to its width
2. Statues as silhouettes against the sky above cornice lines
3. Fountains signifying fine vintage points
4. Series of different shapes connected by traditional narrow streets, column screens or arches
The element of urban design which comprises the above is

(A) Vista   (B) Piazza
(C) Rond Point   (D) Bosque

Q.40 Match the instruments in **Group I** with their corresponding functions in **Group II**

Group I

P. Hygrometer
Q. Disdrometer
R. Anemometer
S. Manometer

Group II

1. Precipitation
2. Vapor Pressure
3. Solar Radiation
4. Relative Humidity
5. Velocity of Air

(A) P-4, Q-1, R-2, S-3   (B) P-4, Q-3, R-2, S-5
(C) P-1, Q-2, R-5, S-4   (D) P-4, Q-1, R-5, S-2

Q.41   Match the features in **Group I** with the corresponding type of garden in **Group II**

Group I

P. Symmetrical layout, water cascades, entombment
Q. Radial layout, symmetrical sculpture, boulevards
R. Occult symmetry, pontoon bridges, stepping stones
S. Hierarchy of courts, hierarchy of gates, zoomorphic forms

Group II

1. French gardens
2. English gardens
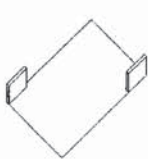3. Chinese gardens
4. Mughal gardens
5. Japanese gardens

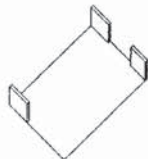(A) P-2, Q-1, R-4, S-3
(C) P-4, Q-3, R-5, S-1
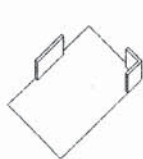(B) P-4, Q-1, R-5, S-3
(D) P-5, Q-1, R-2, S-3

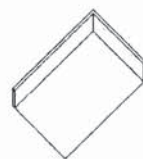Q.42   Arrange the following sense of enclosures in a hierarchy of decreasing order

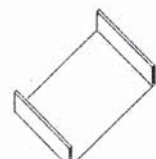P   Q   R   S   T   U

(A) S>Q>U>P>T>R
(C) P>Q>R>S>T>U
(B) U>S>Q>R>P>T
(D) T>P>S>Q>U>R

Q.43   Match the elements of **Group I** with their corresponding type in **Group II**

Group I

P. Fire hydrant
Q. Planter beds
R. Letter box
S. Traffic signs
T. Lamp Posts

Group II

1. Street Furniture
2. Street Hardware

(A) P-2, Q-1, R-1, S-2, T-2
(C) P-1, Q-1, R-2, S-2, T-2
(B) P-1, Q-1, R-2, S-1, T-1
(D) P-2, Q-1, R-2, S-2, T-2

Q.44   In a construction project schedule, A is the first activity. Activities B & C follow A. Activity D follows B & C. Activity E follows C. Activity F follows D & E.

Activity	A	B	C	D	E	F
Duration (in days)	3	2	5	6	5	3

The critical time to complete the project will be

(A) 14 days   (B) 16 days   (C) 17 days   (D) 20 days

Q.45   The maintenance cost of a building will be Rs.2 lacs after 10 years. The annual sinking fund required for such maintenance @ 6 % interest per annum will be

(A) Rs.17,200/-   (B) Rs.15,200/-   (C) Rs.13,200/-   (D) Rs.11,200/-

Q.46   Match the figures in **Group I** with the fixtures in **Group II**

Group I

P   Q   R   S

Group II
   1. Sink Cock   2. Bib Cock   3. Pillar Cock   4. Stop Cock

(A) P-1, Q-4, R-2, S-3   (B) P-2, Q-3, R-1, S-4
(C) P-3, Q-1, R-2, S-4   (D) P-2, Q-4, R-3, S-1

Q.47   Match the joints in **Group I** with the corresponding figures in **Group II**

Group I

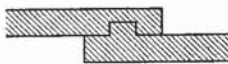P. Butt joint   Q. Rebated joint   R. Table joint   S. Tongue & Groove joint

Group II
   1.   2.   3.   4.

(A) P-3, Q-4, R-1, S-2   (B) P-4, Q-1, R-3, S-2
(C) P-3, Q-1, R-2, S-4   (D) P-3, Q-4, R-2, S-1

Common Data Questions

Common Data for Questions 48 and 49:

A beam of span L is simply supported at two ends. One half span of the beam weighs W and the remaining half span weighs 2W.

Q.48   Maximum shear force in the beam will be

(A) W   (B) 1.25W   (C) 1.75W   (D) 3W

Q.49   Maximum bending moment will occur at

(A) L/16 from midpoint of the beam   (B) Midpoint of the beam
(C) L/7 from midpoint of the beam   (D) One of the endpoints of the beam

Common Data for Questions 50 and 51:

A building site has a plot of 500 sqm

Maximum allowable height – G+7   Area to be utilized for paved access roads – 10 %
Maximum ground coverage – 40%   Runoff coefficient for paved surface – 0.9
Maximum allowable FAR – 2.0   Runoff coefficient for unpaved surface – 0.3

Q.50   If maximum allowable FAR is utilized, the minimum ground coverage would be

(A) 20 %   (B) 25 %   (C) 30 %   (D) 35 %

Q.51   If it rains for 30 min. with an intensity of 10 cm/hr, minimum volume of rain water that can be collected will be

(A) 12.75 cum   (B) 14 cum   (C) 15 cum   (D) 16 cum

Linked Answer Questions

Statement for Linked Answer Questions 52 and 53:

An auditorium having volume of 4500 cum and total absorption of all acoustic materials is 480 m^{2}sabine

Q.52   The reverberation time of the auditorium is

(A) 1.0 second   (B) 1.5 second   (C) 2.0 second   (D) 2.5 second

Q.53   To reduce reverberation time by 0.5 second, additional absorption (m^{2}sabine) required would be

(A) 120   (B) 160   (C) 240   (D) 720

Statement for Linked Answer Questions 54 and 55:

A residential sector planned over an area of 100 hectares has been divided into various plots, each having one dwelling unit with an average household size of 5 persons. Remaining area is devoted for schools, roads, parks, shops etc.

Plot size	Number
500 sqm	500
300 sqm	500
200 sqm	1000

Q.54   The gross density of the residential sector in persons per hectare would be

(A) 100   (B) 150   (C) 200   (D) 250

Q.55   Assuming 20% of the total population being higher secondary school going children and expected enrolment being 80% with per capita floor space requirement of 5.0 sqm, then minimum land required for school building with 40% ground coverage and FAR 0.5 would be

(A) 1.0 hectares   (B) 1.6 hectares   (C) 2.2 hectares   (D) 2.8 hectares

General Aptitude (GA) Questions

Q. 56 – Q. 60 carry one mark each.

Q.56 Choose the word from the options given below that is most nearly opposite in meaning to the given word:

Amalgamate

(A) merge
(B) split
(C) collect
(D) separate

Q.57 Choose the most appropriate word from the options given below to complete the following sentence.

If you are trying to make a strong impression on your audience, you cannot do so by being understated, tentative or _____ .

(A) hyperbolic
(B) restrained
(C) argumentative
(D) indifferent

Q.58 Choose the most appropriate word(s) from the options given below to complete the following sentence.

I contemplated _____ Singapore for my vacation but decided against it.

(A) to visit
(B) having to visit
(C) visiting
(D) for a visit

Q.59 If Log (P) = (1/2)Log (Q) = (1/3) Log (R), then which of the following options is **TRUE**?

(A) $P^2 = Q^3 R^2$ (B) $Q^2 = PR$ (C) $Q^2 = R^3 P$ (D) $R = P^2 Q^2$

Q.60 Which of the following options is the closest in the meaning to the word below:

Inexplicable

(A) Incomprehensible
(B) Indelible
(C) Inextricable
(D) Infallible

Q. 61 to Q. 65 carry two marks each.

Q.61 A container originally contains 10 litres of pure spirit. From this container 1 litre of spirit is replaced with 1 litre of water. Subsequently, 1 litre of the mixture is again replaced with 1 litre of water and this process is repeated one more time. How much spirit is now left in the container?
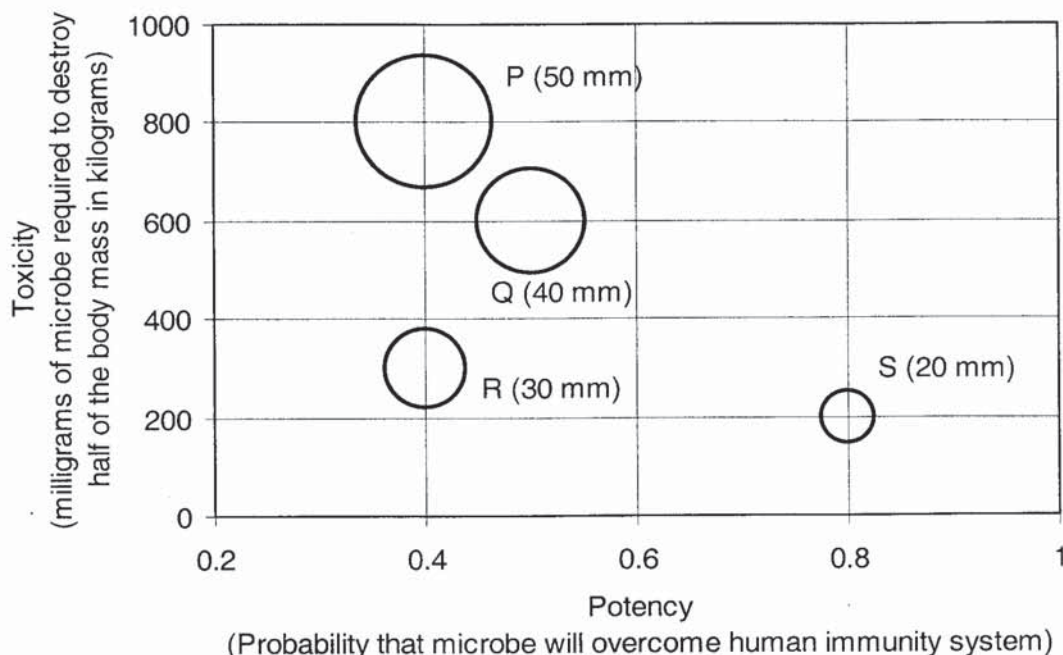
(A) 7.58 litres   (B) 7.84 litres   (C) 7 litres   (D) 7.29 litres

Q.62 A transporter receives the same number of orders each day. Currently, he has some pending orders (backlog) to be shipped. If he uses 7 trucks, then at the end of the 4th day he can clear all the orders. Alternatively, if he uses only 3 trucks, then all the orders are cleared at the end of the 10th day. What is the minimum number of trucks required so that there will be no pending order at the end of the 5th day?

(A) 4   (B) 5   (C) 6   (D) 7

Q.63 The variable cost (V) of manufacturing a product varies according to the equation V= 4q, ~~where q~~ is the quantity produced. The fixed cost (F) of production of same product reduces with q acc~~ording~~ to the equation F = 100/q. How many units should be produced to minimize the total cost (V+F)?

(A) 5   (B) 4   (C) 7   (D) 6

Q.64 P, Q, R and S are four types of dangerous microbes recently found in a human habitat. The area of each circle with its diameter printed in brackets represents the growth of a single microbe surviving human immunity system within 24 hours of entering the body. The danger to human beings varies proportionately with the toxicity, potency and growth attributed to a microbe shown in the figure below:

A pharmaceutical company is contemplating the development of a vaccine against the most dangerous microbe. Which microbe should the company target in its first attempt?

(A) P   (B) Q   (C) R   (D) S

Q.65 **Few school curricula include a unit on how to deal with bereavement and grief, and yet all students at some point in their lives suffer from losses through death and parting.**

Based on the above passage which topic would not be included in a unit on bereavement?

(A) how to write a letter of condolence
(B) what emotional stages are passed through in the healing process
(C) what the leading causes of death are
(D) how to give support to a grieving friend

END OF THE QUESTION PAPER

GATE 2011 - Answer Key - Paper : AR

Paper	Question no.	Key
AR	1	C
AR	2	D
AR	3	B
AR	4	A
AR	5	C
AR	6	A
AR	7	B
AR	8	C
AR	9	B
AR	10	A
AR	11	C
AR	12	B
AR	13	A
AR	14	D
AR	15	B
AR	16	D
AR	17	D
AR	18	C
AR	19	B
AR	20	B
AR	21	C
AR	22	B
AR	23	B
AR	24	D
AR	25	A
AR	26	D
AR	27	B
AR	28	B
AR	29	MarkstoAll
AR	30	A
AR	31	MarkstoAll
AR	32	C
AR	33	B
AR	34	A
AR	35	C

Paper	Question no.	Key
AR	36	B
AR	37	D
AR	38	A
AR	39	B
AR	40	D
AR	41	B
AR	42	B
AR	43	A
AR	44	C
AR	45	B
AR	46	MarkstoAll
AR	47	A
AR	48	C
AR	49	A
AR	50	B
AR	51	A
AR	52	B
AR	53	C
AR	54	A
AR	55	B
AR	56	D
AR	57	B
AR	58	C
AR	59	B
AR	60	A
AR	61	D
AR	62	C
AR	63	A
AR	64	D
AR	65	C