PINNACLE©
THE MBA ENTRANCE COURSE

CAT 2000

(The actual CAT 2000 paper)

Test Directions

About the test

1. DO NOT OPEN THE BOOKLET UNLESS INSTRUCTED TO DO SO.
2. This test is designed to test your competence in the test areas of a standard MBA Entrance Test.
3. Total number of questions is 165. There are 3 sections without any sectional time limits.
4. Total time allowed is 120 minutes.
5. All the scratch work has to be done on the test paper itself. Extra sheets for rough work are NOT allowed. Calculators are NOT allowed.
6. Students are expected to perform equally well in all the test areas.

Marking of Answers

1. Mark your answers in the OMR Score Sheet provided separately. The proper way of marking the answers is by darkening the relevant ovals completely by an **HB pencil.** Proper marking is essential for your scores to be electronically evaluated.
2. If you wish to change an answer, rub off the old answer completely with the help of an eraser and then mark the next answer.

Evaluation of Scores

1. There will be a penalty for every wrong answer marked. Only one answer will be acceptable for a question. In case a student marks more than one answer for the same question, the same shall be considered a wrong answer, by the electronic OMR scanner.

Conduct of Students

1. Cheating will immediately disqualify you from this test. Calculators are not allowed.
2. Please switch off Pagers & Cell-phones during the test.
3. Do not leave the hall until instructed to do so. OMR Scoresheets have to be deposited; Test Paper & Solutions are take-aways.

Do NOT open along this side

→ To open this booklet, → TEAR → along this side →

Test Form Number

111

Corporate Office: 214-17, Naurang House, Opp. Hindustan Times,
21, K.G. Marg, Connaught Place, New Delhi-01.
Ph.: 011-41510891/92/93 Fax: 011-41518999
Registered Office: Race Course Road, Indore.
Email: pinnacle@ptindia.com Web: www.ptindia.com

PT© Education

CAT 2000

SECTION I

Number of Questions : 55

DIRECTIONS : *Each of the five passages given below is followed by questions. Choose the best answer of each question.*

PASSAGE I

The current debate on intellectual property rights (IPRs) raises a number of important issues concerning the strategy and policies for building a more dynamic national agricultural research system, the relative roles of public and private sectors, and the role of agribusiness multinational corporations (MNCs). This debate has been stimulated by the international agreement on Trade Related Intellectual Property Rights (TRIPs), negotiated as part of the Uruguay Round. TRIPs, for the first time, seeks to bring innovations in agricultural technology under a new worldwide IPR regime. The agribusiness MNCs (along with pharmaceutical companies) played a leading part in lobbying for such a regime during the Uruguay Round negotiations. The argument was that incentives are necessary to stimulate innovations, and that this calls for a system of patents which gives innovators the sole right to use (or sell/lease the right to use) their innovations for a specified period and protects them against unauthorised copying or use. With strong support of their national governments, they were influential in shaping the agreement on TRIPs, which eventually emerged from the Uruguay Round.

The current debate on TRIPs in India-as indeed elsewhere-echoes wider concerns about 'privatisation' of research and allowing a free field for MNCs in the sphere of biotechnology and agriculture. The agribusiness corporations, and those with unbounded faith in the power of science to overcome all likely problems, point to the vast potential that new technology holds for solving the problems of hunger, malnutrition and poverty in the world. The exploitation of this potential should be encouraged and this is best done by the private sector for which patents are essential. Some, who do not necessarily accept this optimism, argue that fears of MNC domination are exaggerated and that farmers will accept their products only if they decisively outperform the available alternatives. Those who argue against agreeing to introduce an IPR regime in agriculture and encouraging private sector research are apprehensive that this will work to the disadvantage of farmers by making them more and more dependent on monopolistic MNCs. A different, though related apprehension is that extensive use of hybrids and genetically engineered new varieties might increase the vulnerability of agriculture to outbreaks of pests and diseases. The larger, longer-term consequences of reduced biodiversity that may follow from the use of specially bred varieties are also another cause for concern. Moreover, corporations, driven by the profit motive, will necessarily tend to underplay, if not ignore, potential adverse consequences, especially those which are unknown and which may manifest themselves only over a relatively long period. On the other hand, high-pressure advertising and aggressive sales campaigns by private companies can seduce farmers into accepting varieties without being aware of potential adverse effects and the possibility of disastrous consequences for their livelihood if these varieties happen to fail. There is no provision under the laws, as they now exist, for compensating users against such eventualities.

Excessive preoccupation with seeds and seed material has obscured other important issues involved in reviewing the research policy. We need to remind ourselves that improved varieties by themselves are not sufficient for sustained growth of yields. In our own experience, some of the early high yielding varieties (HYVs) of rice and wheat were found susceptible to widespread pest attacks; and some had problems of grain quality. Further research was necessary to solve these problems. This largely successful research was almost entirely done in public research institutions. Of course, it could in principle have been done by private companies, but whether they choose to do so depends crucially on the extent of the loss in market for their original introductions on account of the above factors and whether the companies are financially strong enough to absorb the 'losses', invest in research to correct the deficiencies and recover the lost market. Public research, which is not driven by profit, is better placed to take corrective action. Research for improving common pool resource management, maintaining ecological health and ensuring sustainability is both critical and also demanding in terms of technological challenge and resource requirements. As such research is crucial to the impact of new varieties, chemicals and equipment in the farmer's field, private companies should be interested in such research. But their primary interest is in the sale of seed material, chemicals, equipment and other inputs produced by them. Knowledge and techniques for resource management are not 'marketable' in the same way as those inputs. Their application to land, water and forests has a long gestation and their efficacy depends on resolving difficult problems such as designing institutions for proper and equitable management of common pool resources. Public or quasi-public research institutions informed by broader, long-term concerns can only do such work.

The public sector must therefore continue to play a major role in the national research system. It is both wrong and misleading to pose the problem in terms of public sector versus private sector or of privatisation of research. We need to address problems likely to arise on account of the public-private sector complementarily, and ensure that the public research system performs efficiently. Complementarily between various elements of research raises several issues in implementing an IPR regime. Private companies do not produce new varieties and inputs entirely as a result of their own research. Almost all technological improvement is based on knowledge and experience accumulated from the past, and the results of basic and applied research in public and quasi-public institutions (universities, research organisations). Moreover, as is increasingly recognised, accumulated stock of knowledge does not reside only in the scientific community and its academic publications, but is also widely diffused in traditions and folk knowledge of local communities all over.

The deciphering of the structure and functioning of DNA forms the basis of much of modern biotechnology. But this fundamental breakthrough is a 'public good' freely accessible in the public domain and usable free of any charge. Varieties/techniques developed using that knowledge can however be, and are, patented for private profit. Similarly, private corporations draw extensively, and without any charge, on germ plasm available in varieties of plants species (neem and turmeric are by now famous examples). Publicly funded gene banks as well as new varieties bred by public sector research stations can also be used freely by private enterprises for developing their own varieties and seek patent protection for them. Should private breeders be allowed free use of basic scientific discoveries? Should the repositories of traditional knowledge and germ plasm be collected which are maintained and improved by publicly funded institutions? Or should users be made to pay for such use? If they are to pay, what should be the basis of compensation? Should the compensation be for individuals or for communities/institutions to which they belong? Should individuals/institutions be given the right of patenting their innovations? These are some of the important issues that deserve more attention than they now get and need serious detailed study to evolve reasonably satisfactory, fair and workable solutions. Finally, the tendency to equate the public sector with the government is wrong. The public space is much wider than government departments and includes co-operatives, universities, public trust and a variety of non-governmental organisations (NGOs). Giving greater autonomy to research organisations from government control and giving non-government public institutions the space and resources to play a larger, more effective role in research, is therefore an issue of direct relevance in restructuring the public research system.

1. *Which one of the following statements describes an important issue, or important issues, not being raised in the context of the current debate on IPRs?*
   (1) The role of MNCs in the sphere of biotechnology and agriculture.
   (2) The strategy and policies for establishing an IPR regime for Indian agriculture.
   (3) The relative roles of public and private sectors.
   (4) Wider concerns about 'privatisation' of research.

2. *The fundamental breakthrough in deciphering the structure and functioning of DNA has become a public good. This means that*
   (1) breakthroughs in fundamental research on DNA are accessible by all without any monetary considerations.
   (2) the fundamental research on DNA has the characteristic of having beneficial effects for the public at large.
   (3) due to the large scale of fundamental research on DNA, it falls in the domain of public sector research institutions.
   (4) the public and other companies must have free access to such fundamental breakthroughs in research.

3. *In debating the respective roles of the public and private sectors in the national research system, it is important to recognise*
   (1) that private companies do not produce new varieties and inputs entirely on their own research.
   (2) that almost all technological improvements are based on knowledge and experience accumulated from the past.
   (3) the complementary role of public-and private-sector research.
   (4) that knowledge repositories are primarily the scientific community and its academic publications.

4. *Which one of the following may provide incentives to address the problem of potential adverse consequences of biotechnology?*
   (1) Include IPR issues in the TRIPs agreement.
   (2) Nationalise MNCs engaged in private research in biotechnology.
   (3) Encourage domestic firms to patent their innovations.
   (4) Make provisions in the law for user compensation against failure of newly developed varieties.

5. *Which of the following statements is not a likely consequence of emerging technologies in agriculture?*
   (1) Development of newer and newer varieties will lead to increase in biodiversity.
   (2) MNCs may underplay the negative consequences of the newer technology on environment.
   (3) Newer varieties of seeds may increase vulnerability of crops to pests and diseases.
   (4) Reforms in patent laws and user compensation against crop failures would be needed to address new technology problems.

6. *The TRIPs agreement emerged from the Uruguay Round to*
   (1) address the problem of adverse consequences of genetically engineered new varieties of grain.
   (2) fulfil the WTO requirement to have an agreement on trade related property rights.
   (3) provide incentives to innovators by way of protecting their intellectual property.
   (4) give credibility to the innovations made by MNCs in the field of pharmaceuticals and agriculture.

7. *Public or quasi-public research institutions are more likely than private companies to address the negative consequences of new technologies, because of which of the following reasons?*
   (1) Public research is not driven by profit motive.
   (2) Private companies may not be able to absorb losses arising out of the negative effects of the new technologies.
   (3) Unlike new technology products, knowledge and techniques for resource management are not amenable to simple market transactions.
   (4) All of the above.

8. *While developing a strategy and policies for building a more dynamic national agricultural research system, which one of the following statements needs to be considered?*
   (1) Public and quasi-public institutions are not interested in making profits.
   (2) Public and quasi-public institutions have a broader and long-term outlook than private companies.
   (3) Private companies are incapable of building products based on traditional and folk knowledge.
   (4) Traditional and folk knowledge cannot be protected by patents.

PASSAGE II

One of the criteria by which we judge the vitality of a style of painting is its ability to renew itself-its responsiveness to the changing nature and quality of experience, the degree of conceptual and formal innovation that it exhibits. By this criterion, it would appear that the practice of abstractionism has failed to engage creatively with the radical change in human experience in recent decades. It has, seemingly, been unwilling to re-invent itself in relation to the systems of artistic expression and viewers' expectations that have developed under the impact of the mass media.

The judgment that abstractionism has slipped into 'inertia gear' is gaining endorsement, not only among discerning viewers and practitioners of other art forms, but also among abstract painters themselves. Like their companions elsewhere in the world, abstractionists in India are asking themselves an overwhelming question today : Does abstractionism have a future? The major crisis that abstractionist face is that of revitalising their picture surface; few have improvised any solutions beyond the ones that were exhausted by the 1970s. Like all revolutions, whether in politics or in art, abstractionism must now confront its moment of truth: having begun life as a new and radical pictorial approach to experience, it has become an entrenched orthodoxy itself. Indeed, when viewed against a historical situation in which a variety of subversive, interactive and richly hybrid forms are available to the art practitioner, abstractionism assumes the remote and defiant air of an aristocracy that has outlived its age: trammelled by formulaic conventions yet buttressed by a rhetoric of sacred mystery, it seems condemned to being the last citadel of the self-regarding 'fine art' tradition, the last hurrah of painting for painting's sake.

The situation is further complicated in India by the circumstances in which an indigenous abstractionism came into prominence here during the 1960s. From the beginning it was propelled by the dialectic between two motives, one revolutionary and the other conservative-it was inaugurated as an act of emancipation from the dogmas of the nascent Indian nation state, when art was officially viewed as an indulgence at worst, and at best, as an instrument for the celebration of the republic's hopes and aspirations. Having rejected these dogmas, the pioneering abstractionists also went on to reject the various figurative styles associated with the Shantiniketan circle and others. In such a situation, abstractionism was a revolutionary move. It led art towards the exploration of the subconscious mind, the spiritual quest and the possible expansion of consciousness. Indian painting entered into a phase of self-inquiry, a meditative inner space where cosmic symbols and non-representational images ruled. Often, the transition from figurative idioms to abstractionist ones took place within the same artist.

At the same time, Indian abstractionists have rarely committed themselves wholeheartedly to a non-representational idiom. They have been preoccupied with the fundamentally metaphysical project of aspiring to the mystical-holy without altogether renouncing the symbolic. This has been sustained by a hereditary reluctance to give up the *murti*, the inviolable iconic form, which explains why abstractionism is marked by the conservative tendency to operate with images from the sacred repertoire of the past. Abstractionism thus entered India as a double-edged device in a complex cultural transaction. Ideologically, it served as an internationalist legitimisation of the emerging revolutionary local trends. However, on entry, it was conscripted to serve local artistic preoccupations-a survey of indigenous abstractionism will show that its most obvious points of affinity with European and American abstract art were with the more mystically oriented of the major sources of abstractionist philosophy and practice, for instance the Kandinsky-Klee school. There have been no takers for Malevich's Suprematism, which militantly rejected both the artistic forms of the past and the world of appearances, privileging the new-minted geometric symbol as an autonomous sign of the desire for infinity.

Against this backdrop, we can identify three major abstractionist idioms in Indian art. The first develops from a love of the earth, and assumes the form of a celebration of the self's dissolution in the cosmic panorama; the landscape is no longer a realistic transcription of the scene, but is transformed into a visionary occasion for contemplating the cycles of decay and regeneration. The second idiom phrases its departures from symbolic and archetypal devices as invitations to heightened planes of awareness. Abstractionism begins with the establishment or dissolution of the motif, which can be drawn from diverse sources, including the hieroglyphic tablet, the Sufi meditation dance or the Tantric diagram. The third idiom is based on the lyric play of forms guided by gesture or allied with formal improvisations like the assemblage. Here, sometimes, the line dividing abstract image from patterned design or quasi-random expressive marking may blur. The flux of forms can also be regimented through the poetics of pure colour arrangements, vector-diagrammatic spaces and gestural design.

In this genealogy, some pure lines of descent follow their logic to the inevitable point of extinction, others engage in cross - fertilization, and yet others undergo mutation to maintain their energy. However, this genealogical survey demonstrates the wave at its crests, those points where the metaphysical and the painterly have been fused in images of abiding potency, ideas sensuously ordained rather than fabricated programmatically to a concept. It is equally possible to enumerate the thoughts where the two principles do not come together, thus arriving at a very different account. Uncharitable as it may sound, the history of Indian abstractionism records a series of attempts to avoid the risks of abstraction by resorting to an overt and near-generic symbolism, which many Indian abstractionists embrace when they find themselves bereft of the imaginative energy to negotiate the union of metaphysics and painterliness.

Such symbolism falls into a dual trap: it succumbs to the pompous vacuity of pure metaphysics when the burden of intention is passed off as justification; or then it is desiccated by the arid formalism of pure painterliness, with delight in the measure of chance or pattern guiding the execution of a painting. The ensuing conflict of purpose stalls the progress of abstractionism in an impasse. The remarkable Indian abstractionists are precisely those who have overcome this and addressed themselves to the basic elements of their art with a decisive sense of independence from prior models. In their recent work, we see the logic of Indian abstractionism pushed almost to the furthest it can be taken. Beyond such artists stands a lost generation of abstractionists whose work invokes a wistful, delicate beauty but stops there.

Abstractionism is not a universal language; it is an art that points up the loss of a shared language of signs in society. And yet, it affirms the possibility of its recovery through the effort of awareness. While its rhetoric has always emphasised a call for new forms of attention, abstractionist practice has tended to fall into a complacent pride in its own incomprehensibility; a complacency fatal in an ethos where vibrant new idioms compete for the viewers' attention. Indian abstractionists ought to really return to basics, to reformulate and replenish their understanding of the nature of the relationship between the painted image and the world around it. But will they abandon their favourite conceptual habits and formal conventions, if this becomes necessary?

9. *Which one of the following is not stated by the author as a reason for abstractionism losing its vitality?*
   (1) Abstractionism has failed to reorient itself in the context of changing human experience.
   (2) Abstractionism has not considered the developments in artistic expression that have taken place in recent times.
   (3) Abstractionism has not followed the path taken by all revolutions, whether in politics or art.
   (4) The impact of mass media on viewers' expectations has not been assessed, and responded to, by abstractionism.

10. *Which one of the following, according to the author, is the role that abstractionism plays in a society?*
   (1) It provides an idiom that can be understood by most members in a society.
   (2) It highlights the absence of a shared language of meaningful symbols which can be recreated through greater awareness.
   (3) It highlights the contradictory artistic trends of revolution and conservatism that any society needs to move forward.
   (4) It helps abstractionists invoke the wistful, delicate beauty that may exist in society.

11. *According to the author, which one of the following characterises the crisis faced by abstractionism?*
   (1) Abstractionists appear to be unable to transcend the solutions tried out earlier.
   (2) Abstractionism has allowed itself to be confined by set forms and practices.
   (3) Abstractionists have been unable to use the multiplicity of forms now becoming available to an artist.
   (4) All of the above.

12. *According to the author, the introduction of abstractionism was revolutionary because it*
   (1) celebrated the hopes and aspirations of a newly independent nation.
   (2) provided a new direction to Indian art, towards self-inquiry and non-representational images.
   (3) managed to obtain internationalist support for the abstractionist agenda.
   (4) was emancipation from the dogmas of the nascent nation state.

13. *Which one of the following is not part of the author's characterisation of the conservative trend in Indian abstractionism?*
    (1) An exploration of the subconscious mind.
    (2) A lack of full commitment to non-representational symbols.
    (3) An adherence to the symbolic while aspiring to the mystical.
    (4) Usage of the images of gods or similar symbols.

14. *Given the author's delineation to the three abstractionist idioms in Indian art, the third idiom can be best distinguished from the other two idioms through its*
    (1) depiction of nature's cyclical renewal.
    (2) use of non-representational images.
    (3) emphasis on arrangement of forms.
    (4) limited reliance on original models.

15. *According to the author, the attraction of the Kandinsky-Klee school for Indian abstractionist can be explained by which one of the following?*
    (1) The conservative tendency to aspire to the mystical without a complete renunciation of the symbolic.
    (2) The discomfort of Indian abstractionists with Malevich's Suprematism.
    (3) The easy identification of obvious points of affinity with European and American abstract art, of which the Kandinsky-Klee school is an example.
    (4) The double-edged nature of abstractionism which enabled identification with mystically-oriented schools.

16. Which one of the following, according to the author, is the most important reason for the stalling of abstractionism's progress in an impasse?
    (1) Some artists have followed their abstractionist logic to the point of extinction.
    (2) Some artists have allowed chance or pattern to dominate the execution of their paintings.
    (3) Many artists have avoided the trap of a near-generic and an open symbolism.
    (4) Many artists have found it difficult to fuse the twin principles of the metaphysical and the painterly.

PASSAGE III

In a modern computer, electronic and magnetic storage technologies play complementary roles. Electronic memory chips are fast but volatile (their contents are lost when the computer is unplugged). Magnetic tapes and hard disks are slower, but have the advantage that they are non-volatile, so that they can be used to store software and documents even when the power is off.

In laboratories around the world, however, researchers are hoping to achieve the best of both worlds. They are trying to build magnetic memory chips that could be used in place of today's electronic ones. These magnetic memories would be non-volatile; but they would also be faster, would consume less power, and would be able to stand up to hazardous environments more easily. Such chips would have obvious applications in storage cards for digital cameras and music-players; they would enable hand-held and laptop computers to boot up more quickly and to operate for longer; they would allow desktop computers to run faster; they would doubtless have military and space-faring advantages too. But although the theory behind them looks solid, there are tricky practical problems and need to be overcome.

Two different approaches, based on different magnetic phenomena, are being pursued. The first, being investigated by Gary Prinz and his colleagues at the Naval Research Laboratory (NRL) in Washington, D.C., exploits the fact that the electrical resistance of some materials changes in the presence of a magnetic field-a phenomenon known as magneto-resistance. For some multi-layered materials this effect is particularly powerful and is, accordingly, called "giant" magneto-resistance (GMR). Since 1997, the exploitation of GMR has made cheap multi-gigabyte hard disks commonplace. The magnetic orientations of the magnetised spots on the surface of a spinning disk are detected by measuring the changes they induce in the resistance of a tiny sensor. This technique is so sensitive that it means the spots can be made smaller and packed closer together than was previously possible, thus increasing the capacity and reducing the size and cost of a disk drive.

Dr. Prinz and his colleagues are now exploiting the same phenomenon on the surface of memory chips, rather than spinning disks. In a conventional memory chip, each binary digit (bit) of data is represented using a capacitor-reservoir of electrical charge that is either empty or full-to represent a zero or a one. In the NRL's magnetic design, by contrast, each bit is stored in a magnetic element in the form of a vertical pillar of magnetisable material. A matrix of wires passing above and below the elements allows each to be magnetised, either clockwise or anti-clockwise, to represent zero or one. Another set of wires allows current to pass through any particular element. By measuring an element's resistance you can determine its magnetic orientation, and hence whether it is storing a zero or a one. Since the elements retain their magnetic orientation even when the power is off, the result is non-volatile memory. Unlike the elements of an electronic memory, a magnetic memory's elements are not easily disrupted by radiation. And compared with electronic memories, whose capacitors need constant topping up, magnetic memories are simpler and consume less power. The NRL researchers plan to commercialise their device through a company called Non-Volatile Electronics, which recently began work on the necessary processing and fabrication techniques. But it will be some years before the first chips roll off the production line.

Most attention in the field is focused on an alternative approach based on magnetic tunnel-junctions (MTJs), which are being investigated by researchers at chip makers such as IBM, Motorola, Siemens and Hewlett-Packard. IBM's research team, led by Stuart Parkin, has already created a 500-element working prototype that operates at 20 times the speed of conventional memory chips and consumes 1 % of the power. Each element consists of a sandwich of two layers of magnetisable material separated by a barrier of aluminium oxide just four or five atoms thick. The polarisation of lower magnetisable layer is fixed in one direction, but that of the upper layer can be set (again, by passing a current through a matrix of control wires) either to the left or to the right, to store a zero or a one. The polarisations of the two layers are then in either the same or opposite directions.

Although the aluminium-oxide barrier is an electrical insulator, it is so thin that electrons are able to jump across it via a quantum-mechanical effect called tunnelling. It turns out that such tunnelling is easier when the two magnetic layers are polarised in the same direction than when they are polarised in opposite directions. So, by measuring the current that flows through the sandwich, it is possible to determine the alignment of the topmost layer, and hence whether it is storing a zero or a one.

To build a full-scale memory chip based on MTJs is, however, no easy matter. According to Paulo Freitas, an expert on chip manufacturing at the Technical University of Lisbon, magnetic memory elements will have to become far smaller and more reliable than current prototypes if they are to compete with electronic memory. At the same time, they will have to be sensitive enough to respond when the appropriate wires in the control matrix are switched on, but not so sensitive that they respond when a neighbouring element is changed. Despite these difficulties, the general consensus is that MTJs are the more promising ideas. Dr. Parkin says his group evaluated the GMR approach and decided not to pursue it, despite the fact that IBM pioneered GMR in hard disks. Dr. Prinz, however, contends that his plan will eventually offer higher storage densities and lower production costs.

Not content with shaking up the multi-billion-dollar market for computer memory, some researchers have even more ambitious plans for magnetic computing. In a paper published last month in Science, Russell Cowburn and Mark Welland at Cambridge University outlined research that could form the basis of a magnetic microprocessor- a chip capable of manipulating (rather than merely storing) information magnetically. In place of conducting wires, a magnetic processor would have rows of magnetic dots, each of which could be polarised in one of two directions. Individual bits of information would travel down the rows as magnetic pulses, changing the orientation of the dots as they went. Dr. Cowburn and Dr. Welland have demonstrated how a logic gate (the basic element of a microprocessor) could work in such a scheme. In their experiment, they fed a signal in at one end of the chain of dots and used a second signal to control whether it propagated along the chain.

It is, admittedly, a long way from a single logic gate to a full microprocessor, but this was true also when the transistor was first invented. Dr. Cowburn, who is now searching for backers to help commercialise the technology, says he believes it will be at least ten years before the first magnetic microprocessor is constructed. But other researchers in the field agree that such a chip is the next logical step. Dr. Prinz says that once magnetic memory is sorted out "the target is to go after the logic circuits." Whether all-magnetic computers will ever be able to compete with other contenders that are jostling to knock electronics off its perch-such as optical, biological and quantum computing-remains to be seen. Dr. Cowburn suggests that the future lies with hybrid machines that use different technologies. But computing with magnetism evidently has an attraction all its own.

17. *In developing magnetic memory chips to replace the electronic ones, two alternative research paths are being pursued. These are approaches based on*
    (1) volatile and non-volatile memories.
    (2) magneto-resistance and magnetic tunnel-junctions.
    (3) radiation-disruption and radiation-neutral effects.
    (4) orientation of magnetised spots on the surface of a spinning disk and alignment of magnetic dots on the surface of a conventional memory chip.

18. *A binary digit or bit is represented in the magneto-resistance based magnetic chip using*
    (1) a layer of aluminium oxide.
    (2) a capacitor.
    (3) a vertical pillar of magnetised material.
    (4) a matrix of wires.

19. *In the magnetic tunnel-junctions (MTJs) tunnelling is easier when*
    (1) two magnetic layers are polarised in the same direction.
    (2) two magnetic layers are polarised in the opposite directions.
    (3) two aluminium-oxide barriers are polarised in the same direction.
    (4) two aluminium-oxide barriers are polarised in opposite directions.

20. *A major barrier on the way to build a full-scale memory chip based on MTJs is*
    (1) the low sensitivity of the magnetic memory elements.
    (2) the thickness of aluminium oxide barriers.
    (3) the need to develop more reliable and far smaller magnetic memory chips.
    (4) all of the above.

21. *In the MTJs approach, it is possible to identify whether the topmost layer of the magnetised memory element is storing a zero or one by*
    (1) measuring an element's resistance and thus determining its magnetic orientation.
    (2) measuring the degree of disruption caused by radiation in the elements of the magnetic memory.
    (3) magnetising the elements either clockwise or anti-clockwise.
    (4) measuring the current that flows through the sandwich.

22. *A line of research which is trying to build a magnetic chip that can both store and manipulate information, is being pursued by*
    (1) Paul Freitas (2) Stuart Parkin (3) Gary Prinz (4) None of these

23. *Experimental research currently underway, using rows of magnetic dots, each of which could be polarised in one of the two directions, has led to the demonstration of*
    (1) working of a microprocessor.
    (2) working of a logic gate.
    (3) working of a magneto-resistance based chip.
    (4) working of a magneto tunnelling-junction (MTJ) based chip.

24. *From the passage, which of the following cannot be inferred?*
    (1) Electronic memory chips are faster and non-volatile.
    (2) Electronic and magnetic storage technologies play a complementary role.
    (3) MTJs are the more promising idea, compared to the magneto-resistance approach.
    (4) Non-volatile Electronics is the company set up to commercialise the GMR chips.

PASSAGE IV

The story begins as the European pioneers crossed the Alleghenies and started to settle in the Midwest. The land they found was covered with forests. With incredible effort they felled the trees, pulled the stumps and planted their crops in the rich, loamy soil. When they finally reached the western edge of the place we now call Indiana, the forest stopped and ahead lay a thousand miles of the great grass prairie. The Europeans were puzzled by this new environment. Some even called it the "Great Desert". It seemed untillable. The earth was often very wet and it was covered with centuries of tangled and matted grasses. With their cast iron plows, the settlers found that the prairie sod could not be cut and the wet earth stuck to their plowshares. Even a team of the best oxen bogged down after a few years of tugging. The iron plow was a useless tool to farm the prairie soil. The pioneers were stymied for nearly two decades. Their western march was halted and they filled in the eastern regions of the Midwest.

In 1837, a blacksmith in the town of Grand Detour, Illinois, invented a new tool. His name was John Deere and the tool was a plow made of steel. It was sharp enough to cut through matted grasses and smooth enough to cast off the mud. It was a simple tool, the "sod buster'" that opened the great prairies to agricultural development.

Sauk County, Wisconsin is the part of that prairie where I have a home. It is named after the Sauk Indians. In 1673, Father Marquette was the first European to lay his eyes upon their land. He found a village laid out in regular patterns on a plain beside the Wisconsin River. He called the place Prairie du Sac. The village was surrounded by fields that had provided maize, beans and squash for the Sauk people for generations reaching back into the unrecorded time.

When the European settlers arrived at the Sauk prairie in 1837, the government forced the native Sauk people west of the Mississippi River. The settlers came with John Deere's new invention and used the tool to open the area to a new kind of agriculture. They ignored the traditional ways of the Sauk Indians and used their sod-busting tool for planting wheat. Initially, the soil was generous and the farmers thrived. However, each year the soil lost more of its nurturing power. It was only thirty years after the Europeans arrived with their new technology that the land was depleted. Wheat farming became uneconomic and tens of thousands of farmers left Wisconsin seeking new land with sod to bust.

It took the Europeans and their new technology just one generation to make their homeland into a desert. The Sauk Indians who knew how to sustain themselves on the Sauk prairie land were banished to another kind of desert called a reservation. And they even forgot about the techniques and tools that had sustained them on the prairie for generations unrecorded. And that is how it was that three deserts were created-Wisconsin, the reservation and the memories of a people. A century later, the land of the Sauks is now populated by the children of a second wave of European farmers who learned to replenish the soil through the regenerative powers of dairying, ground cover crops and animal manures. These third and fourth generation farmers and townspeople do not realise, however, that a new settler is coming soon with an invention as powerful as John Deere's plow.

The new technology is called 'bereavement counselling'. It is a tool forged at the great state university, an innovative technique to meet the needs of those experiencing the death of a loved one, a tool that can "process" the grief of the people who now live on the Prairie of the Sauk. As one can imagine the final days of the village of the Sauk Indians before the arrival of the settlers with John Deere's plow, one can also imagine these final days before the arrival of the first bereavement counsellor at Prairie du Sac. In these final days, the farmers and the townspeople mourn at the death of a mother, brother, son or friend. The bereaved is joined by neighbours and kin. They meet grief together in lamentation, prayer and song. They call upon the words of the clergy and surround themselves in community.

It is in these ways that they grieve and then go on with life. Through their mourning they are assured of the bonds between them and renewed in the knowledge that this death is a part of the Prairie of the Sauk. Their grief is common property, anguish from which the community draws strength and gives the bereaved the courage to move ahead.

It is into this prairie community that the bereavement counsellor arrives with the new grief technology. The counsellor calls the invention a service and assures the prairie folk of its effectiveness and superiority by invoking the name of the great university while displaying a diploma and certificate. At first, we can imagine that the local people will be puzzled by the bereavement counsellor's claim. However, the counsellor will tell a few of them that the new technique is merely to assist the bereaved's community at the time of death. To some other prairie folk who are isolated or forgotten, the counsellor will approach the County Board and advocate the right to treatment for these unfortunate souls. This right will be guaranteed by the Board's decision to reimburse those too poor to pay for counselling services. There will be others, schooled to believe in the innovative new tools certified by universities and medical centres, who will seek out the bereavement counsellor by force of habit. And one of these people will tell a bereaved neighbour who is unschooled that unless his grief is processed by a counsellor, he will probably have major psychological problems in later life. Several people will begin to use the bereavement counsellor because, since the County Board now taxes them to insure access to the technology, they will feel that to fail to be counselled is to waste their money, and to be denied a benefit, or even a right.

Finally, one day, the aged father of a Sauk woman will die. And the next door neighbour will not drop by because he doesn't want to interrupt the bereavement counsellor. The woman's kin will stay home because they will have learned that only the bereavement counsellor knows how to process grief the proper way. The local clergy will seek technical assistance from the bereavement counsellor to learn the correct form of service to deal with guilt and grief. And the grieving daughter will know that it is the bereavement counsellor who really cares for her because only the bereavement counsellor comes when death visits this family on the Prairie of the Sauk.

It will be only one generation between the bereavement counsellor arrives and the community of mourners disappears. The counsellor's new tool will cut through the social fabric, throwing aside kinship, care, neighbourly obligations and community ways of coming together and going on. Like John Deere's plow, the tools of bereavement counselling will create a desert where a community once flourished. And finally, even the bereavement counsellor will see the impossibility of restoring hope in clients once they are genuinely alone with nothing but a service for consolation. In the inevitable failure of the service, the bereavement counsellor will find the deserts even in herself.

25. *Which one of the following best describes the approach of the author?*
    (1) Comparing experiences with two innovations tried, in order to illustrate the failure of both.
    (2) Presenting community perspectives on two technologies which have had negative effects on people.
    (3) Using the negative outcomes of one innovation to illustrate the likely outcomes of another innovation.
    (4) Contrasting two contexts separated in time, to illustrate how 'deserts' have arisen.

26. *According to the passage, bereavement handling traditionally involves*
    (1) the community bereavement counsellors working with the bereaved to help him/her overcome grief.
    (2) the neighbours and kin joining the bereaved and meeting grief together in mourning and prayer.
    (3) using techniques developed systematically in formal institutions of learning, a trained counsellor helping the bereaved cope with grief.
    (4) the Sauk Indian Chief leading the community with rituals and rites to help lessen the grief of the bereaved.

27. *Due to which of the following reasons, according to the author, will the bereavement counsellor find the deserts even in herself?*
    (1) Over a period of time, working with Sauk Indians who have lost their kinship and relationships, she becomes one of them.
    (2) She is working in an environment where the disappearance of community mourners makes her work place a social desert.
    (3) Her efforts at grief processing with the bereaved will fail as no amount of professional service can make up for the loss due to the disappearance of community mourners.
    (4) She has been working with people who have settled for a long time in the Great Desert.

28. *According to the author, the bereavement counsellor is*
    (1) a friend of the bereaved helping him or her handle grief.
    (2) an advocate of the right to treatment for the community.
    (3) a kin of the bereaved helping him/her handle grief.
    (4) a formally trained person helping the bereaved handle grief.

29. *The Prairie was a great puzzlement for the European pioneers because*
    (1) it was covered with thick, untillable layers of grass over a vast stretch.
    (2) it was a large desert immediately next to lush forests.
    (3) it was rich cultivable land left fallow for centuries.
    (4) it could be easily tilled with iron plows.

30. *Which of the following does the 'desert' in the passage refer to?*
    (1) Prairie soil depleted by cultivation of wheat.
    (2) Reservations in which native Indians were resettled.
    (3) Absence of, and emptiness in, community kinship and relationships.
    (4) All of the above.

31. *According to the author, people will begin to utilise the service of the bereavement counsellor because*
    (1) new County regulations will make them feel it is a right, and if they don't use it, it would be a loss.
    (2) the bereaved in the community would find her a helpful friend.
    (3) she will fight for subsistence allowance from the County Board for the poor among the bereaved.
    (4) grief processing needs tools certified by universities and medical centres.

32. *Which one of the following parallels between the plow and bereavement counselling is not claimed by the author?*
    (1) Both are innovative technologies.
    (2) Both result in migration of the communities into which the innovations are introduced.
    (3) Both lead to 'deserts' in the space of only one generation.
    (4) Both are tools introduced by outsiders entering existing communities.

PASSAGE V

The teaching and transmission of North Indian classical music is, and long has been, achieved by largely oral means. The *raga* and its structure, the often breathtaking intricacies of *tala* or rhythm, and the incarnation of *raga* and *tala* as *bandish* or composition, are passed thus, between *guru* and *shishya* by word of mouth and direct demonstration, with no printed sheet of notated music, as it were, acting as a go-between. Saussure's conception of language as a communication between addresser and addressee is given, in this model, a further instance, and a new exotic complexity and glamour.

These days, especially with the middle class having entered the domain of classical music and playing not a small part in ensuring the continuation of this ancient tradition, the tape recorder serves as a handy technological slave and preserves, from oblivion, the vanishing, elusive moment of oral transmission. Hoary *gurus*, too, have seen the advantage of this device, and increasingly use it as an aid to instructing their pupils; in place of the *shawls* and other traditional objects that used to pass from *shishya* to *guru* in the past, as a token of the regard of the former for the latter, it is not unusual, today, to see cassettes changing hands.

Part of my education in North Indian classical music was conducted via this rather ugly but beneficial rectangle of plastic, which I carried with me to England when I was an undergraduate. One cassette had stored in it various *talas* played upon the *tabla*, at various tempos, by my music teacher's brother-in-law, Hazarilalji, who was a teacher of *Kathak* dance, as well as a singer and a *tabla* player. This was a work of great patience and prescience, a one-and-a-half hour performance without any immediate point or purpose, but intended for some delayed future moment when I'd practise the *talas* solitarily.

This repeated playing out of the rhythmic cycles on the *tabla* was inflected by the noises-an irate auto driver blowing a horn; the sound of overbearing pigeons that were such a nuisance on the banister; even the cry of a *kulfi* seller in summer-entering from the balcony of the third floor flat we occupied in those days, in a lane in a Bombay suburb, before we left the city for good. These sounds, in turn, would invade, hesitantly, the ebb and flow of silence inside the artificially heated room, in a borough of West London, in which I used to live as an undergraduate. There, in the trapped dust, silence and heat, the *theka* of the *tabla*, qualified by the imminent but intermittent presence of the Bombay suburb, would come to life again. A few years later, the *tabla* and, in the background, the pigeons and the itinerant *kulfi* seller, would inhabit a small graduate room in Oxford.

The tape recorder, though, remains an extension of the oral transmission of music, rather than a replacement of it. And the oral transmission of North Indian classical music remains, almost uniquely, a testament to the fact that the human brain can absorb, remember and reproduce structures of great complexity and sophistication without the help of the hieroglyph or written mark or a system of notation. I remember my surprise on discovering that Hazarilalji-who had mastered *Kathak* dance, *tala* and North Indian classical music, and who used to narrate to me, occasionally, compositions meant for dance that were grand and intricate in their verbal prosody, architecture and rhythmic complexity-was near illiterate and had barely learnt to write his name in large and clumsy letters.

Of course, attempts have been made, throughout the 20th century, to formally codify and even notate this music, and institutions set up and degrees created, specifically to educate students in this "scientific" and codified manner. Paradoxically, however, this style of teaching has produced no noteworthy student or performer; the most creative musicians still emerge from the *guru-shishya* relationship, their understanding of music developed by oral communication.

The fact that North Indian classical music emanates from, and has evolved through, oral culture, means that this music has a significantly different aesthetic, and that this aesthetic has a different politics, from that of Western classical music. A piece of music in the Western tradition, at least in its most characteristic and popular conception, originates in its composer, and the connection between the two, between composer and the piece of music, is relatively unambiguous precisely because the composer writes down, in notation, his composition, as a poet might write down and publish his poem. However far the printed sheet of notated music might travel thus from the composer, it still remains his property; and the notion of property remains at the heart of the Western conception of "genius", which derives from the Latin *gignere* or 'to beget'.

The genius in Western classical music is, then, the originator, begetter and owner of his work-the printed, notated sheet testifying to his authority over his product and his power, not only of expression or imagination, but of origination. The conductor is a custodian and guardian of this property. Is it an accident that Mandelstam, in his notebooks, compares-celebratorily-the conductor's baton to a policeman's, saying all the music of the orchestra lies mute within it, waiting for its first movement to release it into the auditorium?

The *raga*-transmitted through oral means is, in a sense, no one's property; it is not easy to pin down its source, or to know exactly where its provenance or origin lies. Unlike the Western classical tradition, where the composer begets his piece, notates it and stamps it with his ownership and remains, in effect, larger than, or the father of, his work, in the North Indian classical tradition, the *raga*-unconfined to a single incarnation, composer or performer-remains necessarily greater than the artiste who invokes it.

This leads to a very different politics of interpretation and valuation, to an aesthetic that privileges the evanescent moment of performance and invocation over the controlling authority of genius and the permanent record. It is a tradition, thus, that would appear to value the performer, as medium, more highly than the composer who presumes to originate what, effectively, cannot be originated in a single person-because the *raga* is the inheritance of a culture.

33. *The author's contention that the notion of property lies at the heart of the Western conception of genius is best indicated by which one of the following?*
    (1) The creative output of a genius is invariably written down and recorded.
    (2) The link between the creator and his output is unambiguous.
    (3) The word "genius" is derived from a Latin word which means "to beget."
    (4) The music composer notates his music and thus becomes the "father" of a particular piece of music.

34. *Saussure's conception of language as a communication between addresser and addressee, according to the author, is exemplified by the*
    (1) teaching of North Indian classical music by word of mouth and direct demonstration.
    (2) use of the recorded cassette as a transmission medium between the music teacher and the trainee.
    (3) written down notation sheets of musical compositions.
    (4) conductor's baton and the orchestra.

35. *The author holds that the "rather ugly but beneficial rectangle of plastic" has proved to be a "handy technological slave" in*
    (1) storing the *talas* played upon the *tabla*, at various tempos.
    (2) ensuring the continuance of an ancient tradition.
    (3) transporting North Indian classical music across geographical borders.
    (4) capturing the transient moment of oral transmission.

36. *The oral transmission of North Indian classical music is an almost unique testament of the*
    (1) efficacy of the *guru-shishya* tradition.
    (2) earning impact of direct demonstration.
    (3) brain's ability to reproduce complex structures without the help of written marks.
    (4) the ability of an illiterate person to narrate grand and intricate musical compositions.

37. *According to the passage, in the North Indian classical tradition, the raga remains greater than the artiste who invokes it. This implies an aesthetic which*
    (1) emphasises performance and invocation over the authority of genius and permanent record.
    (2) makes the music no one's property.
    (3) values the composer more highly than the performer.
    (4) supports oral transmission of traditional music.

38. *From the author's explanation of the notion that in the Western tradition, music originates in its composer, which one of the following cannot be inferred?*
    (1) It is easy to transfer a piece of Western classical music to a distant place.
    (2) The conductor in the Western tradition, as a custodian, can modify the music, since it 'lies mute' in his baton.
    (3) The authority of the Western classical music composer over his music product is unambiguous.
    (4) The power of the Western classical music composer extends to the expression of his music.

39. *According to the author, the inadequacy of teaching North Indian classical music through a codified, notation based system is best illustrated by*
    (1) a loss of the structural beauty of the *raga*s.
    (2) a fusion of two opposing approaches creating mundane music.
    (3) the conversion of free-flowing *raga*s into stilted set pieces.
    (4) its failure to produce any noteworthy student or performer.

40. *Which of the following statements best conveys the overall idea of the passage?*
    (1) North Indian and Western classical music are structurally different.
    (2) Western music is the intellectual property of the genius while the North Indian *raga* is the inheritance of a culture.
    (3) Creation as well as performance are important in the North Indian classical tradition.
    (4) North Indian classical music is orally transmitted while Western classical music depends on written down notations.

DIRECTIONS : *Sentences given in each question, when properly sequenced, form a coherent paragraph. The first and last sentences are 1 and 6, and the four in between are labelled A, B, C and D. Choose the most logical order of these four sentences from among the four given choices to construct a coherent paragraph from sentences 1 to 6.*

41. 1. Security inks exploit the same principle that causes the vivid and constantly changing colours of a film of oil on water.
    A. When two rays of light meet each other after being reflected from these different surfaces, they have each travelled slightly different distances.
    B. The key is that the light is bouncing off two surfaces, that of the oil and that of the water layer below it.
    C. The distance the two rays travel determines which wavelengths, and hence colours, interfere constructively and look bright.
    D. Because light is an electromagnetic wave, the peaks and troughs of each ray then interfere either constructively, to appear bright, or destructively, to appear dim.
    6. Since the distance the rays travel changes with the angle as you look at the surface, different colours look bright from different viewing angles.
    (1) ABCD (2) BADC (3) BDAC (4) DCAB

42. 1. Commercially reared chicken can be unusually aggressive, and are often kept in darkened sheds to prevent them pecking at each other.
A. The birds spent far more of their time-up to a third-pecking at the inanimate objects in the pens, in contrast to birds in other pens which spent a lot of time attacking others.
B. In low light conditions, they behave less belligerently, but are more prone to ophthalmic disorders and respiratory problems.
C. In an experiment, aggressive head-pecking was all but eliminated among birds in the enriched environment.
D. Altering the birds' environment, by adding bales of wood-shavings to their pens, can work wonders.
6. Bales could diminish aggressiveness and reduce injuries; they might even improve productivity, since a happy chicken is a productive chicken.
(1) DCAB (2) CDBA (3) DBAC (4) BDCA

43. 1. The concept of a 'nation-state' assumes a complete correspondence between the boundaries of the nation and the boundaries of those who live in a specific state.
A. Then there are members of national collectivities who live in other countries, making a mockery of the concept.
B. There are always people living in particular states who are not considered to be (and often do not consider themselves to be) members of the hegemonic nation.
C. Even worse, there are nations which never had a state or which are divided across several states.
D. This, of course, has been subject to severe criticism and is virtually everywhere a fiction.
6. However, the fiction has been, and continues to be, at the basis of nationalist ideologies.
(1) DBAC (2) ABCD (3) BACD (4) DACB

44. 1. In the sciences, even questionable examples of research fraud are harshly punished.
A. But no such mechanism exists in the humanities-much of what humanities researchers call, research does not lead to results that are replicable by other scholars.
B. Given the importance of interpretation in historical and literary scholarship, humanities researchers are in a position where they can explain away deliberate and even systematic distortion.
C. Mere suspicion is enough for funding to be cut off; publicity guarantees that careers can be effectively ended.
D. Forgeries which take the form of pastiches in which the forger intersperses fake and real parts can be defended as mere mistakes or aberrant misreading.
6. Scientists fudging data have no such defences.
(1) BDCA (2) ABDC (3) CABD (4) CDBA

45. 1. Horses and communism were, on the whole, a poor match.
A. Fine horses bespoke the nobility the party was supposed to despise.
B. Communist leaders, when they visited villages, preferred to see cows and pigs.
C. Although a working horse was just about tolerable, the communists were right to be wary.
D. Peasants from Poland to the Hungarian Pustza preferred their horses to party dogma.
6. 'A farmer's pride is his horse; his cow may be thin but his horse must be fat,' went a Slovak saying.
(1) ACDB (2) DBCA (3) ABCD (4) DCBA

DIRECTIONS : *In each of the following sentences, parts of the sentence are left blank. Beneath each sentence, four different ways of completing the sentence are indicated. Choose the best alternative from among the four.*

46. Though one eye is kept firmly on the ..... , the company now also promotes ..... contemporary art.
(1) present, experimental (2) future, popular
(3) present, popular (4) market, popular

47. The law prohibits a person from felling a sandalwood tree, even if it grows on one's own land, without prior permission from the government. As poor people cannot deal with the government, this legal provision leads to a rip-roaring business for …., who care neither for the ….., nor for the trees.
    (1) middlemen, rich (2) the government, poor
    (3) touts, rich (4) touts, poor

48. It will take some time for many South Koreans to ….. the conflicting images of North Korea, let alone ….. to what to make of their northern cousins.
    (1) reconcile, decide (2) understand, clarify
    (3) make out, decide (4) reconcile, understand

49. In these bleak and depressing times of ….. prices, non-performing governments and ….. crime rates, Sourav Ganguly has given us, Indians, a lot to cheer about.
    (1) escalating, increasing (2) spiralling, booming
    (3) spiralling, soaring (4) ascending, debilitating

50. The manners and ….. of the *nouveau riche* is a recurrent ….. in the literature.
    (1) style, motif (2) morals, story (3) wealth, theme (4) morals, theme

DIRECTIONS : *The sentences given in each question, when properly sequenced, form a coherent paragraph. Each sentence is labelled with a letter. Choose the most logical order of sentences from among the four given choices to construct a coherent paragraph.*

51. A. If caught in the act, they were punished, not for the crime, but for allowing themselves to be caught another lash of the whip.
    B. The bellicose Spartans sacrificed all the finer things in life for military expertise.
    C. Those fortunate enough to survive babyhood were taken away from their mothers at the age of seven to undergo rigorous military training.
    D. This consisted mainly of beatings and deprivations of all kinds like going around barefoot in winter, and worse, starvation so that they would be forced to steal food to survive.
    E. Male children were examined at birth by the city council and those deemed too weak to become soldiers were left to die of exposure.
    (1) BECDA (2) ECADB (3) BCDAE (4) ECDAB

52. A. This very insatiability of the photographing eye changes the terms of confinement in the cave, our world.
    B. Humankind lingers unregenerately in Plato's cave, still revelling its age-old habit, in mere images of truth.
    C. But being educated by photographs is not like being educated by older images drawn by hand; for one thing, there are a great many more images around, claiming our attention.
    D. The inventory started in 1839 and since then just about everything has been photographed, or so it seems.
    E. In teaching us a new visual code, photographs alter and enlarge our notions of what is worth looking at and what we have a right to observe.
    (1) EABCD (2) BDEAC (3) BCDAE (4) ECDAB

53. A. To be culturally literate is to possess the basic information needed to thrive in the modern world.
    B. Nor is it confined to one social class; quite the contrary.
    C. It is by no means confined to "culture" narrowly understood as an acquaintance with the arts.
    D. Cultural literacy constitutes the only sure avenue of opportunity for disadvantaged children, the only reliable way of combating the social determinism that now condemns them.
    E. The breadth of that information is great, extending over the major domains of human activity from sports to science.
    (1) AECBD (2) DECBA (3) ACBED (4) DBCAE

54. A. Both parties use capital and labour in the struggle to secure property rights.
B. The thief spends time and money in his attempt to steal (he buys wire cutters) and the legitimate property owner expends resources to prevent the theft (he buys locks)
C. A social cost of theft is that both the thief and the potential victim use resources to gain or maintain control over property.
D. These costs may escalate as a type of technological arms race unfolds.
E. A bank may purchase more and more complicated and sophisticated safes, forcing safecrackers to invest further in safecracking equipment.

(1) ABCDE (2) CABDE (3) ACBED (4) CBEDA

55. A. The likelihood of an accident is determined by how carefully the motorist drives and how carefully the pedestrian crosses the street.
B. An accident involving a motorist and a pedestrian is such a case.
C. Each must decide how much care to exercise without knowing how careful the other is.
D. The simplest strategic problem arises when two individuals interact with each other, and each must decide what to do without knowing what the other is doing.

(1) ABCD (2) ADCB (3) DBCA (4) DBAC

CAT 2000

SECTION II

Number of Questions : 55

DIRECTIONS : *Answer each of the questions independently.*

56. Let D be a recurring decimal of the form, D = 0. $a_1\ a_2\ a_1\ a_2\ a_1\ a_2$ ……., where digits a_1 and a_2 lie between 0 and 9. Further, at most one of them is zero. Then which of the following numbers necessarily produces an integer, when multiplied by D?

(1) 18 (2) 108 (3) 198 (4) 288

57.

x	1	2	3	4	5	6
y	4	8	14	22	32	44

In the above table, for suitably chosen constants a, b and c, which one of the following best describes the relation between y and x?

(1) y= a + bx (2) $y = a + bx + cx^2$ (3) $y = e^{a + bx}$ (4) None of the above

58. If $a_1 = 1$ and $a_{n+1} = 2a_n + 5$, n = 1 , 2 .. , then a_{100} is equal to

(1) $(5 \times 2^{99} - 6)$ (2) $(5 \times 2^{99} + 6)$ (3) $(6 \times 2^{99} + 5)$ (4) $(6 \times 2^{99} - 5)$

59. What is the value of the following expression?

$(1/(2^2 - 1)) + (1/(4^2 - 1)) + (1/(6^2 - 1)) + \ldots + (1/(20^2 - 1))$

(1) 9/19 (2) 10/19 (3) 10/21 (4) 11/21

60. A truck travelling at 70 kilometres per hour uses 30% more diesel to travel a certain distance than it does when it travels at the speed of 50 kilometres per hour. If the truck can travel 19.5 kilometres on a litre of diesel at 50 kilometres per hour, how far can the truck travel on 10 litres of diesel at a speed of 70 kilometres per hour?

(1) 130 (2) 140 (3) 150 (4) 175

61. Consider a sequence of seven consecutive integers. The average of the first five integers is n. The average of all the seven integers is

(1) n (2) n + 1
(3) K × n, where k is a function of n (4) n + (2/7)

62. If x > 2 and y > – 1, Then which of the following statements is necessarily true?

(1) xy > –2 (2) –x < 2y (3) xy < –2 (4) –x > 2y

63. One red flag, three white flags and two blue flags are arranged in a line such that,

(A) no two adjacent flags are of the same colour

(B) the flags at the two ends of the line are of different colours.

In how many different ways can the flags be arranged?

(1) 6 (2) 4 (3) 10 (4) 2

64. Let S be the set of integers x such that
(i) $100 \leq x \leq 200$ (ii) x is odd
(iii) x is divisible by 3 but not by 7
How many elements does S contain?
(1) 16 (2) 12 (3) 11 (4) 13

65. Let x, y and z be distinct integers, that are odd and positive. Which one of the following statements cannot be true?
(1) xyz^2 is odd (2) $(x - y)^2 z$ is even
(3) $(x + y - z)^2 (x + y)$ is even (4) $(x - y)(y + z)(x + y - z)$ is odd

66. Let S be the set of prime numbers greater than or equal to 2 and less than 100. Multiply all elements of S. With how many consecutive zeros will the product end?
(1) 1 (2) 4 (3) 5 (4) 10

67. What is the number of distinct triangles with integral valued sides and perimeter 14?
(1) 6 (2) 5 (3) 4 (4) 3

68. Let N = 1421 × 1423 × 1425. What is the remainder when N is divided by 12?
(1) 0 (2) 9 (3) 3 (4) 6

69. The integers 34041 and 32506 when divided by a three-digit integer n leave the same remainder. What is n?
(1) 289 (2) 367 (3) 453 (4) 307

70. Each of the numbers $x_1, x_2 \ldots, x_n$ $n \geq 4$, is equal to 1 or –1. Suppose,
$x_1x_2x_3x_4 + x_2x_3x_4x_5 + x_3x_4x_5x_6 + \ldots\ldots + x_{n-3}x_{n-2}x_{n-1}x_n + x_{n-2}x_{n-1}x_nx_1 + x_{n-1}x_nx_1x_2 + x_nx_1x_2x_3 = 0$, then,
(1) n is even (2) n is odd
(3) n is an odd multiple of 3 (4) n is prime

71. The table below shows the age-wise distribution of the population of Reposia. The number of people aged below 35 years is 400 million.

Age group	Percentages
Below 15 years	30.00
15 - 24	17.75
25 - 34	17.00
35 - 44	14.50
45 - 54	12.50
55 - 64	7.10
65 and above	1.15

If the ratio of females to males in the 'below 15 years' age group is 0.96, then what is the number of females (in millions) in that age group?
(1) 82.8 (2) 90.8 (3) 80.0 (4) 90.0

72. Sam has forgotten his friend's seven-digit telephone number. He remembers the following the first three digits are either 635 or 674, the number is odd, and the number nine appears once. If sam were to use a trial and error process to reach his friend, what is the minimum number of trials he has to make before he can be certain to succeed?
(1) 1000 (2) 2430 (3) 3402 (4) 3006

For Q.73 & Q.74 :

A, B, C are three numbers. Let
@ (A, B) = average of A and B,
/ (A, B) = product of A and B, and
X (A, B) = the result of dividing A by B

73. The sum of A and B is given by
(1) /(@(A, B), 2) (2) X(@(A, B), 2) (3) @(/(A, B), 2) (4) @ (X(A, B), 2)

74. Average of A, B and C is given by
(1) @(/@(/B, A), 2), C), 3)
(2) X(/@(/@(B, A), 3), C), 2)
(3) / ((X(@(B, A), 2), C), 3)
(4) / (X(@(/(@(B, A), 2), C), 3), 2)

For Q.75 & Q.76 :

For real numbers x, y, let
f(x, y) = Positive square-root of (x + y),
if $(x + y)^{0.5}$ is real = $(x + y)^2$, otherwise
g(x, y) = $(x + y)^2$,
if $(x + y)^{0.5}$ is real = –(x + y), otherwise

75. Which of the following expressions yields a positive value for every pair of non-zero real number (x, y)?
(1) f(x, y) – g(x, y) (2) f(x, y) – $(g(x, y))^2$
(3) g(x, y) – $(f(x, y))^2$ (4) f(x, y) + g(x, y)

76. Under which of the following conditions is f(x, y) necessarily greater than g(x, y)?
(1) Both x and y are less than –1 (2) Both x and y are positive
(3) Both x and y are negative (4) y > x

For Q.77 to Q.79 :

For three distinct real numbers x, y and z, let
f(x, y, z) = min (max (x, y), max (y, z), max (z, x))
g(x, y, z) = max (min (x, y), min (y, z), min (z, x))
h(x, y, z) = max (max (x, y), max (y, z), max (z, x))
j(x, y, z) = min (min (x, y), min (y, z), min (z, x))
m(x, y, z) = max (x, y, z)
n(x, y, z) = min (x, y, z)

77. Which of the following is necessarily greater than 1?
(1) (h(x, y, z) – f(x, y, z)) /j(x, y, z) (2) j(x, y, z) /h(x, y, z)
(3) f(x, y, z)/g(x, y, z) (4) f(x, y, z) + h(x, y, z)–g(x, y, z))/j(x, y, z)

78. Which of the following expressions is necessarily equal to 1?
(1) (f(x, y, z) –m(x, y, z))/(g(x, y, z)–h(x, y, z)) (2) (m(x, y, z) –f(x, y, z))/(g(x, y, z)–n(x, y, z))
(3) (j(x, y, z) –g(x, y, z))/h(x, y, z) (4) (f(x, y, z) –h(x, y, z))/f(x, y, z)

79. Which of the following expressions is indeterminate?
(1) (f(x, y, z) –h(x, y, z))/(g(x, y, z) –j(x, y, z))
(2) (f(x, y, z) +h(x, y, z) + g(x, y, z) +j(x, y, z))/j(x, y, z) + h(x, y, z) –m(x, y, z)–n(x, y, z))
(3) (g(x, y, z) –j(x, y, z))/(f(x, y, z) –h(x, y, z))
(4) (h(x, y, z) –f(x, y, z))/(n(x, y, z) –g(x, y, z))

For Q.80 & Q.81 :

There are five machines A, B C, D and E situated on a straight line at distances of 10 metres, 20 metres, 30 metres, 40 metres and 50 metres respectively from the origin of the line. A robot is stationed at the origin of the line. The robot serves the machines with raw material whenever a machine becomes idle. All the raw material is located at the origin. The robot is in an idle state at the origin at the beginning of a day. As soon as one or more machines become idle, they send messages to the robot-station and the robot starts and serves all the machines from which it received messages. If a message is received at the station while the robot is away from it, the robot takes notice of the message only when it returns to the station while moving, it serves the machines in the sequence in which they are encountered, and then returns to the origin. If any messages are pending at the station when it returns, it repeats the process again. Otherwise, it remains idle at the origin till the next message(s) is received.

80. Suppose on a certain day, machines A and D have sent the first two messages to the origin at the beginning of the first second, and C has sent a message at the beginning of the 5^{th} second and B at the beginning of the 6^{th} second, and E at the beginning of the 10^{th} second. How much distance in metres has the robot travelled since the beginning of the day, when it notices the message of E? Assume that the speed of movement of the robot is 10 metres per second.
(1) 140 (2) 80 (3) 340 (4) 360

81. Suppose there is a second station with raw material for the robot at the other extreme of the line which is 60 metres from the origin, that is, 10 metres from E. After finishing the services in a trip, the robot returns to the nearest station. If both stations are equidistant, it chooses the origin as the station to return to. Assuming that both stations receive the messages sent by the machines and that all the other data remains the same, what would be the answer to the above question?
(1) 120 (2) 140 (3) 340 (4) 70

For Q.82 to Q.84 :

Given below are three graphs made up of straight-line segments shown as thick lines. In each case choose the answer as

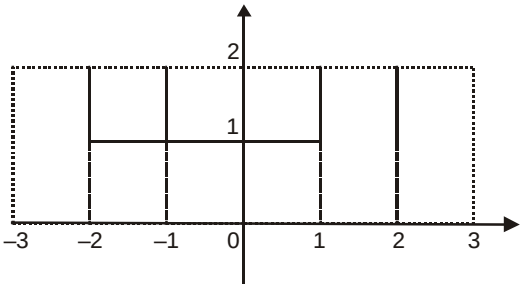
(1) if f(x) = 3 f(–x);

(2) if f(x) = –f(–x);

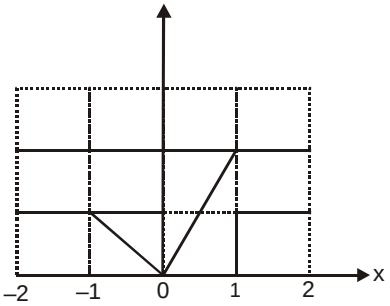
(3) if f(x) = f(–x); and

(4) if 3f(x) = 6 f(–x), for x ≥ 0.

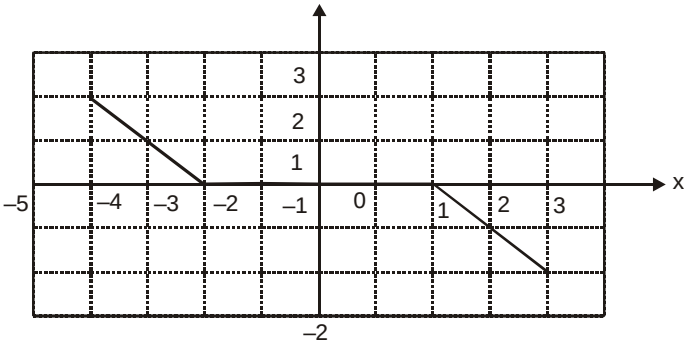
82. f(x)



83. f(x)



84. f(x)



For Q.85 & Q.86 :

There are three bottles of water, A, B, C, whose capacities are 5 litres, 3 litres, and 2 litres respectively. For transferring water from one bottle to another and to drain out the bottles, there exists a piping system. The flow thorough these pipes is computer controlled. The computer that controls the flow through these pipes can be fed with three types of instructions, as explained below

Instruction type	Explanation of the instruction
FILL (X, Y)	Fill bottle labelled X from the water in bottle labelled Y, where the remaining capacity of X is less than or equal to the amount of water in Y.
EMPTY (X, Y)	Empty out the water in bottle labelled X into bottle labelled Y, where the amount of water in X is less than or equal to remaining capacity of Y.
DRAIN (X)	Drain out all the water contained in bottle labelled X.

Initially, A is full with water, and B and C are empty.

85. After executing a sequence of three instructions, bottle A contains one litre of water. The first and the third of these instructions are shown below

First instruction FILL (C, A)

Third instruction FILL (C, A)

Then which of the following statements about the instructions is true?

(1) The second instruction is FILL (B, A)

(2) The second instruction is EMPTY (C, B)

(3) The second instruction transfers water from B to C

(4) The second instruction involves using the water in bottle A.

86. Consider the same sequence of three instructions and the same initial state mentioned above. Three more instructions are added at the end of the above sequence to have A contain 4 litres of water. In this total sequence of six instructions, the fourth one is DRAIN (A). This is the only DRAIN instruction in the entire sequence. At the end of the execution of the above sequence, how much water (in litres) is contained in C?

(1) One (2) Two (3) Zero (4) None of these

For Q.87 & Q.88 :

For a real number X, let

$f(x) = 1/(1 + x)$, if x is non-negative

$= 1 + x$, if x is negative

$f^n(x) = f(f^{n-1}(x))$, n = 2, 3, ...

87. What is the value of the product, $f(2)f^2(2)f^3(2)f^4(2)f^5(2)$?

(1) 1/3 (2) 3 (3) 1/18 (4) None of these

88. r is an integer ≥ 2. Then, what is the value of $f^{r-1}(-r) + f^r(-r) + f^{r+1}(-r)$?

(1) –1 (2) 0 (3) 1 (4) None of these

CAT 2000

For Q.89 to Q.93 :

Sixteen teams have been invited to participate in the ABC Gold Cup cricket tournament. The tournament is conducted in two stages. In the first stage, the teams are divided into two groups. Each group consists of eight teams, with each team playing every other team in its group exactly once. At the end of the first stage, the top four teams from each group advance to the second stage while the rest are eliminated. The second stage comprises of several rounds. A round involves one match for each team. The winner of a match in a round advances to the next round, while the loser is eliminated. The team that remains undefeated in the second stage is declared the winner and claims the Gold Cup.

The tournament rules are such that each match results in a winner and a loser with no possibility of a tie. In the first stage a team earns one point for each win and no points for a loss. At the end of the first stage teams in each group are ranked on the basis of total points to determine the qualifiers advancing to the next stage. Ties are resolved by a series of complex tie-breaking rules so that exactly four teams from each group advance to the next stage.

89. What is the total number of matches played in the tournament?
(1) 28 (2) 55 (3) 63 (4) 35

90. The minimum number of wins needed for a team in the first stage to guarantee its advancement to the next stage is
(1) 5 (2) 6 (3) 7 (4) 4

91. What is the highest number of wins for a team in the first stage in spite of which it would be eliminated at the end of first stage?
(1) 1 (2) 2 (3) 3 (4) 4

92. What is the number of rounds in the second stage of the tournament?
(1) 1 (2) 2 (3) 3 (4) 4

93. Which of the following statements is true?
(1) The winner will have more wins than any other team in the tournament.
(2) At the end of the first stage, no team eliminated from the tournament will have more wins than any of the teams qualifying for the second stage.
(3) It is the possible that the winner will have the same number of wins in the entire tournament as a team eliminated at the end of the first stage.
(4) The number of teams with exactly one win in the second stage of the tournament is 4.

DIRECTIONS : *Answer each of the questions independently.*

94. Let $N = 55^3 + 17^3 - 72^3$. N is divisible by
(1) both 7 and 13 (2) both 3 and 13 (3) both 17 and 7 (4) both 3 and 17

95. If $x^2 + y^2 = 0.1$ and $|x - y| = 0.2$, then $|x| + |y|$ is equal to
(1) 0.3 (2) 0.4 (3) 0.2 (4) 0.6

96. ABCD is a rhombus with the diagonals AC and BD intersecting at the origin on the x-y plane. The equation of the straight line AD is x + y = 1. What is the equation of BC?
(1) x + y = –1 (2) x – y = –1 (3) x + y = 1 (4) None of the above

97. Consider a circle with unit radius. There are 7 adjacent sectors, S1, S2, S3,...., S7 in the circle such that their total area is $(1/8)^{th}$ of the area of the circle. Further, the area of the j^{th} sector is twice that of the $(j-1)^{th}$ sector, for j = 2, ..., 7. What the angle, in radians, subtended by the arc of S1 at the centre of the circle?
(1) $\pi/508$ (2) $\pi/2040$ (3) $\pi/1016$ (4) $\pi/1524$

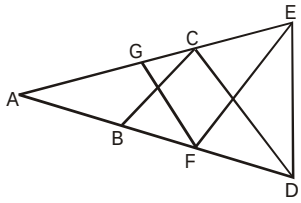
98. There is a vertical stack of books marked 1, 2, and 3 on Table-A, with 1 at the bottom and 3 on top. These are to be placed vertically on Table-B with 1 at the bottom and 2 on the top, by making a series of moves from one table to the other. During a move, the topmost book, or the topmost two books, or all the three, can be moved from one of the tables to the other. If there are any books on the other table, the stack being transferred should be placed on top of the existing books, without changing the order of books in the stack that is being moved in that move. If there are no books on the other table, the stack is simply placed on the other table without disturbing the order of books in it. What is the minimum number of moves in which the above task can be accomplished?
(1) one (2) Two (3) Three (4) Four

99. The area bounded by the three curves |x + y | = 1, | x | = 1, and | y | = 1, is equal to
(1) 4 (2) 3 (3) 2 (4) 1

100. If the equation $x^3 - ax^2 + bx - a = 0$ has three real roots, that it must be the case that,
(1) b = 1 (2) $b \neq 1$ (3) a = 1 (4) $a \neq 1$

101. If a, b, c are the sides of a triangle, and $a^2 + b^2 + c^2 = bc + ca + ab$, then the triangle is
(1) equilateral (2) isosceles (3) right angled (4) obtuse angled

102.



In the figure above, AB = BC = CD = DE = EF = FG = GA. Then ∠DAE is approximately
(1) 15° (2) 20° (3) 30° (4) 25°

103. A shipping clerk has five boxes of different but unknown weights each weighing less than 100 kgs. The clerk weighs the boxes in pairs. The weights obtained are 110, 112, 113, 114, 115, 116, 117, 118, 120 and 121 kgs. What is the weight, in kgs, of the heaviest box?
(1) 60 (2) 62 (3) 64 (4) Cannot be determined

CAT 2000

104. There are three cities A, B and C, each of these cities is connected with the other two cities by at least one direct road. If a traveller wants to go from one city (origin) to another city (destination), she can do so either by traversing a road connecting the two cities directly, or by traversing two roads, the first connecting the origin to the third city and the second connecting the third city to the destination. In all there are 33 routes from A to B (including those via C). Similarly there are 23 routes from B to C (including those via A). How many roads are there from A to C directly?

(1) 6 (2) 3 (3) 5 (4) 10

105. The set of all positive integers is the union of two disjoint subsets
{f(1), f(2) ....f(n),.....} and {g(1), g(2),.....,g(n),.....}, where
f (1) < f(2) <...<f(n) ....., and g(1) < g(2) <...< g(n) ....., and
g(n) = f(f(n)) +1 for all n $\geq$ 1.
What is the value of g (1)?

(1) Zero (2) Two (3) One (4) Cannot be determined

106. ABCDEFGH is a regular octagon. A and E are opposite vertices of the octagon. A frog starts jumping from vertex to vertex, beginning from A. From any vertex of the octagon except E, it may jump to either of the two adjacent vertices. When it reaches E, the frog stops and stays there. Let a_n be the number of distinct paths of exactly n jumps ending in E. Then what is the value of a_{2n-1}?

(1) Zero (2) Four (3) 2n – 1 (4) Cannot be determined

107. For all non-negative integers x and y, f(x, y) is defined as below
f(0, y) = y + 1
f(x + 1, 0) = f(x, 1)
f(x + 1,y + 1) = f(x, f(x + 1, y))
Then, what is the value of f(1, 2)?

(1) Two (2) Four (3) Three (4) Cannot be determined

108. Convert the number 1982 from base 10 to base 12. The result is

(1) 1182 (2) 1912 (3) 1192 (4) 1292

109 Two full tanks, one shaped like a cylinder and the other like a cone, contain jet fuel. The cylindrical tank holds 500 litres more than the conical tank. After 200 litres of fuel has been pumped out from each tank the cylindrical tank contains twice the amount of fuel in the conical tank. How many litres of fuel did the cylindrical tank have when it was full?

(1) 700 (2) 1000 (3) 1100 (4) 1200

110 A farmer has decided to build a wire fence along one straight side of his property. For this, he planned to place several fence-posts at six metre intervals, with posts fixed at both ends of the side. After he bought the posts and wire, he found that the number of posts he had bought was five less than required. However, he discovered that the number of posts he had bought would be just sufficient if he spaced them eight metres apart. What is the length of the side of his property and how many posts did he buy?

(1) 100 metres, 15 (2) 100 metres, 16 (3) 120 metres, 15 (4) 120 metres, 16

SECTION III

Number of Questions : 55

DIRECTIONS : *There are ten short passages given below. Read each of the passage and answer the question that follows it.*

111. In a recent report, the gross enrolment ratios at the primary level, that is, the number of children enrolled in classes one to five as a proportion of all children aged 6 to 10, were shown to be very high for most states; in many cases they were way above 100 percent! These figures are not worth anything, since they are based on the official enrolment data compiled from school records. They might as well stand for 'gross exaggeration ratios'.

Which one of the following options best supports the claim that the ratios are exaggerated?

(1) The definition of gross enrolment ratio does not exclude, in its numerator, children below 6 years or above 10 years enrolled in classes one to five.

(2) A school attendance study found that many children enrolled in the school records were not meeting a minimum attendance requirement of 80 percent.

(3) A study estimated that close to 22 percent of children enrolled in the class one records were below 6 years of age and still to start going to school.

(4) Demographic surveys show shifts in the population profile which indicate that the number of children in the age group 6 to 10 years is declining.

112. Szymanski suggests that the problem of racism in football may be present even today. He begins by verifying an earlier hypothesis that clubs' wage bills explain 90% of their performance. Thus, if players' salaries were to be only based on their abilities, clubs that spend more should finish higher. If there is pay discrimination against some group of players-fewer teams bidding for black players thus lowering the salaries for blacks with the same ability as whites-that neat relation may no longer hold. He concludes that certain clubs seem to have achieved much less than what they could have, by not recruiting black players.

Which one of the following findings would best support Szymanski's conclusion?

(1) Certain clubs took advantage of the situation by hiring above-average shares of black players.

(2) Clubs hired white players at relatively high wages and did not show proportionately good performance.

(3) During the study period, clubs in towns with a history of discrimination against blacks, under-performed relative to their wage bills.

(4) Clubs in one region, which had higher proportions of black players, had significantly lower wage bills than their counterparts in another region which had predominantly white players.

113. The pressure on Italy's 257 jails has been increasing rapidly. These jails are old and overcrowded. They are supposed to hold up to 43,000 people-9,000 fewer than now. San Vittore in Milan, which has 1,800 inmates, is designed for 800. The number of foreigners inside jails has also been increasing. The minister in charge of prisons fears that tensions may snap, and so has recommended to the government an amnesty policy.

Which one of the following, if true, would have most influenced the recommendation of the minister?

(1) Opinion polls have indicated that many Italians favour a general pardon.

(2) The opposition may be persuaded to help since amnesties must be approved by a two third majority in the parliament.

(3) During a recent visit to a large prison, the pope, whose pronouncements are taken seriously, appeared for 'a gesture of clemency'.

(4) Shortly before the recommendation was made, 58 prisons reported disturbances in a period of two weeks.

114. The offer of the government to make iodised salt available at a low price of one rupee per kilo is welcome, especially since the government seems to be so concerned about the ill effects of non-iodised salt. But it is doubtful whether the offer will actually be implemented. Way back in 1994, the government, in an earlier effort, had prepared reports outlining three new and simple but experimental methods for reducing the costs of iodisation to about five paise per kilo. But these reports have remained just those-reports on paper.

Which one of the following, if true, most weakens the author's contention that it is doubtful whether the offer will be actually implemented?

(1) The government proposes to save on costs by using the three methods it has already devised for iodisation.

(2) The chain of fair-price distribution outlets now covers all the districts of the state.

(3) Many small-scale and joint-sector units have completed trials to use the three iodisation methods for regular production.

(4) The government which initiated the earlier effort is in place even today and has more information on the effects of non-iodised salt.

115. About 96% of Scandinavian moths have ears tuned to the ultrasonic pulses that bats, their predators, emit. But the remaining 4% do not have ears and are deaf. However, they have a larger wingspan than the hearing moths, and also have higher wing-loadings-the ratio between a wing's area and its weight-meaning higher maneuverability.

Which one of the following can be best inferred from the above passage?

(1) A higher proportion of deaf moths than hearing moths fall prey to bats.

(2) Deaf moths may try to avoid bats by frequent changes in their flight direction.

(3) Deaf moths are faster than hearing moths, and so are less prone to becoming a bat's dinner than hearing moths.

(4) The large wingspan enables deaf moths to better receive and sense the pulses of their bat predators.

116. Argentina's beef cattle herd has dropped to under 50 million from 57 million ten years ago in 1990. The animals are worth less, too: prices fell by over a third last year, before recovering slightly. Most local meat packers and processors are in financial trouble, and recent years have seen a string of plant closures. The Beef Producers' Association has now come up with a massive advertisement campaign calling upon Argentines to eat more beef -their "juicy, healthy, rotund, plate-filling" steaks.

Which one of the following, if true, would contribute most to a failure of the campaign?

(1) There has been a change in consumer preference towards eating leaner meats like chicken and fish.

(2) Prices of imported beef have been increasing, thus making locally grown beef more competitive in terms of pricing.

(3) The inability to cross breed native cattle with improved varieties has not increased, production to adequate levels.

(4) Animal rights pressure groups have come up rapidly, demanding better and humane treatment of farmyard animals like beef cattle.

117. The problem of traffic congestion in Athens has been testing the ingenuity of politicians and town planners for years. But the measures adopted to date have not succeeded in decreasing the number of cars on the road in the city centre. In 1980, an odds and evens number-plate legislation was introduced, under which odd and even plates were banned in the city centre on alternate days, thereby expecting to halve the number of cars in the city centre. Then in 1993 it was decreed that all cars in use in the city centre must be fitted with catalytic converters; a regulation had just then been introduced, substantially reducing import taxes on cars with catalytic converters, the only condition being that the buyer of such a 'clean' car offered for destruction a car at least 15 years old.

Which one of the following options, if true, would best support the claim that the measures adopted to date have not succeeded?

(1) In the 1980s, many families purchased second cars with the requisite odd or even number plate.

(2) In the mid-1990s, many families found it feasible to become first-time car owners by buying a car more than 15 years old and turning it in for a new car with catalytic converters.

(3) Post-1993, many families seized the opportunity to sell their more than 15 year-old cars and buy 'clean' cars from the open market, even if it meant forgoing the import tax subsidy.

(4) All of the above.

118. Although in the limited sense of freedom regarding appointments and internal working, the independence of the Central Bank is unequivocally ensured, the same cannot be said of its right to pursue monetary policy without coordination with the central government. The role of the Central Bank has turned out to be subordinate and advisory in nature.

Which one of the following best supports the conclusion drawn in the passage?,

(1) A decision of the chairman of the Central Bank to increase the bank rate by two percentage points sent shock-waves in industry, academic and government circles alike.

(2) Government has repeatedly resorted to monetisation of the debt despite the reservation of the Central Bank.

(3) The Central Bank does not need the central government's nod for replacing soiled currency notes.

(4) The inability to remove coin shortage was a major shortcoming of this government.

119. The Shveta-chattra the "White Umbrella" was a symbol of sovereign political authority placed over the monarch's head at the time of the coronation. The ruler so inaugurated was regarded not as a temporal autocrat but as the instrument of protective and sheltering firmament of supreme law. The white umbrella symbol is of great antiquity and its varied use illustrates the ultimate common basis of non-theocratic nature of states in the Indian tradition. As such, the umbrella is found, although not necessarily a white one, over the head of Lord Ram, the Mohammedan sultans and Chatrapati Shivaji.

Which one of the following best summarises the above passage?

(1) The placing of an umbrella over the ruler's head was a common practice in the Indian: subcontinent.

(2) The white umbrella represented the instrument of firmament of the supreme law and the non-theocratic nature of Indian states.

(3) The umbrella, not necessarily a white one; was a symbol of sovereign political authority.

(4) The varied use of the umbrella symbolised the common basis of the non-theocratic nature of states in the Indian tradition.

120. The theory of games is suggested to some extent by parlour games such as chess and bridge. Friedman illustrates two distinct features of these games. First, in a parlour game played for money, if one wins the other (others) loses (lose). Second, these games are games involving a strategy. In a game of chess, while choosing what action is to be taken, a player tries to guess how his /her opponent will react to the various actions he or she might take. In contrast, the card-pastime, 'patience' or 'solitaire' is played only against chance.

Which one of the following can best be described as a "game?"

(1) The team of Tenzing Norgay and Edmund Hillary climbing Mt. Everest for the first time in human history.

(2) A national level essay writing competition.

(3) A decisive war between the armed forces of India and Pakistan over Kashmir.

(4) Oil Exporters' Union deciding on world oil prices, completely disregarding the countries which have at most minimal oil production.

DIRECTIONS : *Read each of the five problems given below and choose the best answer from among the four given choices.*

121. Persons X, Y, Z and Q live in red, green, yellow or blue coloured houses placed in a sequence on a street. Z lives in a yellow house. The green house is adjacent to the blue house. X does not live adjacent to Z. The yellow house is in between the green and red houses. The colour of the house X lives in is

(1) blue (2) green

(3) red (4) not possible to determine .

122. My bag can carry no more than ten books. I must carry at least one book each of management, mathematics, physics and fiction. Also, for every management book I carry I must carry two or more fiction books, and for every mathematics book I carry I must carry two or more physics books. I earn 4, 3, 2 and 1 points for each management, mathematics, physics and fiction book, respectively, I carry in my bag. I want to maximise the points I can earn by carrying the most appropriate combination of books in my bag. The maximum points that I can earn are

(1) 20 (2) 21 (3) 22 (4) 23

123. Five persons with names P, M, U, T and X live separately in anyone of the following a palace, a hut, a fort, a house or a hotel. Each one likes two different colours from among the following blue, black, red, yellow and green. U likes red and blue. T likes black. The person living in a palace does not like black or blue. P likes blue and red. M likes yellow. X lives in a hotel. M lives in a

(1) hut (2) palace (3) fort (4) house

124. There are ten animals-two each of lion, panther, bison, bear, and deer-in a zoo. The enclosures in the zoo are named X, Y, Z, P and Q and each enclosure is allotted to one of the following attendants Jack, Mohan, Shalini, Suman and Rita. Two animals of different species are housed in each enclosure. A lion and a deer cannot be together. A panther cannot be with either a deer or a bison. Suman attends to animals from among bison, deer, bear and panther only. Mohan attends to a lion and a panther. Jack does not attend to deer, lion or bison. X, Y and Z are allotted to Mohan, Jack and Rita respectively. X and Q enclosures have one animal of the same species. Z and P have the same pair of animals. The animals attended by Shalini are

(1) bear & bison (2) bison & deer (3) bear & lion (4) bear & panther

125. Eighty kilograms (kg) of store material is to be transported to a location 10 km away. Any number of couriers can be used to transport the material can be packed in any number of units of 10, 20 or 40 kg. Courier charges are Rs. 10 per hour. Couriers travel at the speed of 10 km/hr if they are not carrying any load, at 5 km/hr if carrying 10 kg, at 2 km/hr if carrying 20 kg and at 1 km/hr if carrying 40 kg. A courier cannot carry more than 40 kg of load. The minimum cost at which 80 kg of store material can be transported will be

(1) Rs. 180 (2) Rs. 160 (3) Rs. 140 (4) Rs. 120

CAT 2000

DIRECTIONS : *Answer these questions with reference to the table given below.*

Information Technology Industry in India (Figure are in million US dollars)

	1994-95	1995-96	1996-97	1997-98	1998-99
Software :					
Domestic	350	490	670	950	1250
Exports	485	734	1083	1750	2650
Hardware :					
Domestic	590	1037	1050	1205	1026
Exports	177	35	286	201	4
Peripherals :					
Domestic	148	196	181	229	329
Exports	6	6	14	19	18
Training	107	143	185	263	302
Maintenance	142	172	182	221	236
Networking & others	36	73	156	193	237
Total	2041	2886	3807	5031	6052

126. The total annual exports lay between 35 and 40 percent of the total annual business of the IT industry, in years
(1) 1997-98 & 1994-95 (2) 1996-97 & 1997-98
(3) 1996-97 & 1998-99 (4) 1996-97 & 1994-95

127. The highest percentage growth in the total IT business, relative to the previous year was achieved in
(1) 1995-96 (2) 1996-97 (3) 1997-98 (4) 1998-99

128. Which one of the following statements is correct?
(1) The annual software exports steadily increased but annual hardware exports steadily declined during 1994-1999.
(2) The annual peripheral exports steadily increased during 1994-1999.
(3) The total IT business in training during 1994-1999 was higher than the total IT business in maintenance during the same period.
(4) None of the above statements is true.

DIRECTIONS : *For any activity, A, year X dominates year Y if IT business in activity A, in the year X, is greater than the IT business, in activity A, in the year Y. For any two IT business activities, A & B, year X dominates year Y if*

i. the IT business in activity A, in the year X, is greater than or equal to the IT business, in activity A in the year Y,
ii. the IT business in activity B, in the year X, is greater than or equal to the IT business in activity B in the year Y and
iii. there should be strict inequality in the case of at least one activity.

129. For the IT hardware business activity, which one of the following is not true?
(1) 1997-98 dominates 1996-97 (2) 1997-98 dominates 1995-96
(3) 1995-96 dominates 1998-99 (4) 1998-99 dominates 1996-97

130. For the two IT business activities, hardware and peripherals, which one of the following is true?
(1) 1996-97 dominates 1995-96 (2) 1998-99 dominates 1995-96
(3) 1997-98 dominates 1998-99 (4) None of these

DIRECTIONS : *Each question is followed by two statements A and B. Answer each question using the following instructions.*

Choose 1; if the question can be answered by using one of the statements alone, but cannot be answered using the other statement alone.

Choose 2; if the question can be answered by using either statement alone.

Choose 3; if the question can be answered by using both statements together, but cannot be answered using either statement alone.

Choose 4; if the question cannot be answered even by using both statements together.

131. Consider three real numbers, X, Y and Z. Is Z the smallest of these numbers?
   (A) X is greater than at least one of Y and Z.
   (B) Y is greater than at least one of X and Z.

132. Let X be a real number. Is the modulus of X necessarily less than 3?
   (A) $X(X + 3) < 0$ (B) $X(X - 3) > 0$

133. How many people are watching TV programme P?
   (A) Number of people watching TV programme Q is 1000 and number of people watching both the programmes, P and Q, is 100.
   (B) Number of people watching either P or Q or both is 1500.

134. Triangle PQR has angle PRQ equal to 90 degrees. What is the value of PR + RQ?
   (A) Diameter of the inscribed circle of the triangle PQR is equal to 10 cm.
   (B) Diameter of the circumscribed circle of the triangle PQR is equal to 18 cm.

135. Harshad bought shares of a company on a certain day, and sold them the next day. While buying and selling he had to pay to the broker one percent of the transaction value of the shares as brokerage. What was the profit earned by him per rupee spent on buying the shares?
   (A) The sales price per share was 1.05 times that of its purchase price.
   (B) The number of shares purchased was 100.

136. For any two real numbers

   $a \oplus b = 1$ if both a and b are positive or both a and b are negative.

   $= -1$ if one of the two numbers a and b is positive and the other negative.

   What is (2 0) (– 5 – 6)?

   (A) a b is zero if a is zero (B) a b = b a

137. There are two straight lines in the x-y plane with equations $ax + by = c$, $dx + ey = f$. Do the two straight lines intersect?
   (A) a, b, c, d, e and f are distinct real numbers (B) c and f are non-zero.

138. O is the centre of two concentric circles. ae is a chord of the outer circle and it intersects the inner circle at point; b and d. c is a point on the chord in between b and d. What is the value of ac/ce?
   (A) bc/cd = 1
   (B) A third circle intersects the inner circle at b and d and the point c is on the line joining the centres of the third circle and the inner circle.

139. Ghosh Babu has decided to take a non-stop flight from Mumbai to No-man's-land in South America. He is scheduled to leave Mumbai at 5 am, Indian Standard Time on December 10, 2000. What is the local time at No-man's-land when he reaches there?
   (A) The average speed of the plane is 700 kilometres per hour.
   (B) The flight distance is 10,500 kilometres.

140. What are the ages of two individuals, X and Y?
   (A) The age difference between them is 6 years. (B) The product of their ages is divisible by 6.

CAT 2000

DIRECTIONS : *Answer these questions based on the data provided in the table below*

Factory Sector by Type of Ownership.

All figures in the table are in percent of the total for the corresponding column

Sector	Factories	Employment	Fixed Capital	Gross Output	Value Added
Public	7.0	27.7	43.2	25.8	30.8
Central Govt.	1.0	10.5	17.5	12.7	14.1
State/local Govt.	5.2	16.2	24.3	11.6	14.9
Central & State/local Govt.	0.8	1.0	1.4	1.5	1.8
Joint	1.8	5.1	6.8	8.4	8.1
Wholly private	90.3	64.6	46.8	63.8	58.7
Others	0.9	2.6	3.2	2.0	2.4
Total	100.0	100.0	100.0	100.0	100.0

141. Suppose the average employment level is 60 per factory. The average employment in "wholly private" factories is approximately
(1) 43 (2) 47 (3) 50 (4) 54

142. Among the firms in different sectors, value added per employee is highest in
(1) Central government (2) Central and State/local governments
(3) Joint sector (4) Wholly private

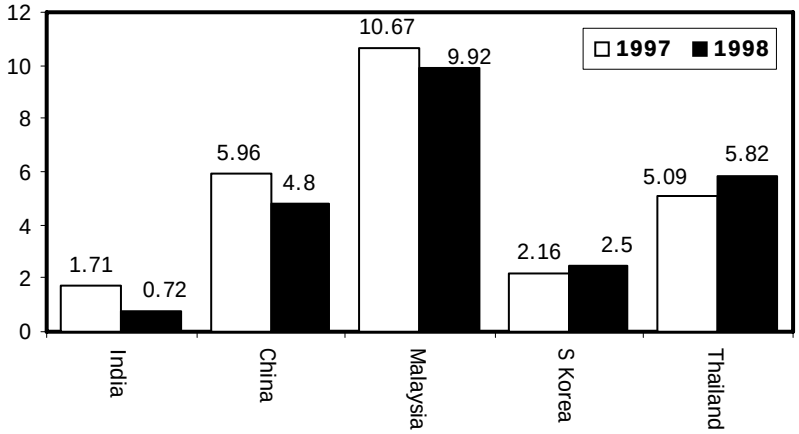
143. Capital productivity is defined as the gross output value per rupee of fixed capital. The three sectors with the higher capital productivity, arranged in descending order are
(1) Joint, wholly private, central and state/local (2) Wholly private, joint, central and state/local
(3) Wholly private, central and state/local, joint (4) Joint, wholly private, central

144. A sector is considered "pareto efficient" if its value added per employee and its value added per rupee of fixed capital is higher than those of all other sectors. Based on the table data, the pareto efficient sector is
(1) Wholly private (2) Joint
(3) Central and state/local (4) Others

145. The total value added in all sectors is estimated at Rs. 140,000 crores. Suppose that the number of firms in the joint sector is 2700. The average value added per factory, in Rs. crores, in the central government is
(1) 141 (2) 14.1 (3) 131 (4) 13.1

DIRECTIONS : *Answer these questions based on the data provided in the figure below.*

FEI for a country in a year, is the ratio (expressed as a percentage) of its foreign equity inflows to its GDP. The following figure displays the FEIs for select Asian countries for the years 1997 and 1998.



146. The country with the largest change in FEI in 1998 relative to its FEI in 1997, is
(1) India (2) China (3) Malaysia (4) Thailand

147. Based on the data provided, it can be concluded that
(1) absolute value of foreign equity inflows in 1998 was higher than that in 1997 for both Thailand and South Korea.
(2) absolute value of foreign equity inflows was higher in 1998 for Thailand and lower for Chaina than the corresponding values in 1997.
(3) absolute value of foreign equity inflows was lower in 1998 for both India and China than the corresponding value in 1997.
(4) none of the above can be inferred.

148. It is known that China's GDP in 1998 was 7% higher than its value in 1997, while India's GDP grew by 2% during the same period. The GDP of South Korea, on the other hand, fell by 5%. Which of the following statements is/are true?
I. Foreign equity inflows to China were higher in 1998 than in 1997.
II. Foreign equity inflows to China were lower in 1998 than in 1997.
III. Foreign equity inflows to India were higher in 1998 than in 1997.
IV. Foreign equity inflows to South Korea decreased in 1998 relative to 1997.
V. Foreign equity inflows to South Korea increased in 1998 relative to 1997.
(1) I, III & IV (2) II, III & IV (3) I, III & V (4) II & V

149. China's foreign equity inflows in 1998 were 10 times that into India. It can be concluded that
(1) China's GDP in 1998 was 40% higher than that of India.
(2) China's GDP in 1998 was 70% higher than that of India.
(3) China's GDP in 1998 was 50% higher than that of India.
(4) No inference can be drawn about relative magnitudes of China's and India's GDPs.

CAT 2000

DIRECTIONS : *Answer these questions based on the table below.*

The table shows trends in external transactions of Indian corporate sector during the period 1993-94 to 1997-98. In addition, following definitions hold good.

$Sales_i$, $Imports_i$, and $Exports_i$ respectively denote the sales, imports and exports in year i.

Deficit in year i, $Deficit_i = Imports_i - Exports_i$.

Deficit Intensity in year i, $DI_i = Deficit_i / Sales_i$.

Growth rate of deficit intensity in year i, $GDI_i = (DI_i - DI_{i-1})/DI_{i-1}$.

Further, note that all imports are classified as either raw material or capital goods.

Trends in External Transactions of Indian Corporate Sector
(All figures in %)

Year	1997-98	1996-97	1995-96	1994-95	1993-94
Export Intensity*	9.2	8.2	7.9	7.5	7.3
Import Intensity*	14.2	16.2	15.5	13.8	12.4
Imported raw material/ total cost of raw material	20.2	19.2	17.6	16.3	16
Imported capital goods/ Gross fixed assets	17.6	9.8	11.8	16.3	19.5

* Ratio of Exports (or Imports) to sales.

150. The highest growth rate in deficit intensity was recorded in

(1) 1994-95 (2) 1995-96 (3) 1996-97 (4) 1997-98

151. The value of the highest growth rate in deficit intensity is approximately

(1) 8.45% (2) 2.15% (3) 33.3% (4) 23.5%

152. In 1997-98 the total cost of raw materials is estimated as 50% of sales of that year. The turn over of Gross fixed assets, defined as the ratio of sales to Gross fixed assets, in 1997-98 is, approximately

(1) 3.3 (2) 4.3

(3) 0.33 (4) not possible to determine

153. Which of the following statements can be inferred to be true from the given data?

(1) During the 5 year period between 1993-94 and 1997-98, exports have increased every year.

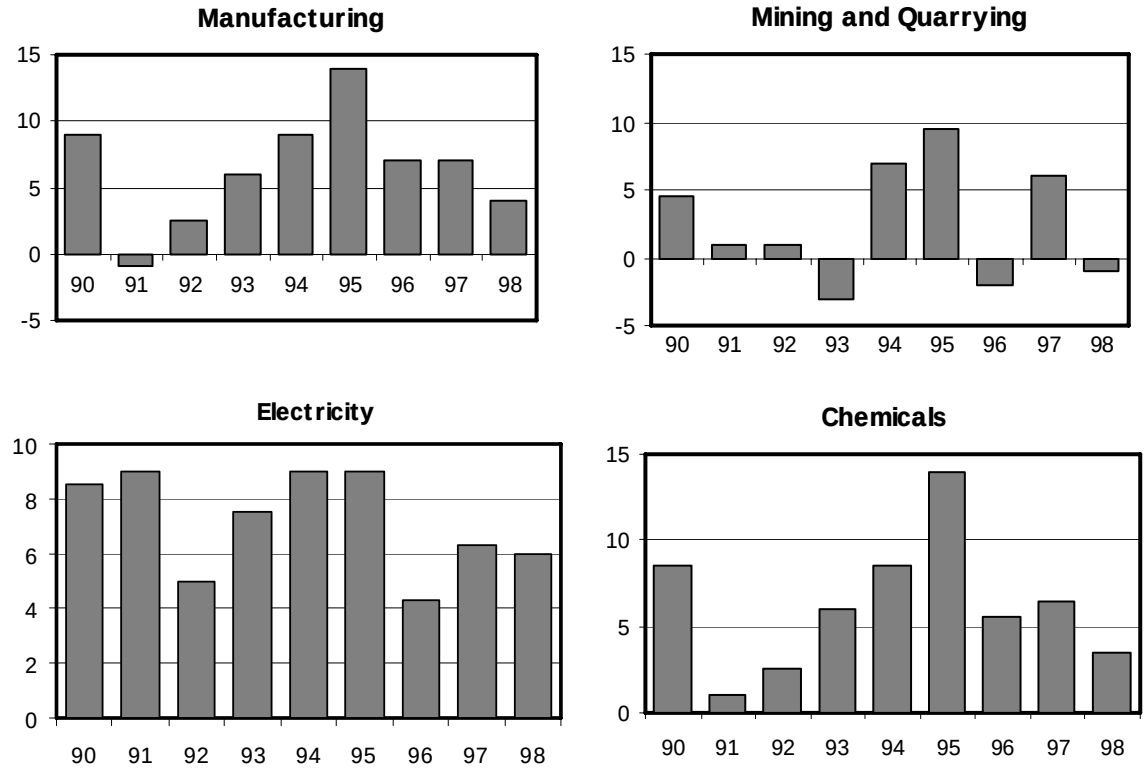
(2) During the 5 year period between 1993-94 and 1997-98, imports have decreased every year.

(3) Deficit in 1997-98 was lower than that in 1993-94.

(4) Deficit intensity has increased every year between 1993-94 and 1996-97.

DIRECTIONS : *Answer these questions based on the data given below.*

The figures below present annual growth rate, expressed as the % change relative to the previous year, in four sectors of the economy of the Republic of Reposia during the 9 year period from 1990 to 1998. Assume that the index of production for each of the four sectors is set at 100 in 1989. Further, the four sectors manufacturing, mining and quarrying, electricity, and chemicals, respectively, constituted 20%. 15%. 10% and 15% of total industrial production in 1989.



154. Which is the sector with the highest growth during the period 1989 and 1998?
(1) Manufacturing (2) Mining and quarrying
(3) Electricity (4) Chemicals

155. The overall growth rate in 1991 of the four sectors together is approximately
(1) 10% (2) 1% (3) 2.5% (4) 1.5%

156. When was the highest level of production in the manufacturing sector achieved during the nine-year period 1990-1998?
(1) 1998 (2) 1995
(3) 1990 (4) Cannot be determined

157. When was the lowest level of production of the mining and quarrying sector achieved during the nine year period 1990-1998?
(1) 1996 (2) 1993
(3) 1990 (4) Cannot be determined

158. The percentage increase of production in the four sectors, namely, manufacturing, mining & quarrying, electricity and chemicals, taken together, in 1994, relative to 1989, is approximately
(1) 25 (2) 20 (3) 50 (4) 40

159. It is known that the index of total industrial production in 1994 was 50 percent more that in 1989. Then, the percentage increase in production between 1989 and 1994 in sectors other than the four listed above is
(1) 57.5 (2) 87.5 (3) 127.5 (4) 47.5

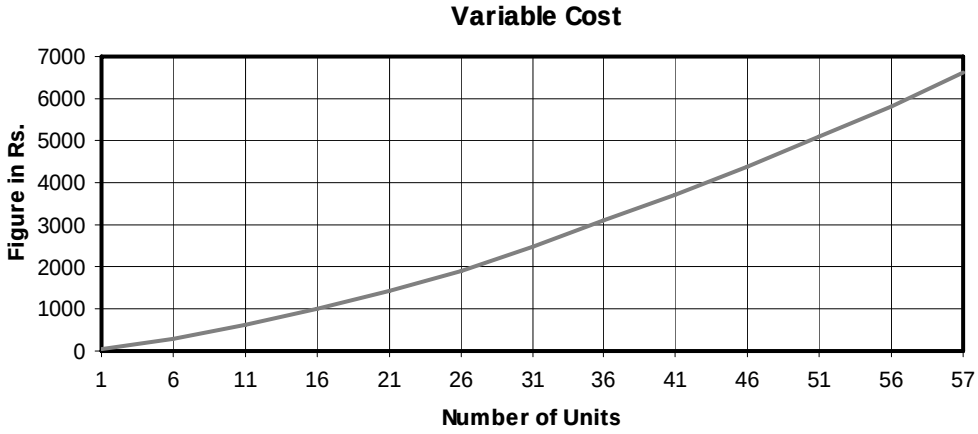
CAT 2000

DIRECTIONS : *Answer these questions based on the following information.*

ABC Ltd. produces widgets for which the demand is unlimited and they can sell all of their production. The graph below describes the monthly variable costs incurred by the company as a function of the quantity produced. In addition, operating the plant for one shift results in a fixed monthly cost of Rs. 800. Fixed monthly costs for second shift operation are estimated at Rs. 1200. Each shift operation provides capacity for producing 30 widgets per month.

Note : Average unit cost, AC = Total monthly costs / monthly production, and

Marginal cost, MC is the rate of change in total cost for unit change in quantity produced.



160. Total production in July is 40 units. What is the approximate average unit cost for July?
(1) 3600 (2) 90 (3) 140 (4) 115

161. ABC Ltd. is considering increasing the production level. What is the approximate marginal cost of increasing production from its July level of 40 units?
(1) 110 (2) 130 (3) 240 (4) 160

162. From the data provided it can be inferred that, for production levels in the range of 0 to 60 units.
(1) MC is an increasing function of production quantity.
(2) MC is a decreasing function of production quantity.
(3) initially MC is a decreasing function of production quantity, attains a minimum and then it is an increasing function of production quantity.
(4) None of the above.

163. Suppose that each widget sells for Rs 150. What is the profit earned by ABC Ltd. in July? (Profit is defined as the excess of sales revenue over total cost.)
(1) 2400 (2) 1600 (3) 400 (4) 0

164. Assume that the unit price is Rs. 150 and profit is defined as the excess of sales revenue over total costs. What is the monthly production level of ABC Ltd. at which the profit is highest?
(1) 30 (2) 50 (3) 60 (4) 40

165. For monthly production level in the range of 0 to 30 units
(1) AC is always higher than MC.
(2) AC is always lower than MC.
(3) AC is lower than MC up to a certain level and then is higher than MC.
(4) None of the above is true.

SOLUTIONS

CAT-2000

DETAILED SOLUTIONS

1. The first two paragraphs of the passage mention about the debates on Intellectual Property Rights and the issues raised in context of the debate. Options (1) and (3) are mentioned in the first paragraph whereas option (4) is mentioned in the first line of the second paragraph. Option (2) i.e. strategy and policies for establishing an IPR regime specifically for Indian agriculture, does not find a mention and is the answer. **Ans.(2)**

2. First few lines of the fifth paragraph mention about the discovery of the structure and functioning of DNA. First two sentences clearly indicate that the decipherment of the structure and functioning of DNA forms the basis of much of the modern biotechnology and is freely accessible by all free of any change. Option (1) highlights the same point and is the correct answer. **Ans.(1)**

3. The passage talks about the roles of the public and private sector in the national research system, it mentions that both these sectors are complementary to each other. Private sector uses some of the inventions and researches done by the public sector earlier, it also uses the publicly funded gene banks and the new varieties bred by public sector for developing their own varieties and various research works. Moreover in the sphere of biotechnology and agriculture, MNCs and pharmaceutical companies have a great potential and have played a leading role in bringing innovations in agricultural technology. Both these sectors depend upon each other, this is highlighted in options (3) and is the correct answer. **Ans.(3)**

4. The second paragraph mentions about the debate on TRIPS and the role of public and private sector in the innovations of new technologies in the field of biotechnology. It also highlights the problems of potential adverse consequences. Last statement of the paragraph clearly mentions about the provision under the law, for compensating users against failure of the newly developed varieties. The correct answer thus is (4). **Ans.(4)**

5. Paragraph two mentions about the consequences of emerging technologies in agriculture. Options (2), (3) and (4) find a mention in the paragraph. Option (1) is not mentioned and is the correct answer. **Ans.(1)**

6. Paragraph one mentions about the debate on Intellectual Property Rights. The argument in the debate was that incentives are necessary to stimulate innovations and TRIPS agreement emerged from the Uruguay Round to provide incentives, in the form of patents, to innovators by way of protecting their intellectual property from unauthorised copying and use. This is highlighted in option (3), hence it is the correct answer. **Ans.(3)**

7. The passage mentions that public institutions are more likely, than private companies, to address the negative consequences of new technologies because public research, is not driven by profit whereas the primary interest of private companies is the sale of seed, chemicals and other outputs produced by them. Moreover, they are not financially strong enough to absorb to the losses in research to correct the deficiencies and recover the lost market. Paragraph three of the passage mentions these points. Thus all the options are mentioned and options (4), a combination of all three, is the suitable answer. **Ans.(4)**

8. Paragraph three of the passage mentions about the various aspects, of public and private sector, that should be considered while developing a strategy. Last sentence clearly mentions that public or quasi-public institutions informed by broader and long-term concerns can only do such work. Option (2), which highlights this, is the correct answer. **Ans.(2)**

9. Option (3) is not stated as a reason for abstractionism losing its vitality. Other options are mentioned in the first paragraph as the reasons due to which abstractionism lost its importance. Option (3) is thus the right answer. **Ans.(3)**

10. It is explicitly mentioned in the last paragraph of the passage. First statement of the last para mentions about abstractionism as an art that points out the loss and absence of a shared language of meaningful signs and symbols in society which can be recreated through awareness. Option (2), which highlights the same, is thus the correct answer. **Ans.(2)**

11. Second paragraph of the passage mentions about the crisis that the abstractionists face. Options (1), (2) and (3) all characterise the crisis faced by abstractionism. Thus option (4), a combination of all the three options, is the most apt choice. **Ans.(4)**

12. The fourth paragraph of the passage mentions that abstractionism was a revolutionary move as it led Indian art towards a phase of self inquiry, a meditative inner reflection where cosmic symbols and non-representational images ruled. Option (2) is thus the correct tick. **Ans.(2)**

13. The third paragraph mentions about the two motives in Indian abstractionism, one revolutionary and the other conservative. The characteristics of the conservative trend is mentioned, in the paragraph, which include options (2), (3) and (4). Option (1) is associated with the revolutionary motive, and is not a characterisation of the conservative trend in Indian abstractionism. Thus, the answer is options (1). **Ans.(1)**

14. Fifth paragraph of the passage mentions about the three major abstractionist idioms in Indian art. The last statement of the paragraph tells that frequent changes were made in the forms, colour and arrangement of the third idiom which suggests that emphasis was give in the arrangement of forms and, this distinguishes it from the other two idioms. Option (3) is thus the correct answer. **Ans.(3)**

15. Fourth paragraph of the passage mentions that Indian abstractionists have been preoccupied with fundamentally metaphysical project of aspiring to the mystical- holy without altogether renouncing the symbolic and kandinsky-klee school was more mystically oriented to the major sources of abstractionist philosophy and practice. Thus the answer is options (1). **Ans.(1)**

16. The last statement of para six mentions that the Indian abstractionists get embarrassed when they find themselves deprived of the imaginative energy to negotiate the union of metaphysics and painterliness. This is highlighted in options (4), and is the correct answer. **Ans.(4)**

17. The first line of the third paragraph mentions about the two approaches based on different magnetic phenomena- the first being 'magneto-resistance' and the other being 'magnetic tunnel-junctions' (which finds a mention in the fifth paragraph of the passage). Thus the correct answer is (2). **Ans.(2)**

18. It is explicitly mentioned in the fourth paragraph that in a conventional memory chip a bit is represented using a 'capacitor' whereas in the NRI's magnetic design i.e. the magneto-resistance based magnetic chip a bit is stored in a magnetic element in the form of a vertical pillar of magnetised material. Thus, the answer is option (3). **Ans.(3)**

19. It is explicitly mentioned in the sixth paragraph, which talks about the Magnetic Tunnel Junction, that tunnelling is easier when the two magnetic layers are polarised in the same direction. Option (1) is thus the correct choice. **Ans.(1)**

20. Seventh paragraph of the passage says that to build a full scale memory chip based on MTJs is not an easy matter. It also mentions about the various difficulties or barriers, to build these full-scale memory chips, with a major difficulty being that of the size and reliability. It explicitly mentions that magnetic memory elements will have to become far smaller and more reliable than current prototypes in order to compete with electronic memory. Option (3) is thus the most apt choice. **Ans.(3)**

21. The correct answer is option (4) and is explicitly mentioned in sixth paragraph. Many of you might confuse your answer with option (1), as paragraph four mentions that, by measuring an element's resistance you can determine its magnetic orientation, and hence whether it is storing a zero or a one. But, keep in mind, this is about GMR approach, you have to be very careful while answering the questions, the question asks you about the MTJs approach, and in this approach it is identified by measuring the current that flows through the sandwich, thus the answer is (4). **Ans.(4)**

22. The line of research, which is trying to build a magnetic chip that is capable of manipulation as well as storing information magnetically is being performed by Dr. Russell Cowburn and Dr. Mark Welland. Thus, the correct answer to the question is (4), none of the above. **Ans.(4)**

SOLUTIONS

23. The second last paragraph of the passage mentions about the research of Dr. Cowburn and Dr. Welland. They demonstrated the working of a logic gate by using a magnetic processor having rows of magnetic dots, each of which could be polarised in one of two direction. The correct answer thus is option (2). **Ans.(2)**

24. The very first paragraph of the passage mentions that 'Electronic memory chips are fast but volatile', option (1) does not agree about the volatile characteristic of electronic memory. It is incorrect as per the passage and thus cannot be inferred. The other options are mention in the first, seventh and fourth paragraph respectively. Thus the answer is (1). **Ans.(1)**

25. Option (3) is the correct answer, The author, in the passage mentions about various new tools that were invented for agriculture at different periods, every time he describes about the invention of a new tool he mentions that the old tool became useless and that led to the invention of the new tool. In the first para he mentions that the iron plow became useless to farm the prairie soil, thus the new plow made of steel was invented. There are a few more examples which highlight that failure of one technique led to the discovery of the other. Thus the correct answer is option (3). **Ans.(3)**

26. The sixth paragraph of the passage clearly mention that traditionally, i.e. before the innovation of new technology called 'bereavement counselling', bereaves were joined by neighbors and kin, they met grief together in lamentation, prayer and song. This is highlighted in option (2). Option (2) is thus the correct answer. **Ans.(2)**

27. The last paragraph of the passage mentions the importance of the community and the human touch. Man being a social animal finds a need of the community. The passage mentions about a technology which tries to replace this human element but at the end it is found that the human element cannot be done away with. Option (3) highlights the same point that professional service cannot make up for loss due to disappearance of community mourners. (3) is thus the correct option. **Ans.(3)**

28. The passage mentions 'bereavement counselling' as an innovative technique which was formed at the great state university to meet the needs of those experiencing the death of a loved one. The counsellor calls the invention a service displaying a diploma and certificate. It is also mentioned that the local clergy will seek technical assistance from her and the people have learned that only the bereavement counsellor knows how to process grief the proper way. All these points highlight that the bereavement counsellor is a formally trained person helping the bereaved, handle grief. Option (4) is thus the correct answer. **Ans.(4)**

29. The first paragraph of the passage mentions that the European pioneers were puzzled by the new environment i.e. a thousand miles of the grass prairie covered with centuries of tangled and matted grasses that seemed untillable. This is highlighted in option (1) and thus the correct answer. **Ans.(1)**

30. In the first paragraph 'desert' is referred to the prairie soil depleted by cultivation of wheat. In the fifth paragraph, 'desert' is referred to reservation in which native Indians were resettled. And the 'desert' in the last paragraph refers to the emptiness in community kinship and relationship. Thus, desert refers to all the options given in the question. Option (4) is thus the correct answer. **Ans.(4)**

31. The eighth paragraph of the passage highlights that the county Board taxes the people to insure access to the technology of bereavement counselling and they feel that to fail to be counselled is to waste their money, and to be denied a benefit, or even a right. Option (1) is thus the correct answer. **Ans.(1)**

32. The author does not claim that people migrated or moved in the communities where the innovative technology of the plow or bereavement counselling were introduced. Nothing related to this is mentioned in the passage. Option (2) is thus the correct answer. All the other options are mentioned or can be inferred from the passage. **Ans.(2)**

33. It is explicitly mentioned in the last statement of seventh paragraph that the notion of property lies at the heart of the Western conceptions of "genius", which is derived from, a Latin word 'gignere' which means 'to beget'. Option (3) is thus the correct answer. **Ans.(3)**

34. 'Exemplify' means 'to show or illustrate by example'. As per the first paragraph of the passage Saussure's conception of language as a communication between addresser and addressee is illustrated by the teaching of North Indian classical music by oral means. The teaching used to be by word of mouth and by direct demonstrations, with no printed material. Option (1) is thus the correct answer. **Ans.(1)**

35. The author in the third paragraph of the passage mentions about the audiocassettes as an 'ugly but beneficial rectangle of plastic' which he carried to England. Some part of his education in North Indian classical music was conducted through there cassettes which stored the various 'talas' and 'ragas' of North Indian classical music. Thus, these cassettes helped him by capturing the transient moment of oral transmission. Options (1) and (3) are very specific, as an audio cassette in not just used for transporting North Indian classical music or storing 'talas' played on the 'tabla', it was just one of the cassettes that was storing 'talas' played upon the tabla, other cassettes might be storing something else. (4) is thus the correct answer. **Ans.(4)**

36. The passage clearly mentions that the teaching of North Indian classical music was only by word of mouth and direct demonstrations, it did not use a printed sheet of noted music. The students were taught through oral means, there was no written material for reference they had to learn and remember everything very carefully. Thus, we can say that it is a testimony of brain's ability to reproduce without the help of written material. Option (3) is, thus, the most appropriate answer. **Ans.(3)**

37. In the North Indian classical tradition, the 'raga' or music was given more importance than the 'guru' or the 'artiste' who invokes it. The performance on a particular instrument or 'raga' was more important than the artiste who composed it. The 'raga', transmitted through oral means, is no one's property whereas in Western classical music, the genius is the originator and owner of his work, The last paragraph of the passage clearly mentions that this led to very different policies of interpretation and valuation to an aesthetic that emphasised performance and invocation over the authority of genius and permanent record. Option (1) is the correct answer. **Ans.(1)**

38. Option (2) cannot be inferred from the notion mentioned in question as paragraph 8 of the passage clearly mentions that the conductor is a custodian and guardian of the property. He is responsible for its originality. Thus, the second part of option (2), that the conductor can modify this music is incorrect and thus cannot be inferred. All the other options can very well be inferred. **Ans.(2)**

39. The sixth paragraph of the passage mentions that attempts have been made to formally codify and notate the North Indian classical music and institutions are set up to educate students in this 'scientific' and 'codified' manner but this style of teaching failed to produce any noteworthy students or performers and the most creative musicians still emerge from where teaching is through oral demonstration. Option (4) is thus the correct answer. **Ans.(4)**

40. The author, in the passage, talks about various differences in the styles and characteristics of North India classical music and Western classical music. The passage specifically conveys that in North Indian classical music the 'raga' is unconfined to a single composer or performer, it is greater than the artiste who invokes it whereas in Western classical music, the originator or the genius remains the father of his work, it is his intellectual property. This point is highlighted in option (2), which is the suitable answer. **Ans.(2)**

41. Links are 1 B where the principle mentioned in 1 is explained in B and C 6 where distance mentioned in the two sentences decides the issue. **Ans.(2)**

42. 'The darkened sheds' in one obviously leads to 'low light conditions' in B. **Ans.(4)**

43. 1D and BAC are obviously links ' the concept of a ....' in 1 is referred to as ' this ....' in D. BA and C explain sequentially the exceptions to the concept. **Ans.(1)**

44. The links are 1 C and ABD. Harsh punishment mentioned in 1 is described in C and ABD sequentially talks about humanities researchers. **Ans.(3)**

45. 1A and D6 are very obvious links. **Ans.(3)**

46. Contemporary and "popular" are obvious and the company would keep its eye but on the "future" only. **Ans.(2)**

47. Only this option meaningfully completes the given sentence. **Ans.(4)**

48. "Decide" in the second blank is very clear. "Make out" could not be an option for the first as the structure of the sentence would then be not very correct. **Ans.(1)**

49. Soaring crime rates is the best fit, as the government is non performing, hence the prices are spiralling. Escalating is the wrong usage hence option (1) is ruled out. **Ans.(3)**

50. Obvious as "manners" cannot go with either "style" or "wealth". Also, "theme" is a simpler substitute for "motif". **Ans.(4)**

51. The link is ' those deemed .... were left to die of ...' in E, 'those fortunate .... survive baby hood .... rigorous military training' in C, 'this consisted ....' in D. B comes first of all as it prepares the reader for the bellicosity of Spartans. **Ans.(1)**

52. CDAE a very obvious sequence talks about photographs of something. Hence B should come first referring to the object being photographed. **Ans.(3)**

53. The connection AEC is obvious from ' ..... to possess the basic information' in A,' ..... that information.....' in E and '..... it .... ' in C. **Ans.(1)**

54. The very obvious clue is that the paragraph has to start with C as it initiates the discussion about costs and parties involved in the theft. 'Both parties' in A follows to refer to C. **Ans.(2)**

55. The links are DB and AC '... is a case' in B obviously refers to the 'strategic problem' in D while 'each must' in C refers to the motorist and pedestrian in A. **Ans.(4)**

56. It is recurring decimal and can be written as $D = 0.a_1a_2$ (a_1a_2 repeating). To convert this to fraction, we shall write it as $a_1a_2/99$. Thus when the number is multiply by 198 we shall necessarily get integer. **Ans.(3)**

57. As can be seen the data does not look to be of a linear equation. Hence we begin from the table and with the second option. Let the equation be $y = a + bx + cx^2$. Putting the values of x and y. $4 = a + b + c$, $8 = a + 2b + 4c$ and $14 = a + 3b + 9c$. Solving these we get $a = 2$, $b = 1$ and $c = 1$. So the equation is $y = 2 + x + x^2$. **Ans.(2)**

58. $a_1 = 1$, $a_2 = 7$, $a_3 = 19$, $a_4 = 43$. The difference between the terms is in series 6, 12, 24, 48, ... i.e. GP, then using the formula of the sum of n terms for a GP,

$a_{100} = a_1 + a\,(r^n - 1)/(r - 1) = 1 + 6(2^{99} - 1)/(2 - 1) = 6 \times 2^{99} - 5$. **Ans.(4)**

59. $1/3 + 1/15 + 1/35 + ... + 1/399$

$= 1/2\,(1 - 1/3) + 1/2(1/3 - 1/5) + 1/2(1/5 - 1/7) + ... 1/2(1/19 - 1/21)$

$= 1/2 - 1/6 + 1/6 - 1/10 + 1/10 - 1/14 ..... 1/38 - 1/42$

$= 1/2 - 1/42 = (21 - 1)/42 = 20/42 = 10/21$. **Ans.(3)**

60. Truck goes 19.5 km/litre @ 50 kmph

Hence it should go 19.5/1.3 km/litre @70 kmph = 15 km/litre. So going at 70 kmph, it shall go a distance of 150 km on 10 litre of fuel. **Ans.(3)**

61. $n = (1 + 2 + 3 + 4 + 5)/5 = 3$. Average of 7 integers is

$k = (1 + 2 + 3 + 4 + 5 + 6 + 7)/7 = 4$, $k = n + 1$. **Ans.(2)**

62. Considering option (1). If $x = 10$, $y = -0.9$,

then $xy = -9 < -2$. So option (1) and (4) can be eliminated.

If $x = 3$, $y = 1$ then $xy = 3 > -2$. So, option (3) is not always true. **Ans.(2)**

63. The white flags will be placed on either odd places or even places. When white flags are placed on odd places, the three remaining places will be placed by two blue and one red flags.

Number of arrangement = (3!/ 2!) + (3! / 2!) = 6.

The possible arrangements are :

1	2	3	4	5	6
W	R	W	B	W	B
W	B	W	R	W	B
W	B	W	B	W	R
R	W	B	W	B	W
B	W	R	W	B	W
B	W	B	W	R	W

Ans.(1)

64. Required number

= (number divisible by 3) – (number divisible by 21)

= 33 – 5 – 17 + 2 = 13. **Ans.(4)**

65. Let the odd positive integers be 1, 3, 5.

Then, (1) implies $xyz^2 = 1 \times 3 \times 25 = 75$ is always odd.

(2) implies $(x - y)^2 z = (-2)^2 \times 5 = 20$ is always even.

(3) implies $(x + y - z)^2 (x + y) = 1 \times 4 = 4$ is always even.

(4) implies $(x - y)(y + z)(x + y - z) = -2 \times 8 \times -1 = 16$

is always even. So (4) is wrong. An absolute sitter, just assume values of x, y, z and get to the answer. **Ans.(4)**

66. The only prime number that can given a zero at the end are 2 and 5. Hence only 1 zero. **Ans.(1)**

67. If the sides of the triangle are a, b, c then $a + b > c$. Given $a + b + c = 14$ then the sides are (4, 4, 6), (5, 5, 4), (6, 5, 3) and (6, 6, 2). Hence four triangles. **Ans.(3)**

68. $N = 1421 \times 1423 \times 1425$. When divided by 12, it shall look like $1421 = 5 \pmod{12}$

$1423 = 7 \pmod{12}$

$1425 = 9 \pmod{12}$

$N = 5 \pmod{12} \times 7 \pmod{12} \times 9 \pmod{12}$

$= 315 \pmod{12} = 3 \pmod{12}$. **Ans.(3)**

69. $(34041 - r)$ & $(32506 - r)$ are perfectly divisible by n. Hence their difference should also be divisible by the same.

$(34041 - r) - (32506 - r) = 1535$. The only possible given option is 307. **Ans.(4)**

70. Take some value of n and then try to get to the answer. The answer is (1) which is even. **Ans.(1)**

71. Total 400 million is for 64.75% of the population. Hence total population is approx 618 million. Let females be F & Males be M. Then $F/M = 0.96$ or $F = 0.96$ M. (in the class below 15) Total population in the range is approx 185 million. Hence number of females is 90.8 million. **Ans.(2)**

72. There are two possible cases. The number 9 comes at the end, or it comes at position 4, 5 or 6. For the first case the number would look like: 635 _ _ _ 9 / 674 _ _ _ 9. In both these cases the blanks can be occupied by any of the available 9 digits (0, 1, 2 .....8). Thus total possible numbers would be $2 \times (9 \times 9 \times 9) = 1458$. For the second case the number 9 can occupy any of the given position 4, 5 or 6 and there shall be an odd number at position 7. Thus the total number of ways shall be $2\,[3(9 \times 9 \times 4)] = 1944$. Hence answer is 3402. **Ans.(3)**

73. By option answer is /(@(A, B), 2). **Ans.(1)**

74. By option answer is /(×(@(/(@(B, A), 2), C), 3), 2). **Ans.(4)**

75. Since square root of real number is also real.

So, for non- zero real numbers (x, y). If $x + y$ is positive then

$(x + y)^{0.5}$ is also positive and if $(x + y)$ is negative then, $(x + y)^{0.5}$ is imaginary and in this case $f(x, y) = (x + y)^2$ is positive real number and $g(x, y) = -(x + y)$ is also positive real number. **Ans.(4)**

76. If both x and y are less then –1,

then $x + y$ is negative and $(x + y)^{1/2}$ will be imaginary.

In this case $f(x) = (x + y)^2$ = a positive value.

$g(x) = -(x + y)$ = a positive value. But $(x + y)^2 > -(x + y)$. **Ans.(1)**

77. For the given set of questions assume any value of x, y, z. And then get the value of the given functions. Then check the options. **Ans.(4)**

78. Take some value of x, y and z and then check with the options. **Ans.(1)**

79. The answer is (2) because the denominator becomes zero. If $x = 1$, $y = 2$, $z = 3$, then

$f(x, y, z) = \min(2, 3, 3) = 2$

$g(x, y, z) = \max(1, 2, 1) = 2$

$h(x, y, z) = \max(2, 3, 3) = 3$

$j(x, y, z) = \min(1, 2, 1) = 1$

$m(x, y, z) = \max(1, 2, 3) = 3$

$n(x, y, z) = \min(1, 2, 3) = 1$

Considering option (2), we get = $\frac{2+3+2+1}{1+3-3-1} = \frac{8}{0}$. **Ans.(2)**

SOLUTIONS

80. 

The robot begins to give material to machine A and then to D, it thus covers 40 m. in the span and takes 4 sec. Also then it returns to the Origin, and takes 4 sec, while covering 40m again. Then when it arrives at the origin, the message of B and C is already there, thus it moves to give the material to them, which takes it in all 6 sec, and it covers in all 30 + 30 = 60m. Hence the answer should is 140m. **Ans.(1)**

81. In this question, once the robot has delivered the material to machine A & D, it shall reach the Origin 2 (nearest), taking 6 seconds, and covering 60m. Then it immediately moves to delivering material to machines C & B, and then finally back to the Origin (nearest). Thus covering a distance of 60m. Hence it covers a distance of 120m. To solve this set, just apply your head and get the desired result. **Ans.(1)**

82. f(x) = f(–x). **Ans.(3)**

83. 3f(x) = 6(f(–x)), 3 × f(1) = 6 × f(–1) implies that 3 × 2 = 6 × 1. **Ans.(4)**

84. f(x) = –f(–x), like f(1) = –f(–1), f(3) = –f(–3), i.e., –1= –(1). **Ans.(2)**

85. At the end of First operation A = 3, B = 0, C = 2. At the end of the second operation the possible set can be, all the liquid of C is emptied into B or drained off, such that now that once again the liquid of A can be transferred to C. Thus A should have in all 1 litre. So only operation possible shall be (2). **Ans.(2)**

86. At the end of the above stated three steps, and three more steps if A has in all 4 liters, then the only possible thing is that B & C have emptied all their contents into A. Thus C shall have 0 liters. Based on simple logic and could have been done directly. **Ans.(3)**

87. $f(2) = \frac{1}{1+2} = \frac{1}{3}$, $f^2(2) = f(f(2)) = f(1/3) = \frac{1}{1+\frac{1}{3}} = \frac{3}{4}$

$f^3(2) = f(f^2(2)) = f(3/4) = \frac{1}{1+\frac{3}{4}} = \frac{4}{7}$,

$f^4(2) = f(f^3(2)) = f(4/7) = \frac{1}{1+\frac{4}{7}} = \frac{7}{11}$

$f^5(2) = 11/18$

Required product = $\frac{1}{3}\times\frac{3}{4}\times\frac{4}{7}\times\frac{7}{11}\times\frac{11}{18} = \frac{1}{18}$. **Ans.(3)**

88. Let r = 2, then $f^{r-1}(-r) = f(-2) = 1 - 2 = -1$

$f^r(-r) = f^2(-2) = f(f(-2)) = f(-1) = 0$

$f^{r+1}(-r) = f^3(-2) = f(f^2(-2)) = f(0) = 1/(1 + 0) = 1$

Required sum = –1 + 0 + 1 = 0. **Ans.(2)**

89. There shall be 8 teams in each group. Each team in a group shall be playing with every other team. Hence total number of matches shall be (7 × 8) / 2 = 28 in one group. Hence in both the groups there shall be 56 matches. This is for the first stage. At the second stage, 4 matches(Round 1) + 2 matches (Round 2) + 1 Match (Round 3) = 7. Hence total number of matches is 63.

Shortcut: Once you know that there shall be 56 matches in the first stage, then only possible answer can be (3). **Ans.(3)**

90. From the following table it is clear that if a team wins 5 games, then also there is no guarantee of its advancement to the next stage, as only 4 teams can go to the next stage.

Note: In the table W → Wins, L → Loose, × → No match

Team	1	2	3	4	5
1	×	W	L	L	W
2	L	×	W	W	L
3	W	L	×	W	L
4	W	L	L	×	W
5	L	W	W	L	×
6	W	W	W	W	W
7	W	W	W	W	W
8	W	W	W	W	W

The above is one of such combination. Since after winning 5 matches too, there is no guarantee to advancement, so the answer must be 6, because no two teams can get 7 points each. **Ans.(2)**

91. The team which gets 1 point at 1st stage would be eliminated because the combination may be 6 points for the team and 2 times each for remaining. **Ans.(1)**

92. As per above. **Ans.(3)**

93. **Ans.(3)**

94. Use concept of modulus. 55 = 1(mod3);

$55^3 = 1^3(\text{mod}3) = 1(\text{mod}3)$

17 = 2(mod3); $17^3 = 2^3(\text{mod}3) = 8(\text{mod}3) = 2\ (\text{mod}3)$, 72 = 0(mod3); 72^3 = 0(mod3).

55 = 4(mod17); $55^3 = 64\ (\text{mod}17) = -4\ (\text{mod}17)$

$17^3 = 0(\text{mod}17)$; $72 = 4(\text{mod}17) \Rightarrow 72^3 = 64\ (\text{mod}17)$

$= -4(\text{mod}17)$

Now, N = (1 + 2 – 0) (mod3) = 3 (mod3) = 0 (mod3)

N = (4 + 0 – 4) (mod17) = 0 (mod17). **Ans.(4)**

95. $|x - y| = 0.2 \Rightarrow x - y = 0.2$ or $y - x = 0.2$

$\Rightarrow x^2 + y^2 - 2xy = 0.04 \Rightarrow -2xy = 0.04 - 0.1$

$\Rightarrow xy = 0.06 / 2 = 0.03$.

Now $(x + y)^2 = x^2 + y^2 + 2xy = 0.1 + 0.06 = 0.16$

$\Rightarrow x + y = 0.4$ and $x - y = 0.2$

$\Rightarrow x = 0.3$ and $y = 0.1 \Rightarrow |x| + |y| = 0.4$. **Ans.(2)**

96. The gradient of the line AD is –1. Co-ordinates of B are (–1, 0), hence equation of BC is y – 0 = –1 (x – 0) i.e. y + x = –1. Directly from basic coordinate geometry. Done in the class, right ? **Ans.(1)**

97. Let the area of sector S_1 be x units. Then the area of the corresponding sectors shall be 2x, 4x, 8x, 16x, 32x & 64x since every successive sector has an area that is twice the previous one. The total area then shall be 127x units. This is 1/8th of the total area of the circle. Total area of the circle will be π. Hence $127x = \pi / 8$ units $\Rightarrow x = \pi/1016$. Hence area of sector S_1 is $\pi/1016$. Therefore the required angle

$= \pi r^2 \theta / 360 = \pi/1016 \Rightarrow \theta = \pi/508$ radian. **Ans.(1)**

98. Initial state

	3	top
	2	
	1	bottom

Table (A)

Move (1) book 3 from table (A) to table (B)

Move (2) book 2 from table (A) to table (B)

Move (3) book 2 & 3 from table (B) to table (A)

Move (4) book 2, 3 & 1 from table (A) to table (B). **Ans.(4)**

99. Solving these equations we get 6 distinct lines. x + y = 1, x + y = –1, x = 1, x = –1, y = 1 and y = –1. Tracing these curves, we get the area common as 3 square units. **Ans.(2)**

SOLUTIONS

100. Using option, if b = 1 then the factors are $(x - a)(x^2 + 1)$. This can not yield 3 real roots. **Ans.(2)**

101. This given condition is possible only when the triangle is equilateral. Also you can try the formula of

Cos A = $(b^2 + c^2 - a^2) / 2bc$. **Ans.(1)**

102. Work backwards. You shall get to the answer. **Ans.(1)**

103. Work backwards from the options. 60 is wrong because then to arrive at a total of 121, the other box will have to weigh 61 kgs which will not obviously be the highest. 64 is wrong too... because then to add upto 121 the other weight will have to be 57 and to make up a total of 120 the next box shall have a weight 63 which obviously makes the maximum possible total as 64 + 63 =127. 62 is the correct answer because the other boxes shall be 59, 54, 58, 56. **Ans.(2)**

104. The possible figure can be: Number of ways of going from A to B can be 3, that of going from B to C can be 5, and finally that of A to C, can be 6. These are the only set of options that can satisfy the given conditions. **Ans.(1)**

105. **Ans.(2)**

106. The frog has to cover minimum four sides of the octagon to reach E. This it can do in only even number of jumps. Now (2n – 1) is odd for any n and as such there is no route in which the frog can reach E in odd number of jumps. Hence $a_{2n-1} = 0$. **Ans.(1)**

107. f(1, 2) = f(0, 3) = 3 + 1 = 4. **Ans.(2)**

108. The answer is 1192. You should have worked backwards to get to the answer. $1 \times 12^3 + 1 \times 12^2 + 9 \times 12^1 + 2 \times 12^0 = 1982$ hence working backwards from the options we see that it is indeed correct. **Ans.(3)**

109. Work backwards from the options. If the cylinder has a capacity of 1200 litre, then the conical vessel shall have a capacity of 700 liters. Once 200 liters have been taken out from the same, the remaining holding of each of them shall be 1000 & 500. **Ans.(4)**

110. Let the length of the field be X m and let the number of fences he get be Y. Then as per the plan if the farmer tries to arrange them at a distance of 6m each, then there shall be 5 short. Also if he tries to place them 8m apart, then the number of fences required shall be perfectly matching the number available. Hence the equations shall look like:

(X / 6) + 1= Y + 5 ; X / 8 + 1 = Y. Solving Y = 16, also the value of X = 120m. **Ans.(4)**

111. Option (3) best supports the claim of exaggerated ratios. Since the claim lacks credibility there would be every possibility to in increase the numerator (as the denominator has to remain fixed) for the ratios to assume exaggerated forms. The sought option serves the purpose. Option (1) could be the next best one. It comes out weak before option (3). Option (2) cannot serve the purpose as the number of children in a class is unalterable. Option (4) has no linkage to the question and is certainly the worst one. **Ans.(3)**

112. Option (2) best supports Szymanski's conclusion. The key component of the passage is its conclusion. In the option sought, mention is made of clubs recruiting. White players at relatively high wages not recruiting black players with low salaries given the same abilities as whites The result was predictable, strength Szymanski's hypothesis. Option (3) comes as the next best but it is not as strong as option (2). Option (4) does not mention the performance outcome of clubs recruiting black players and only the bill aspect is deliberated. Option (1) is the farthest from Szymanski's conclusion. **Ans.(2)**

113 The passage mention of the overcrowding of Italy's jails with the burgeoning occupation of prisoners. The minister was apprehensive of the explosive situation with the snapping of tensions. In option (4), a report of tension erupting in 58 prisons pressed the panic button influenced and the recommendation of the minister. Options (1), (2) and (3) are weak before option (4) in influencing the recommendation of the minister. **Ans.(4)**

114. The author's stand is that the implementation of the offer is doubtful, given the fate of the reports. The search is for that option which goes against the author's reservation. In other words, that option, which suggests most the implementation of the offer to slash the prices of iodised salt and prevent people from consuming non-iodised salt and suffer from the ill effects. Option (3) best fits in. The alternative experimental methods of making iodised salt at reduced priced prices have come out successfully. Option (1), (2) and (4) do not immediately address themselves to the problem and come out weak before (3). **Ans.(3)**

115. Option (2) is the best inference. The physiological defects are wonderfully compensated by other. Rescue devices provided by nature. Deafness has out be come a liability and burden for the remaining 4% of Scandinavian moths. Their natural gift of a larger wingspan and ability to more over have come in handy towards protection from the predators. Option (4) comes next best with option (3) following. Option (1) is the weakest one. **Ans.(2)**

116. Option (1) is the best one. Is would contribute most to the failure of the campaign. The success of a commodity relies heavily on the demand for it. It the commodity happens to be an item of food, the success is unpredictable, since the demand varies unpredictably, as eating habits and rating preferences are not fixed but keep on varying in an irregular and an unpredictably pattern. This is the most uncontrollable factor. Options (2), (3) and (4) are controllable and do not come out strong as option (1) in deciding the outcome of the campaign. **Ans.(1)**

117. The objective of decongesting the traffic by decreasing the cars on the road in the city center was ill served by the measures adopted. Options (1), (2) and (3) all suggest that cars have not decreased. The measures enforced in the 1980's were annulled in the 1990's when the number of cars that was decreased in the 1980's was increased in the 1990's and further. Hence (1), (2) and (3) best support the claim that the measures enforced did not meet with the desired success. However, option (4), a combination of (1), (2) and (3) is the best one. **Ans.(4)**

118. The passage states of the role of the Central Bank turning out to be subordinate and advisory and that the final say rests with the central government, without whose coordination monetary policy, cannot be pursued. However, it will not be incorrect to infer that central government can go ahead with policies despite the central bank expressing grave reservation. This is best brought by option (2). Options (1) and (3) are not strong before option (2), as coordination central government is not required in the pursuit of such measures and independence of the central bank is in place. Option (4) is the farthest to support the conclusion. **Ans.(2)**

119. The best summary of the passage is brought out by this option as the use of the umbrella had an effect on the subjects under rule. Other option (1), (2) and (3) are not wholly complete in giving the summary. **Ans.(4)**

120. The 'game' apart from deciding the winners and the losers, emphasizes on the element of strategy working. 'Checkmating' preempting and making moves anticipating in advance those of the opponent are all constituents of the 'game'. Hence (3) best fits into the mould and frame of a 'game'. Other options (1), (2) and (4) come out weak when putted against (3). **Ans.(3)**

121. From the given information we get the following sequence of houses : Blue, Green, Yellow, Red. Since Z lives in a yellow house and X doesn't live adjacent to Z, X must live in a blue house. **Ans.(1)**

122. Using the data given above we get optimum combination as: 1 Management book + 2 Maths books + 5 Physics book + 2 Fiction books, i.e., 10 books making 22 points. **Ans.(3)**

123. From the given information we get the following table :

Name	U	T	P	M	X
Colour liked	Red, Blue	Black	Blue, Red	Yellow, ...	
Stays in				Palace	Hotel

Since the person living in a place does not like black or blue, that person can not be U, T or P. So the person who lives in a palace will be either M or X. But X lives in a hotel. Hence M must live in a palace. **Ans.(2)**

124.

Name	Mohan	Jack	Rita	Shalini	Suman
Animals	Lion & Panther	Bear & Panther	Deer & Bison	Lion & Bear	Deer & Bison
Cage	X	Y	Z	Q	P

The data for Mohan & Jack can be filled directly, similarly X, Y, Z directly from data given. The key after filling in these animals is that Z and P have the same pair of animals, the only pair is deer & bison. Since suman doesn't attend lion. Shalini must attend the lion. **Ans.(3)**

125. By trial & error we can make different combinations and find the cost, like 20kg × 2 +10kg × 4, the cost would be Rs.180. The minimum cost comes in the case of 10kg × 8 i.e. Rs.160. **Ans.(2)**

SOLUTIONS

126. For 1996-97 total export = 1083 + 286 + 14 = 1383.

Hence export percentage = (1383 / 3807) × 100 = 36%.

For year 1997-98, total export = 1750 + 201 + 19 = 1970 million dollars.

Hence export percentage = $\frac{1970}{5031}\times 100 = 39.15\%$

For year 1998-1999, export percentage = $\frac{2672}{6052}\times 100 = 44\%$

For year 1994-95, export percentage = $\frac{668}{2041} = 32.7\%$. **Ans.(2)**

127. Find the difference between total IT Business for subsequent year. So, value of year 1995-96 - value of year

1994-95 = 2886 – 2041 = 845 million dollars.

Now we have to find 845 is what percentage of 2041. Which comes to 41%. Similarly for 1996-97 it is 32%, for 1997-98 is 32% and for 1998-99 it is 20%. **Ans.(1)**

128. Total IT business in training during 1994-99

= 107 + 143 + 185 + 263 + 302 = 1000 million dollars.

Total IT business in maintenance during 1994-99

142 + 172 + 182 + 221 + 236 = 953 million dollar. **Ans.(3)**

129. Add Export and Import of Hardware for each year. Thus answer can be easily deduced. **Ans.(4)**

130. Add Export and Import of Hardware as well as Peripheral. Thus the answer can be easily deduced. **Ans.(4)**

131. From statement (A), X > Y or X > Z or X > Y and Z.

This statement alone is not sufficient.

From statement (B), Y > X or Y > Z or Y > X and Z.

This statement alone is not sufficient.

Using both statement together we get. If x > Y, then Y > Z and if Y > X then X > Z. In both cases Z is smallest. **Ans.(3)**

132. From statement (A), X (X + 3) < 0

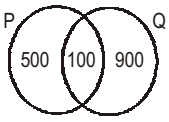
$\Rightarrow$ X < 0 and X + 3 > 0 $\Rightarrow$ X > – 3 $\Rightarrow$ |X| < 3.

So, statement (A) alone is sufficient. From statement (B),

X(X – 3) > 0 $\Rightarrow$ X > 0 and X > 3 or X < 0 and X – 3 < 0

This statement does not give a unique answer. **Ans.(1)**

133. The Venn diagram arrived at from both (A) and (B) clearly indicates that 500 people are watching programme P. **Ans.(3)**



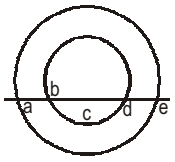
134. Neither statement (A) nor statement (B) alone is sufficient. But combined statements (A) and (B) are sufficient to get the answer. **Ans.(3)**

135. Statement (A) implies that profit is 2.92%. The cost of buying the shares for Harshad is CP + 0.01 CP = 1.01 CP. The cost of selling is SP – 0.01 SP = 0.99 SP. The difference of the two is profit i.e., 0.99 SP – 1.01 CP = 0.99 × 1.05 CP – 1.01 CP = 0.0295 CP. Hence profit 2.92%. **Ans.(1)**

136. We can not work the questions individually through (A) or (B). But combining the two statements, we get (2 $\oplus$ 0) = (0 $\oplus$ 2) = 0 and 0 $\oplus$ (–5 $\oplus$ –6) = 0. **Ans.(3)**

137. Both the statement combined also do not tell us if they are intersecting or not. The two lines can be parallel also depending on the values of a, b, d, e. **Ans.(4)**

138. You can see from the following diagram that both statement individually imply towards c being the mid point of bd. The ratio of ac/ce will be one by using any statement. **Ans.(2)**



139. Here by combining the two statements we get the duration of the flight. For the arrival time we should have information regarding the time zone difference of Mumbai and Nomansland. **Ans.(4)**

140. Statement (A) implies X – Y = 6 Statement (B) implies XY is divisible by 6. You can see that many values of X and Y can satisfy (A) & (B). **Ans.(4)**

141. Total number of employees = 60 × 100 = 6000. Now 64.6% of 6000 = 3876 working in Wholly private factories. But the number of private factories is 90.3 Hence 3876 / 90.3 = 43. **Ans.(1)**

142. Value added / employment

For Central government.

= 14.1 / 10.5 = 1.34, for Central & states / local government.

= 1.8 / 1 = 1.8,

For Joint sector

= 8.1 / 5.1 = 1.5 and for Wholly private = 58.7 / 64.6 = 0.9. **Ans.(2)**

143. First find the compound productivity of all the sectors i.e. Gross output / Fixed capital Hence compound productivity of Public sector = 0.6, Central Government. = 0.725, States / local = 0.47, Central Government. & states / local = 1.07, Joint sector = 1.23 and Wholly private = 1.36. So we can easily get the answer. **Ans.(2)**

144. First find out all values of (value added / employment) And value added upon Fixed Capital. Hence for Wholly private the respective values are 0.9, 1.25 and for Joint sector it is 1.59, 1.19 and for Central government. and states / local, it is 1.8, 1.28 and for others the values are 0.92, 0.75. **Ans.(3)**

145. Since no. of firms in Joint sector is 2700. Total number of units becomes 150000. Hence number of Central government factories are 1% of 150000 = 1500. Total value added is 14.1% of 140000 crores = 19740. Now 19740 / 1500 = 13.16. **Ans.(4)**

146. Required change for India = $\frac{1.71-0.72}{1.72}\times 100 = 57.56\%$

Required change for China = $\frac{5.96-4.8}{5.96}\times 100 = 19.46\%$

Required change for Malaysia = $\frac{10.67-9.92}{10.67}\times 100 = 7.02\%$.

Required change for Thailand = $\frac{5.82-5.09}{5.09}\times 100 = 14.3\%$ **Ans.(1)**

147. Since the absolute values are not given.... hence none of the above. **Ans.(4)**

148. GDP of China in 1998 (G_{C2}) = 1.07 × GDP of China in 1997 (G_{C1})

GDP of India in 1998 (G_{I2}) = 1.02 × GDP of India in 1997 (G_{I1})

GDP of South Korea in 1998 (G_{S2}) = 0.95 × GDP of South Korea in 1997 (G_{S1})

For 1997 $\frac{F_{C1}}{G_{C1}} = 5.96$ and for 1998, $\frac{F_{C2}}{G_{C2}} = 4.8$

$F_{C1} = 5.96 \times G_{C1}$.

$F_{C2} = 4.8 \times G_{C2} = 4.8 \times 1.07 \times G_{C1} = 5.136\ G_{C1}$.

$F_{C1} > F_{C2}$. So, statement (I) is false. So options (1) and (3) can be eliminated. Statement (II) is correct.

For 1998 $\frac{F_{I2}}{G_{I2}} = 0.72 \Rightarrow F_{I2} = 0.72 \times G_{I2} = 0.72 \times 1.02 \times G_{I1} = 0.73 G_{I1}$

For 1997 $\frac{F_{I1}}{G_{I1}} = 1.71 \Rightarrow F_{I1} = 1.71 \times G_{I1}$.

$F_{I1} > F_{I2}$. So, statement (III) is false. Hence option (2) can be ruled out. **Ans.(4)**

149. Let x be the Foreign Equity inflow of India. Hence China's Foreign Equity inflows is 10x. Now in 1998 FEI in India was 0.72, therefore 0.72 = x / GDP of India Similarly FEI in China in 1998 was 4.8, therefore 4.8 = 10x / GDP of China. Hence (GDP of China / GDP of India) = (10 × 0.72) / 4.8 = 1.5. Thus China's GDP is 50% higher than that of India. **Ans.(3)**

150. Growth rate of deficit intensity in year 1994-1995

$$= \frac{(13.8-7.5)-(12.4-7.3)}{12.4-7.3} = \frac{1.2}{5.1} = 0.23 = 23\%$$

in year 1995-1996 = $\frac{(15.5-7.9)-(13.8-7.5)}{13.8-7.5} = \frac{1.3}{6.3} = 0.20 = 20\%$

in year 1996-1997 = $\frac{(16.2-8.2)-(15.5-7.9)}{15.5-7.9} = \frac{0.4}{7.6} = 0.052 = 5.2\%$

in year 1997-1998 = $\frac{(14.2-9.2)-(16.2-8.2)}{(16.2-8.2)} = -0.375 = -37.5\%$ **Ans.(1)**

151. As per solution in Q.150. Highest growth rate of deficit intensity = 23%. **Ans.(4)**

152. From the table given :

Import of Raw Material = 10.1 × Sales (S)

Import of Cap. Goods = 17.6 × Gross

fixed assets (GFA)

Given Imports = Raw Materials + Capital Goods

So, Imports = 10.1 S + 17.6 GFA.

Again So Imports = 14.2 S

Hence 14.2 S = 10.1 S + 17.6 GFA

Hence S / GFA = 17.6 / 4.1 = 4.3. **Ans.(2)**

153. Clear from the table. **Ans.(4)**

154. Clear from the graph. **Ans.(3)**

155. First find out the growth in 1990 of the all the four sectors. So Manufacturing 9 % of 20 = 1.8. Hence 20 + 1.8 = 21.8. Similarly for Mining and Quarrying it is 15.6 For Electrical it is 10.85 and for Chemical it is 16.2 Now in 1991 there is –1% negative growth in manufacturing. So 1% of 21.8 becomes 0.218 Thus 21.8 – 0.218 = 21.582. Similarly for Mining and Quarrying it is 15.44. For Electrical it is 11.826 and for Chemical it is 16.36. Now we add the figures for 1991 of all the sectors that comes to 21.582 + 15.44 + 11.826 + 16.36 = 65.208. Now 65.208 – 60 = 5.208 that comes to approximately 1% growth rate. **Ans.(2)**

156. **Ans.(1)**

157. In 1990 there is 4% growth. Hence 4% of 15 = 0.6. So weightage in 1990 becomes 15.6 Similarly in 1991 becomes 15.44, in 1992 it is 15.6, in 1993 it is 14.97, in 1994 it is 16.16 Hence it can been seen that the lowest level of production was in 1993. **Ans.(2)**

158. Find out the weightage for all the sectors for the year 1994 for Manufacturing it is 25.54, for Mining and Quarrying it is 16, for Electrical it is comes out 14.5 and Chemical is 19.5. The total comes to approximately = 77. In 1989 it was 60. Hence 77 – 60 = 17 which is approximately 25 percent increase. **Ans.(1)**

159. Since the index of total industrial production in 1994 is 50 percent more than in 1989 that is it becomes 150. Now total weightage for Manufacturing, Mining and Quarrying, Electrical and Chemical in 1994 is approximately 77. So 150 – 77 = 73.

In 1989 it was 100 – 60 = 40. So 73 – 40 = 33, which is approximately 87.5%. **Ans.(2)**

160. Total monthly costs = Fixed Cost + Variable Cost

= (800 + 1200) + 3600 = Rs. 5600

$\therefore$ Average unit cost = 5600 / 40 = 140.0 140 (approx.). **Ans.(3)**

161. Total cost for 40 units = Rs. 5600 (approx.)

Total cost for 41 units = Rs. 5700 (approx.)

Required change = Rs. 100(approx.). **Ans.(1)**

162. It is clear from the graph. **Ans.(4)**

163. Total selling price = 150 × 40 = Rs. 6000

Profit = 6000 – 5600 = Rs.400. **Ans.(3)**

164. On checking with options, we get for 30 units.

Profit is highest = Rs. 1500. **Ans.(1)**

165. It is clear from the graph. **Ans.(4)**

Objective Key

1.(2)	2.(1)	3.(3)	4.(4)	5.(1)	6.(3)	7.(4)	8.(2)	9.(3)	10.(2)
11.(4)	12.(2)	13.(1)	14.(3)	15.(1)	16.(4)	17.(2)	18.(3)	19.(1)	20.(3)
21.(4)	22.(4)	23.(2)	24.(1)	25.(3)	26.(2)	27.(3)	28.(4)	29.(1)	30.(4)
31.(1)	32.(2)	33.(3)	34.(1)	35.(4)	36.(3)	37.(1)	38.(2)	39.(4)	40.(2)
41.(2)	42.(4)	43.(1)	44.(3)	45.(3)	46.(2)	47.(4)	48.(1)	49.(3)	50.(4)
51.(1)	52.(3)	53.(1)	54.(2)	55.(4)	56.(3)	57.(2)	58.(4)	59.(3)	60.(3)
61.(2)	62.(2)	63.(1)	64.(4)	65.(4)	66.(1)	67.(3)	68.(3)	69.(4)	70.(1)
71.(2)	72.(3)	73.(1)	74.(4)	75.(4)	76.(1)	77.(4)	78.(1)	79.(2)	80.(1)
81.(1)	82.(3)	83.(4)	84.(2)	85.(2)	86.(3)	87.(3)	88.(2)	89.(3)	90.(2)
91.(1)	92.(3)	93.(3)	94.(4)	95.(2)	96.(1)	97.(1)	98.(4)	99.(2)	100.(2)
101.(1)	102.(1)	103.(2)	104.(1)	105.(2)	106.(1)	107.(2)	108.(3)	109.(4)	110.(4)
111.(3)	112.(2)	113.(4)	114.(3)	115.(2)	116.(1)	117.(4)	118.(2)	119.(4)	120.(3)
121.(1)	122.(3)	123.(2)	124.(3)	125.(2)	126.(2)	127.(1)	128.(3)	129.(4)	130.(4)
131.(3)	132.(1)	133.(3)	134.(3)	135.(1)	136.(3)	137.(4)	138.(2)	139.(4)	140.(4)
141.(1)	142.(2)	143.(2)	144.(3)	145.(4)	146.(1)	147.(4)	148.(4)	149.(3)	150.(1)
151.(4)	152.(2)	153.(4)	154.(3)	155.(2)	156.(1)	157.(2)	158.(1)	159.(2)	160.(3)
161.(1)	162.(4)	163.(3)	164.(1)	165.(4)					